PRICES
AND
INCOMES
COMMISSION

John G. Cragg

Wage Changes and Labor Flows in Canada

wage changes and labor flows in canada

by

John G. Cragg

University of British Columbia
Vancouver

«This is one of a series of studies prepared for the Prices and Incomes Commission. The analyses and conclusions of these studies are those of the authors themselves and do not necessarily reflect the view of the Commission».

Available by mail from Information Canada, Ottawa,
and at the following Information Canada bookshops:

HALIFAX
1683 Barrington Street

MONTREAL
640 St. Catherine Street West

OTTAWA
171 Slater Street

TORONTO
221 Yonge Street

WINNIPEG
393 Portage Avenue

VANCOUVER
800 Granville Street

or through your bookseller

Price: $5.00 Catalogue No. RG 33-18/1973

Price subject to change without notice

Information Canada
Ottawa, 1973

CONTENTS

Chapter		Page

TABLES

chapter one

PURPOSES AND PROCEDURES

Outline

How wages are set and how they change are subjects which have commanded a great deal of attention recently. Much of this interest has arisen in connection with the study of inflation for the belief is widespread that the mechanisms at work in the labor market are such that many of the most important adjustments to excess demand occur in labor markets. At the same time, it is often felt that the labor market serves as a major driving force behind the transmission and perpetuation of inflation. However, comparatively little attention has been focussed on the role which wage changes themselves play in the economic system.

Phillips curve studies are directed mainly at the relationship going from the unemployment rate to changes in wages or earnings. Investigations using Canada data[1] suggest that there is such a relationship, though it is established a good deal less firmly than one might want.[2] An apparently related question, but one which is quite distinct for most

---

[1] Cf. eg. Kaliski (1964), Vanderkamp (1966) and Bodkin, Bond Reuber and Robinson (1967). References are to works included in the bibliography.

[2] Cf. Cragg (1971b) and Taylor, Turnovsky and Wilson (1973).

purposes, concerns whether larger rates of increase of money wages, or increases in money wages which are larger than expected, produce or permit lower unemployment rates. This question has received much less attention than the Phillips curve, especially at the aggregate level.

Both these questions are of importance to the study of inflation, but it can be argued that it is the second rather than the first which is more important and certainly it seems to have received much less empirical attention.[3] Thus the question to which much of our attention is directed is whether rising money wages help to achieve low unemployment rates and how they do so. Clearly, if they do, then there is a sense in which wage inflation can be used to "buy" lower unemployment. This is not to preclude the possibility that low unemployment rates produce higher rates of increase of money wages (which is the Phillips curve question) but instead involves the question of whether these wage increases then help to maintain or to lower still further the unemployment rate. It is, however, possible that the Phillips curve relationship holds without its having much of anything to do with the attainment of low unemployment rates. If this were the case, the suppression of the wage-change effect would not affect unemployment, at least not directly.

The distinction between the two questions becomes particularly crucial when one contemplates devices to suppress inflation or the change in wages, such as incomes policy. In particular, whether such suppression renders difficult or impossible the maintenance of low unemployment depends on whether the wage changes affect unemployment, not on whether unemployment tends to affect wage changes. Stated crudely, if only the latter effect were present, a good case could be made that the inflation represents a weakness in the existing mechanism for setting wages and prices which is preventing adequate utilization of resources and that any costs of direct intervention can be set against the costs of this underutilization of resources (given that wage and price stability are to be achieved). If both effects occurred, it might not be possible to have both an effective incomes policy and low unemployment rates and something would have

---

[3] It is worth noting that Fisher (1926) has the simple Phillips curve "run backwards".

to "give".

It is hardly a surprise that this study does not succeed in dealing with these questions either fully or adequately. They are, in the last analysis, empirical questions and it is doubtful whether a fully satisfactory resolution of the issues is possible with the data available for the Canadian economy. Furthermore, many theoretical problems remain unsolved so that even if the data were fully adequate, the guidance in specification needed for a clear resolution of issues is lacking.

At best then the results of this study are suggestive and in many cases they indicate all too clearly the need for further research. Furthermore, many of the relationships investigated are clearly only associative, indicating simply what sorts of interrelationships are present in the data with no very firm account of why they should occur. In the same connection, parts of the empirical work are clearly incomplete. This is partly because the time-constraints involved when research is conducted for an organization with a finite life do not always correspond to those that turn out to be appropriate for the research, especially when the author is engaged in other tasks. Even more so, however, it seemed likely that diminishing returns were setting in and that the major findings would not be substantially improved by fully exploring all possibilities in comparable fashion.

The basic plan of the study is as follows. Chapter two raises various theoretical issues concerning the operation of labor markets and the role of money wages in them. This draws heavily on a good deal of recent literature surrounding the Phillips curve. The Phillips curve itself, taken in the wide sense, is a possibility of the model, though it does not emerge as an established implication of the theory. What does emerge is the implication that ceteris paribus, an increase in money wages above those expected will produce or maintain low unemployment rates. An unfortunate danger produced by the existence of this relationship is that there may be a quasi-identification problem involved in studies of the Phillips curve; that is, the association in variation found between wage changes and unemployment may stem from this effect of wages on unemployment rather than, or as well as, from the effect which unemployment rates have on wages.

The theoretical considerations provide some basis for the approach taken in some of the later parts of the study. They are, however, partly a digression for it is a very long way from the theory to the empirical work. Problems of specification, aggregation and inappropriate data arise which produce severe econometric problems. The nature of these problems, the data used and the specifications adopted are outlined in chapter three. It may be noted that the subsequent empirical work is carried out at a very high level of aggregation, the total economy, the industrial composite or the major industrial divisions in most cases; and this, of course, limits the range of questions which can be investigated. It may also be noted that the difficulties discussed in chapter three are such that in a sense the study might have ended there. They provide the reason why the empirical work must be regarded as being associative rather than as constituting adequate tests of theory.

One severe problem in dealing with Canadian data is seasonality, which contributes much of the variance and covariance which exist in the data. The nature of the seasonality is given some explicit consideration in chapter four. One suspects that it may be one of the main obstacles to developing a coherent understanding of the Canadian economy, but the work in chapter four does not begin to provide an adequate resolution of these difficulties.

Chapter five investigates the structures of unemployment and labor-force participation, the extent of agreement among the various series for employment, the relationship of unemployment to vacancies, and the comparative structure of various series for employment. It serves as a preliminary to later work by investigating relationships which are largely separate from those suggested by the theoretical work.

The key empirical work is reported in chapters six through nine. The first is concerned with investigations for the industrial composite of hirings, separations, placements and employment change. Much of the specification analysis done for the study used the industrial composite with these variables. Chapter seven then extends the models developed to the major divisions or industrial sectors for which data are available. Chapter eight instead, looks at movements into and out of employment, unemployment and the labor force, and examines directly the connections between unemployment, labor force participation and wages. Finally, chapter nine looks at wage changes both from the points of view developed in earlier chapters and from the usual Phillips curve specification. The final chapter attempts to integrate the various findings which are made in the course of the study and summarizes the conclusions and their implications.

Acknowledgements

This study was done while the author was on the staff of the the Prices and Incomes Commission, and it could not have been carried out without the assistance, stimulus and facilities provided by the Commission. The help of a wide variety of the staff of the Commission is very gratefully acknowledged. In particular, the very able assistance rendered by Mr. Hugh Young, Mrs. Jennifer Whybrow, Mr. Michael Whybrow and Mr. Charles Wiseman was crucial for the empirical work. The resourcefulness and meticulous work performed by Mr. J.B. Calouri in arranging for and supervising the gathering of data was invaluable and prevented many serious errors being made. Comments by Professor G.C. Archibald and Professor B.L. Scarfe materially improved parts of the study. The patience and competence of Mrs. Carmen Mohr and Miss Julia Trahearne in turning hen-scratchings into typescript are also very gratefully acknowledged.

Needless to say, all errors and failures both of commission or omission are solely those of the author. While he may hope that this work has influenced the Prices and Incomes Commission, it should be stressed that all views expressed are those of the author and cannot be taken to reflect or represent those of the Commission.

chapter two

THE WORKINGS OF LABOR MARKETS

Introduction

Any account of the adjustment of money wages to economic conditions or of employment to wages must rest on some account of the processes at work in the labor market. Such an account is particularly necessary because the labor market is not an organized one[1] and because, in most segments, the short-run operation of labor markets is bound to be fairly imperfect.

The typical pattern in labor markets is that individuals have to seek work and often employers have to search for people. These activities take place in an environment where individuals are uncertain about the jobs available and their rates of remuneration and where it takes time and effort to improve knowledge. These circumstances make it quite possible for workers or employers to act on the basis of misconceptions about what typical wage rates and opportunities are, and for such behavior to affect actual wage determination and employment.

---

[1] As Phelps (1968) has remarked, an account such as the excess-demand hypothesis itself requires an explanation and does not constitute a self-sufficient theory.

It is argued in this chapter that these features color the short-term workings of the labor market and have a definite effect on its operation. This is quite apart from imperfections that may be introduced by unionization or by the oligopsonistic powers of large employers. Instead, it is argued, the effects imparted by uncertainty may make the general behavior of wages in unionized and non-unionized segments of the economy be qualitatively quite similar.

Concentration on labor-market features in describing aggregate wage behavior is not new. It may be found, in various forms and extents, in Hicks (1948), Bowen (1960), Stigler (1962), Oi (1964), Holt and David (1966), Phelps (1968), Behman (1969), Holt (1969), Phelps (1969), and Mortenson (1971) as well as in papers in Phelps et al (1970), to mention only a few.[2] Strands from these earlier accounts are woven into the pattern outlined in this chapter, which relies very heavily on these earlier studies, especially Mortenson (1971), and Holt (1970).

The general structure of the model is as follows. Since workers are uncertain about their alternative opportunities, they are assumed to form estimates of their prospects of finding jobs and of their opportunity costs which are regarded here simply to be the wages[3] involved. This latter estimate we term the "going wage". It is a centrality parameter, such as the mean, of the distribution of wages which might be offered. The worker then sets a minimum acceptable wage in relation to the perceived value of the going wage and of conditions perceived to prevail with respect to the ease of finding jobs. Taken together with the perception about the state of the labor market and the going wage, this decision determines whether an employed worker quits and the subjective probability of being hired for those looking for a job. Aggregated together, these factors give the separation rate and what might be termed the intended hiring rate and intended unemployment rate, with "intended" indicating the aggregate implications of the individual expectations and decisions rather than the values "desired" by anyone. The actual hiring rate and unemployment rate depend not only on these perceptions and

---

[2] These contributions are ably reviewed in Phelps (1969).

[3] Unless otherwise qualified, wages in this study refer to money wages and not real wages.

decisions but on the actual conditions prevailing in labor markets with respect to unemployment, the ease of finding jobs and the wages actually being paid. In particular, wages higher than expected will result in unemployment rates lower than intended.

The basic structure of the model relies on behavior by people within the labor force and it is for that reason that money wages rather than real wages are considered to be relevant. Changes in labor-force participation should depend on real wages, but it is argued that these effects are likely to be swamped by other ones and that the effect is likely to be changing with time. It is also argued that for much labor-force participation money wages rather than real wages may still be a closer simple approximation to the relevant variable.

Employers as well as workers confront an uncertain market. Firms are faced with problems of retaining and attracting workers. Wages and the demand for labor are set in terms of perceptions about conditions in the labor market and the level of output being produced. In the model employers set hiring standards or the ease of finding jobs for those who are seeking work and the rate of involuntary separations. They, possibly in conjunction with a union, set the wages being offered. The interplay of these decisions with those being taken by workers determines the outcome in terms of employment and unemployment. The model has the possibility of a Phillips curve, though it is of a rather different nature from the usually specified curve, but whether there is one remains an empirical matter. If wages do rise, however, unemployment will be lower than otherwise unless the rise in wages is offset by decisions on hiring standards or rates of involuntary separations, or the rise is immediately reflected in perceptions about the going wage.

Labor markets are only a part of the economic system. We focus attention on them in isolation, but it should be emphasized that the variables on which we concentrate have repercussions on others which in turn feed back upon the labor market. The areas which we ignore are particularly the determinants of output and investment. The story told here is partial and incomplete, the attempt being to get a better fix on labor markets rather than to give a full account of the process. In doing this, we concentrate on some simplified -- possibly over-simplified -- aspects of the market and heuristic relationships. The simplifications extend not only to other variables and decisions not directly concerned with the labor market, but also to complications and difficulties arising from the fact that production and employment are processes in which current actions affect both the immediate and the more distant future.

Labor Decisions[4]

A person who is in the labor force is regarded as having two main types of decisions he may take. First, if he has a job, he may quit it or continue in it. Second, if he is offered a job, he may accept or reject it. These decisions are similar in the sense that the decision to continue in a job is analogous to that of accepting one. A different set of decisions, on whether or not to be in the labor force, is in some ways similar to these choices and will be examined briefly in the fourth section.

The labor market typically involves the need to search for positions. Each job has a set of specific characteristics attached to it. Time and effort are involved in finding potential employers and it is quite possible that a person will not be offered some jobs for which he is qualified. It is then not feasible for a person simply to survey all potential jobs and to pick the one most suitable to him. Indeed, the number of job offers he can accumulate before he makes up his mind is likely to be even more constrained, for employers are likely to want quick reaction so that they can offer the job to someone else if it is not going to be taken. Finally, it is usually not possible for the job seeker to make very substantial adjustments to the terms and conditions of a particular job being considered. Instead, a possible employee's choice at any one time may concern whether or not he should accept a particular position -- or remain in one which he already has -- and we shall treat it in this fashion.

Suppose that the worker regards the terms of different potential job offers as being independent, given his perceptions of the state of the labor market. These perceptions concern the distribution of wages he might be paid and the ease of finding a job in the sense of the probability of

---

4 Parts of the development in this section are very similar to Mortenson (1971).

being offered one which he investigates. Suppose also that the wage rate, w, is the only variable of interest and that the wage rate is regarded as a random variable the position of whose subjective distribution depends on the worker's perception of the wages being paid generally. This information is supposed to be summarized in the going wage, w*, which is a centrality parameter such as the mean, median, or mode of the worker's subjective probability distribution of wages. The probability of a job, which might be offered, paying a wage less than some particular value, w_o, designated by $P(w_o)$, is then thought to be given by

$$P(w_o) = \int_{-\infty}^{w_o} f(w,w^*)dw. \qquad (2.1).$$

We assume that

$$\partial P(w_o)/\partial w^* \leq 0 \qquad (2.2)$$

for all values of w_o; that is, the probability of receiving a wage less than any specific value decreases as w* increases.[5]

The uncertainty about wages expressed in (2.1) arises for two reasons. First, the worker may be eligible for several types of job, paying typically different rates and he is not sure which ones he can get. Second, not all employers pay the same rate for the same job; or, if they do, the worker may not know it, or be certain about what that rate actually is.

Suppose that a person has found a job. Presumably he will accept it -- or keep it if he is already working in it -- if he judges the wage to be acceptable.[6] We let w_m be the minimum acceptable wage[7] in the sense that the worker will accept the job if $w \geq w_m$ and will turn it down (or quit) if $w < w_m$. However, before a worker can accept or reject a job, he has

---

[5] The inequality is presumed not to be strict only because of possible ranges of w which would not conceivably be offered.

[6] We are simply ignoring all the other features of jobs which make them more or less attractive.

[7] This appears to be what Holt (1970) calls the aspiration level, though it does not necessarily vary in the ways Holt describes.

to find it, and we do not presume that this is a sure-fire endeavor. If he searches for a job, the probability, p, that he will find an acceptable one within some reasonably short period of time[8] depends on three things. The first is the number of potential jobs that can be investigated which is presumed to be limited and a great deal smaller than the total number of potential jobs because the investigation takes not negligible amounts of time. The second is the probability that any one will be offered at all when it is investigated, p(e). It is not unity because information about who has jobs available may not be correct, either because the qualifications of the worker, rightly or wrongly, are not considered by the employer to be suitable for the job or because the job has already been given to someone else and so is not actually available or because there was not actually a job to be had in the first place. The third thing is the probability that the wage will be acceptable, which is given by

$$1 - p(w_m) = \int_{w_m}^{\infty} f(w,w^*)dw \qquad (2.3).$$

For a given distribution, this probability depends on the value of w_m selected by the worker. The probability that any one job investigated will be offered and accepted, assuming independence between these quantities, is

$[p(e) \int_{w_m}^{\infty} f(w,w^*)dw]$. Unity minus this quantity is, of course, the probability of the particular investigation not producing a job. Considering the jobs searched to be chosen at random and the probabilities to remain the same so that the binomial distribution applies, the probability, p, that a job will be found is given by unity minus the

---

[8] The length of the time period is essentially arbitrary. Implicitly it is defined as the period before a job, which is found within the period, is expected to begin and is likely to be either a day or a week. Such problems could be avoided by using continuous time, but this introduces conceptual complications also and it is less easy to bring out the elements of involuntary unemployment that are incorporated in the framework. To the level pursued here, the differences in possible treatment appear to make no differences to conclusions to be drawn.

probability that all n investigations are unfruitful or

$$p = 1 - [1 - p(e) \int_{w_m}^{\infty} f(w,w^*)dw]^n \qquad (2.4).$$

It will be noted that the probability of finding a job goes up with n and with p(e) and goes down with w_m. From assumption (2.2) it rises with w*. n reflects conditions which affect the possibility of investigating jobs. It presumably depends not only on institutional factors but also on how many employers are seeking workers and on how many other people are looking for work in relation to the employers' efforts which will affect the length of time spent waiting to complete the investigation of a particular job. Similarly, p(e) will presumably depend on how many jobs an employer has available and how many other people are looking for work. From the worker's point of view, these are parameters of the market at any time, though he may well be uncertain about their values. For purposes of his decisions it is his perceived values of n and p(e) that are relevant. If we presume that the distribution of wages can be expressed in actuality in a fashion similar to (2.1) with some actual centrality parameter reflecting wages actually available, the true probability will depend on the actual parameters and may be different from the perceived probability.

Even if the worker will accept any job that is offered, so that the integral in (2.3) is unity, he may not find a job. This might be regarded as "involuntary" unemployment while failure to accept a job because the offer is less than w_m would be "voluntary". It is, of course, quite possible that a particular person is unemployed for both reasons and it is implicit in the formulation that the possibility is being contemplated. That is, an unemployed person may have turned down some jobs while he has not been offered some he would accept. Thus in the formulation people are not unemployed simply because they are holding out for better terms.

Needless to say, the situation involved may be a good deal more complicated. The higher the wage being offered, the lower may be the chances of a particular worker getting it. The job may also take a different length of time to investigate, with both aspects also depending on conditions in the labor market. Thus rather than assuming (2.4) we shall instead assume that

$$p = p(w_m,\tau,w^*) = \int_{w_m}^{\infty} p'(w,\tau,w^*)dw \qquad (2.5).$$

Here τ is some (possibly vector) index of "tightness" in labor markets and can be taken to depend on such things as unemployment, vacancies and the extent of efforts being made to fill vacancies. In the discussion to follow it is assumed that τ is a scaler with

$$\partial\tau/\partial u < 0 \qquad (2.6)$$

where u is the unemployment rate. It is also presumed that

$$\partial p/\partial\tau > 0 \text{ for all possible values of } w_m \qquad (2.6').$$

The function p' is such that $\int_{w_a}^{w_b} p'(w,\tau,w^*)dw$ gives the probability of being offered a job in the range w_a to w_b. Given that such an offer is made, the distribution of wages is given by $p'(w,\tau,w^*)/\int_{w_a}^{w_b} p'(w,\tau,w^*)dw$. Thus the probability of being offered a job at all is $\int_0^{\infty} p'(w,w_m,\tau)dw$ while the distribution of wages that might be offered is

$$p'(w,\tau,w^*)/\int_0^{\infty} p'(w,\tau,w^*)dw. \qquad (2.7).$$

Implicity, p' is assumed to be a positive function. It is not presumed that (2.6') is the same as f in (2.1), the difference being that (2.1) refers to perceptions of wages being paid while in (2.7) those perceptions are further weighted by the relative probability of jobs paying those wages being offered. Analogous to (2.2), however it is assumed that both

$$\partial p(w_m,\tau,w^*)/\partial w^* \geq 0 \qquad (2.8)$$

and

$$\partial\left[\int_{w_b}^{\infty} p'(w,\tau,w^*)dw \Big/ \int_{w_a}^{\infty} p'(w,\tau,w^*)dw\right]\Big/\partial w^* \geq 0 \text{ for } w_b > w_a \quad (2.9).$$

Inequality (2.8) simply assumes that the probability of being offered a job paying more than any particular value goes up with the going wage while (2.9) presumes that an increase in the going wage increases the probability that an offer will be above some higher value more than in proportion to the increase in the probability of its being above a lower value. (2.9) guarantees that the expected wage, given that a job is offered, will increase with the going wage.[9]

Given that an acceptable job is found, the expected wage E(y) is given by

---

[9]It will be noticed that we are sliding over the possibility that the distribution of offers depends on w_m, which may affect what jobs it is worth investigating. More specifically, what we are ignoring is that a worker may search in any of K submarkets with typically different wage levels, amounts of effort needed to investigate jobs and different probabilities of being offered jobs. Such a model is much more complicated and seems unlikely to be fruitful here, though it would obviously be highly relevant for considerations of the effects of increasing the number of sub-markets in which a worker may participate or of differentially altering his prospects in the various sub-markets. Some manpower programs might be regarded as having such effects. Formally, it might be possible to capture part of the richness by making w_m a parameter of p'. However, if we assume that

$$\partial p/\partial w_m < 0,\ \partial\left[\int_{w_m}^{\infty} wp'(w,\tau,w^*,w_m)dw \Big/ \int_{w_m}^{\infty} p'(w,\tau,w^*,w_m)dw\right]\Big/\partial w_m > 0$$

and that other derivatives of the functions with respect to exogenous variables are as stated in the text, the only effect is to lengthen the algebraic expressions while the qualitative results remain the same. The last assumptions seem reasonable, given that the approach would really be a fudge of a more complicated situation, the dander being avoided being that in improved situations, a particular minimum acceptable wage might implicitly plunge the searcher into less favorable submarkets.

$$E(y) = \int_{w_m}^{\infty} w\, p'(w,\tau,w^*)dw / \int_{w_m}^{\infty} p'(w,\tau,w^*)dw \qquad (2.10).$$

It will be noted that

$$\frac{\partial E(y)}{\partial w_m} = p'(w_m,\tau,w^*) \int_{w_m}^{\infty} (w-w_m)p'(w,\tau,w^*)dw/p^2$$

$$= p'(w_m,\tau,w^*)\ [E(y) - w_m]/p > 0 \qquad (2.11).$$

If, now, a searcher finds a job at least meeting his minimum acceptable wage, w_m, and he has a subjective discount rate[10] of r, then the expected present value of a job found in period j in the wage range above w_m is

$$R_j = \sum_{t=j}^{\infty} (1+r)^{-t}E(y) = r^{-1}(1+r)^{-(j-1)}E(y) \qquad (2.12).$$

However, the job must be found.

We assume that there are costs to looking for a job, say k per period of search. These costs may be negative if there is unemployment insurance or social assistance payments whose receipt is dependent on job search.[11] The expected present value of searching for a job with a minimum acceptance wage of w_m is

$$E(w_m) = \sum_{t=1}^{\infty} (1-p)^{t-1}pR_t - \sum_{t=1}^{\infty} [(1-p)^{t-1}/(1+r)^{t-1}]k$$

$$= [E(y)p/r-k][(1+r)/(r+p)] \qquad (2.13).$$

In setting w_m the worker is assumed to maximize (2.13). The first-order condition for this is

---

10 This approach, though standard, is hardly uncontroversial.

11 The development will assume that voluntary rejection of a job will not affect further payments -- possibly by reason of the searcher's ability to make sure that the job is not formally offered if he does not want it.

$$\frac{\partial E(w_m)}{\partial w_m} = \frac{p(1+r)}{r(r+p)} \frac{\partial E(y)}{\partial w_m} + \left[\frac{(E(y)+k)\ (1+r)}{(r+p)^2} \right] \frac{\partial p}{\partial w_m} = 0 \quad (2.14).$$

(2.14) will have a solution unless above some value less than (-k), receiving an offer is impossible, so that E(y) is not defined. This is the case where unemployment compensation is worth more than any job which might be found. Otherwise, the first term of (2.15) is simply the expected improvement in the present value of a job which comes from raising the minimum acceptance wage for given probabilities while the second is the effect that comes from lowering the probability of finding a job that stems from raising the acceptance wage. Substituting (2.11) into (2.14) yields

$$\frac{\partial E(w_m)}{\partial w_m} = \left[\frac{(1+r)p'(w_m,\tau,w^*)}{(r+p)^2}\right] \left[\frac{E(w_m)}{(1+r)} - \frac{w_m}{r}\right] = 0 \qquad (2.15)$$

or, using (2.13),

$$w_m = r[E(y)p/r-k]/(r+p) = rE(w_m)/(1+r) \qquad (2.16).$$

We shall assume that w_m is positive since otherwise it is likely that a person will drop out of the labor market. It will be noted that the second-order condition for a maximum holds when (2.15) does, for there

$$\frac{\partial^2 E(w_m)}{\partial w_m^2} = -\left[\frac{(1+r)p'(w_m,\tau,w^*)}{(r+p)}\right] < 0 \qquad (2.17).$$

Analysis of the effects of changes can proceed using (2.16). Total differentiation yields the result that increasing the parameters of the search process decreases the minimum acceptable wage and raises the probability of finding an acceptable job for

$$\frac{\partial w_m}{\partial r} = -\frac{(1+2r)}{r(r+p)^2} w_m - \frac{E(y)p}{r(r+p)} - \frac{r}{(r+p)^2}\left[\frac{E(y)p}{r} - k\right] < 0 \quad (2.18)$$

and $$\frac{\partial w_m}{\partial k} = - \frac{r}{(r+p)} < 0 \qquad (2.19).$$

For other parameters -- both those explicitly considered and others, say x -- differentiation of (2.16) yields

$$\frac{\partial w_m}{\partial x} = \frac{r}{(1+r)} \frac{\partial E(w_m)}{\partial x} = \frac{p}{(r+p)} \frac{\partial E(y)}{\partial x}$$

$$+ \frac{r}{(r+p)^2} \left[\frac{E(y)}{(1+r)} + k\right] \frac{\partial p}{\partial x} \qquad (2.20).$$

From (2.14) both the terms multiplying the partial derivatives on the right-hand side of (2.20) are positive. Thus a change which left the expected value of a job found, E(y), unchanged, while increasing the probability of finding a job would raise the minimum acceptable wage. Similarly, an increase in the expected value which leaves the probability unchanged raises the minimum wage. Basically then, an increase in dispersion of wages above the minimum acceptance wage raises that reserve wage.

It is quite possible that a change would affect both E(y) and p. For example, an increase in unemployment might be regarded as cutting off the possibilities of getting a low paying job in greater proportion than it affects the possibility of getting higher paying jobs. It is, however, unlikely that the change in E(y) will swamp that in p for, using the formulation in (2.10), (2.13) and (2.15), (2.20) can be written as,

$$\frac{\partial w_m}{\partial x} = \frac{\int_{w_m}^{\infty} w[\partial p'(w,\tau,w^*)/\partial x]dw}{r(r+p)} - \frac{w_m \int_{w_m}^{\infty} [\partial p'(w,\tau,w^*)/\partial x]dw}{r(r+p)}$$

$$= \int_{w_m}^{\infty} [w-w_m][\partial p'(w,\tau,w^*)/\partial x]dw/r(r+p)] \qquad (2.21)$$

while

$$\partial p/\partial x = \int_{w_m}^{\infty} [\partial p'(w,\tau,w^*)/\partial x]dw \qquad (2.22).$$

Since the first term in the integrand of (2.21) is necessarily positive, only if $\partial p'(w,\tau,w^*)/\partial x$ changes sign somewhere in the range above w_m (and in the appropriate way) will the effect of a variable on w_m be different from its effect on the probability for a given w_m. For this to happen, a change which lowers p must at the same time raise the probability of finding a job paying in some particular range above w_m. This effect has been ruled out for w* by (2.8) while it is then likely but not certain that from (2.6´)

$$\frac{\partial w_m}{\partial \tau} > 0 \qquad (2.23).$$

It has now been argued that changes which increase the probability of finding jobs can be presumed to raise w_m and so to then lower p from what it would be if w_m remained constant. The question arises as to whether or not this offsets the original, direct effect so that the probability falls. The answer appears to be ambiguous. The total effect is given by

$$\frac{dp}{dx} = \frac{\partial p}{\partial x} + \frac{\partial p}{\partial w_m}\frac{\partial w_m}{\partial x}$$

$$= \frac{\int_{-w_m}^{\infty} [r(r+p) - p'(w_m,\tau,w^*)\ (w-w_m)]\ (\partial p'(w,\tau,w^*)/\partial x)dw}{r(r+p)} \qquad (2.24).$$

which contains terms of opposite sign. Thus it is not clear that improving the functioning of the labor market -- in the sense of making the probability of obtaining a job at a given wage higher -- will necessarily raise the intended probability of obtaining a job. Although numerical examples using the rectangular distribution and simple forms of (2.4) suggest that the reverse effect is not likely to occur, it does remain a distinct possibility that is worrisome. The possibility, for example, renders it unclear that improving opportunities or the efficiency of labor markets, for example through manpower policies, will necessarily increase the probability of those who are searching both finding and accepting jobs.

It might seem reasonable to suppose that the distribution of wages relative to the going wage is unaffected by the level of the going wage. Thus p' might be of the form

$$p'(w,\tau,w^*) = p_2(w/w^*,\tau)/w^* \qquad (2.25).$$

It is then easily verified that if there are no search costs, w_m/w^* does not depend on w^* nor does the probability of being offered an acceptable job. Similarly, if costs automatically change with w^* so that k/w^* is a constant, the solution for w_m/w^* and the value of p is unaffected. This conclusion is not surprising for the change is basically one in the unit of account. For more interesting changes in w^* it is unlikely that the situation can be represented by (2.25). Particularly with a progressive income tax, it is unlikely that (2.25)holds for the relevant distribution. It is, however, not at all clear what the effect will be and the intuition that a change in w^* will result in a decrease in w_m/w^* in the absence of search costs depends apparently on the assumption that the progressivity of the tax does not decline too rapidly.[12]

Even without these complications, changes in other parameters will affect the relationships between w_m and w^*. If the model is of general applicability and w^* is related to prevailing wages being offered, then the other parameters will affect their relationship and average wages actually being paid may change without changes occurring in the wages being offered or paid by any particular employer since these parameters do affect the wages which are acceptable and so accepted. Thus an increase in labor-market tightness, for given values of w^*, will tend to increase average wages being paid unless those who are now successfully holding out for better terms are not randomly scattered throughout the overall wage distribution and their share of total employment changes noticeably.

The parameters of the model discussed are those perceived by job searchers. If the functions are based on relationships that hold for actual data, then the probabilities of actually obtaining jobs depend on these conditions and on w_m.

They thus depend on the perceived conditions only in so far as these affect w_m. This feature is particularly relevant with respect to the discussion of the effect on the probability of finding employment. The ambiguity there arises from the change in w_m which stems from perceived changes in conditions. If these changes are not perceived, so that w_m does not change, or are only partially perceived, so that the change is less than it would be, there is less chance that the probability of someone becoming employed will decline when the possibilities for finding a job improve.

While the discussion has focussed on the acceptance of a job, the same considerations apply to voluntary resignations or quits. Thus a worker will quit a job to look for other work if the wage is less than the value of w_m determined in (2.15).

---

12 We can assume here that take-home pay is relevant. Let this be

$$w_T = wh(w)$$

where h(w) is unity minus the average tax rate. For the tax to be progressive

$$h'(w) < 0$$

while for take-home pay to increase with w, it is necessary that

$$h(w) + wh'(w) > 0 \, .$$

Defining the expectations in (2.10) as applying to wh(w) rather than w, using (2.25) for the distribution, proceeding in the same way and re-arranging some terms, yields that

$$\partial w_m/\partial w^* = \left[\frac{w_m}{w^*}\right]\left[\frac{1+\int_{w_m}^{\infty} w^2h'(w)p'(w,\tau,w^*)dw/\int_{w_m}^{\infty} wh(w)p'(w,\tau,w^*)dw}{1 + w_m h'(w_m)/h(w_m)}\right].$$

This will certainly be less than w_m/w^* if $wh'(w)/h(w)$ is a decreasing function of w for all $w>w_m$ (that is, its absolute value is increasing) and certainly greater if the reverse is the case. Otherwise the effect depends on the distribution of wages. Since w is an increasing function of w and h(w) a decreasing one, the first condition will hold unless [-h'(w)] decreases fairly rapidly with w.

Needless to say, the model is greatly over-simplified. Possibly four deficiences are most glaring. First, there is no provision for a special adaptation to information gained by searchers through the search process. Holt (1970) has stressed this aspect and evidence he discusses suggests that w_m is revised downwards as unsuccessful search proceeds, presumably due to changes in perception of the situation facing individuals.[13] This is ignored largely because at the level at which we shall be working, it seems to add nothing to implications already obtained.

Secondly we have treated the probabilities as being constant for all time. We have not allowed for perceptions to involve expected variations in the future either of the probability of finding jobs or of the wages being offered. Furthermore, there has been no consideration of the probability of an individual's finding a job declining with age.

Third, the model has ignored the possibility that the worker might be fired subsequently from a job which he finds. Formally, if this possibility is constant over time and for all jobs, it merely adds an additional term to the discount factor in (2.12), while to R_j has to be added the expected present value of subsequent searches necessitated by being fired. Similarly, recognition of the finite length of any job tenure simply puts a finite upper limit on the sums in (2.12) and (2.13). More important, however, would be the recognition that the probability of being fired itself varies from job to job. Incorporation of this aspect changes the decision problem to that of selecting a function of the probability of being fired which gives the minimum acceptable wage for each probability of being fired. Pursuit of such matters would lead us far afield without noticeable implications for the sorts of crude aggregate models we shall be pursuing subsequently. Not surprisingly, the extension produces the result that w_m rises with the probability of

---

[13] It is not true, however, that unsuccessful search necessarily lowers either the perceived probabilities of being offered a job or the perception of the going wage. For example, a person who thought the probability of being offered a job was 0.1 and wanted a job well above the mean of the distribution might well revise upwards his perceptions and w_m if in 10 searches he was offered two jobs both paying above the mean though less than w_m.

being fired. This, of course, may give employers the incentive to be reluctant to fire employees since it may allow them to pay lower wages.

Finally, no provision has been made for the fact that in many jobs wages are not expected to be constant or to bear a constant relationship to the going wage or, say, the trend of wages generally. Again analysis would lead us far afield without seeming to produce implications of relevance to this study. It may, however, present an opportunity for employers to gain by providing stability of wages and rates of increase of wages, possibly relative to generally expected values, for this may allow them to pay lower wages.

Both these last omissions, besides greatly complicating the analysis of the problem facing the individual, also greatly complicate the decision problem facing firms. Each provides a reason for firms not to react strongly to changing economic conditions quite apart from failures to perceive or appreciate changes or from the investment costs involved in integrating employees into the firm of the sort stressed by Oi (1962). Presumably, employees largely judge the prospective security of employment and the prospective course of wages on the basis of the past record of an employer. If they value failure by employers to react to varying economic circumstances either by reducing the number of employees or by variations in wages, the employer is provided a reason for maintaining or enhancing his reputation as a "good" employer.

Aggregation Considerations and the Phillips Curve

The analysis of section two was concerned with an individual's perceptions about the labor market and their effects on his decisions. To be of interest or to have implications for the working of labor markets, it is necessary to aggregate over individuals and to consider how many individuals there are.

Each participant in the labor market was assumed to set a minimum acceptable wage which implied a perceived or intended probability of his being unemployed at the end of the period. If his perceptions were correct, then this would actually be the probability. Averaging over searchers and letting $\bar{p}_t$ be the average probability, the number unemployed at the end of the period U_t, is expected to be

$$E(U_t) = \bar{p}_t(U_{t-1} + Q_t + L_t - L_{t-1}) \qquad (3.1).$$

Here Q_t is the number who quit and L_t is the labor force. For the moment we presume that involuntary quits do not occur. Letting E_{t-1} be the number employed, presuming that the numbers involved are large enough so that the variance of $\bar{p}$ is trivial relative to its mean and defining

$$\bar{q}_t = Q_t/E_{t-1},$$

$$\text{and} \quad (L_t - L_{t-1})/L_{t-1} = \alpha_t \qquad (3.2),$$

the unemployment rate u_t can be written as:

$$(1+\alpha_t)u_t = \bar{p}_t[(1-\bar{q}_t)u_{t-1} + \bar{q}_t + \alpha_t] \qquad (3.3).$$

If $\bar{p}_t$, $\bar{q}_t$ and α_t were constants, (3.3) provides a straightforward, stable linear difference equation with particular solution

$$u_t = \bar{p}(\bar{q} + \alpha)/(1 + \alpha - \bar{p} + \overline{pq}) \qquad (3.4).$$

The tenor of the argument in section two is that $\bar{p}_t$ and $\bar{q}_t$ are not constant. Instead it was argued that for individual i they depend both on perceptions about wages and the tightness of labor markets, w_i^* and τ_i, and on the actual values of these variables prevailing in the labor market, say, $\bar{\tau}$ and $\bar{w}$. The latter may be different from the perceptions, and both types of quantity may change.

We may consider τ_i and w_i^* to be random variables when we consider variations among different individuals. We assume that, in principle, there are aggregate indexes τ and w^* such that for all relevant functions, g_i, the signs of $\partial E[g_i(\tau_i,w_i^*)|\tau,w^*]/\partial\tau$ and $\partial E[g_i(\tau_i,w_i^*)|\tau,w^*]/\partial w^*$ are the same as the signs of $\partial g_i(\tau_i,w_i^*)/\partial\tau_i$ and $\partial g_i(\tau_i,w_i^*)/\partial\tau_i$ respectively. Then for a fixed group of searchers or for groups composed of various members for whom the joint distributions of the τ_i, w_i^*, and g_i are the same, we may analyze (3.4) on the basis of the considerations developed in the previous section. Unfortunately, it is doubtful whether the last conditions hold as a reasonable approximation as conditions in the labor market vary since the characteristics of those who are searching and of employees who might quit may well change with labor-market conditions. We shall simply ignore this possibility for the time being.

It was argued in section two that workers quit when w_m is greater than the wage they are being paid while w_m depends on w^* and τ. The higher are wages being paid, $\bar{w}$, relative to those perceived to prevail, w^*, the fewer is the number of people who quit if we take actual wages and wage expectations of individuals as being distributed in unchanged fashions about their means. Thus we may consider

$$\bar{q}_t = \bar{q}(\bar{w}_t, w_t^*, \tau_t) \tag{3.5}$$

with

$$\partial\bar{q}_t/\partial\bar{w}_t < 0,$$

$$\partial\bar{q}_t/\partial w_t^* > 0,$$

and

$$\partial\bar{q}_t/\partial\tau_t > 0 \tag{3.6}.$$

The proportion of searchers who remain unemployed, $\bar{p}$, is somewhat more complicated since it depends not only on perceived conditions but also on actual conditions of tightness in the labor markets which in turn depend on the number who are searching, or the proportion of the labor force who are searching:

$$s_t = [u_{t-1} + (1-u_{t-1})\bar{q}_t + \alpha_t]/(1+\alpha_t) \tag{3.7}.$$

In connection with the formulation of the aggregate hiring relationship it is worth pausing for a moment to consider the employers' situation which will be relevant for the development in the next section.

The number of workers whom a particular employer, j, might hire may be considered a random variable whose distribution depends on three things: the number of applicants, m_j, he gets; the probability that he will offer a job to an applicant, $p(\bar{y}_j)$; and the probability that an applicant will accept, $p(w_j, w^*, \tau)$. Here $\bar{y}_j$ is the minimum skill require-ment decided on by the employer and $p(\bar{y}_j)$ is the probability that a randomly chosen applicant will at least meet these requirements. It is assumed that $\partial p(\bar{y}_j)/\partial \bar{y}_j < 0$. The number of applicants presumably depends on the number who are looking for work, s_t. It may also depend on how many jobs other employers are trying to fill, $\bar{v}_t$, the skill requirements of these other employers, $\bar{y}$, and the wages they are paying $\bar{w}$. Thus we might consider the probability that the number of applicants will exceed some fixed number is given by some function

$$p(m_j \geq m_o) = f_{m_o}(s,\bar{v},\bar{y},\bar{w}) \qquad (3.8)$$

with

$$\partial f_{m_o}/\partial s > 0$$

$$\partial f_{m_o}/\partial \bar{v} \leq 0$$

and

$$\partial f_{m_o}/\partial \bar{y} \geq 0 \qquad (3.9).$$

The number the employer might hire, h_j, depends on this and on the other two functions which affect the probabilities that those who apply will be acceptable and find the job acceptable:[14]

$$p(h_j \geq h_{jo}) = p_{h_{jo}}(s,\bar{v},\bar{y},\bar{w},y_j,w_j,w^*,\tau) \qquad (3.10)$$

with the derivatives with respect to s and w_j being positive and those with respect to $\bar{v},\bar{w}$, and to w^* and τ, the searchers'

---

[14] Specifically, if acceptance, offers, and number of applicants are independent, this function might be of the form, based on the binomial distribution,

$$p(h_j \geq h_o) = \sum_{m_j=h_o}^{sL} \sum_{k=h_o}^{m_j} p(m_j)[m_j!/(m_j-k)!k!](p(y_j)p(w_j))^k \times$$

$\times(1-p(y_j)p(w_j))^{m_j-k}$. However, it seems unlikely that the process is binomial.

perceptions, being negative. There is ambiguity with respect to $\bar{y}$ since higher standards by other employers may raise the number of applicants a particular employer can attract while lowering their average skill level.

While (3.10) yields the distribution of the number an employer might hire, the distribution of the number he actually does hire depends also on the maximum number he is willing to hire, $\bar{v}_j$, with $\partial E(h)/\partial \bar{v}_j > 0$. Thus the individual employer can increase the expected number he will hire by raising the wage, lowering the requirements, or increasing the maximum number he is willing to hire. Needless to say, by raising his $\bar{v}_j$ or by lowering $\bar{y}_j$, he contributes to the aggregate tightness faced by other employers and to the extent he does so, he lowers their expected hirings. If in the aggregate this effect were wholly offsetting, the probability of an individual's being hired would not depend on these variables. Instead, and in line with the discussion of section two, we shall assume that the aggregate number of hires increases with $\bar{v}$ and decreases with $\bar{y}$. Thus the actual tightness discussed in section two can be considered to be given by some function

$$\bar{\tau}_t = \tau(\bar{v}_t, \bar{y}_t, s_t) \qquad (3.11),$$

with $\partial\bar{\tau}_t/\partial\bar{v}_t > 0$; $\partial\bar{\tau}_t/\partial\bar{y}_t < 0$; and $\partial\bar{\tau}_t/\partial s_t < 0$ and the proportion of searchers who remain unemployed $\bar{p}_t$, is given by

$$\bar{p}_t = \bar{p}(\bar{\tau}_t, w_t, \tau_t, w^*_t) \qquad (3.12),$$

with

$$\partial\bar{p}_t/\partial\bar{\tau}_t < 0$$

$$\partial\bar{p}_t/\partial\bar{w}_t < 0$$

$$\partial\bar{p}_t/\partial\tau_t > 0$$

$$\partial\bar{p}_t/\partial w^*_t > 0 \qquad (3.12).$$

The last two terms in (3.12) arise from the effects of the perceived values of market tightness and wages on the minimum acceptable wage of individuals.

We may now rewrite (3.3) as

$$u_t(1+\alpha) = \overline{p}(\overline{\tau}_t, \overline{w}_t, \tau_t, w_t^*)[\{1-q(\overline{w}_t, w_t^*, \tau_t)\} u_{t-1}$$

$$+ q(\overline{w}_t, w_t^*, \tau_t) + \alpha] \qquad (3.13).$$

Because of the dependence of $\overline{\tau}_t$ on u_{t-1}, (3.13) is a non-linear difference equation with

$$\partial u_t/\partial u_{t-1} = \overline{p}_t(1-q_t)/(1+\alpha) - s_t(\partial\overline{p}_t/\partial\overline{\tau}_t)(\partial\overline{\tau}_t/\partial u_{t-1}) \qquad (3.14).$$

Furthermore, if we presume that

$$0 < \overline{p}_t(\overline{\tau}_t, \overline{w}_t, \tau_t, w_t^*) < 1 \qquad (3.15)$$

for all values of the parameters, as seems reasonable, and that all functions may be treated as continuous, then (3.13) has at least one locally stable equilibrium point, u_t^e, where (3.13) holds for $u_t^e = u_{t-1}^e$ and (3.14) is less than unity. The condition is that not all searchers can be expected to find jobs but it is also never impossible to find jobs. The statement follows from observing that from (3.13) u_t is positive for u_{t-1} equal to zero and is less than unity when $u_{t-1}=1$.

It follows from the arguements developed so far that

$$\partial u_t/\partial\overline{v}_t < 0;$$

$$\partial u_t/\partial\overline{y}_t > 0;$$

$$\partial u_t/\partial\overline{w}_t < 0;$$

$$\partial u_t/\partial\tau_t > 0;$$

$$\partial u_t/\partial w_t^* > 0;$$

and $$\partial u_t/\partial\alpha > 0 \qquad (3.16).$$

The inequalities in (3.16) also hold for the changes in equilibrium values, u_t^e, which are stable. According to these arguments, then, an increase in wages being paid or of employer-determined tightness in labor markets will produce a lower unemployment rate than would otherwise be the case and will lower whatever equilibrium rate unemployment is approaching. Conversely, if possible and actual employees believe that labor markets are tighter or that wages are higher, this difference in belief will produce a higher unemployment rate and a higher equilibrium unemployment rate.

These conclusions treat actual conditions and perceived conditions as independent. For analysis over only a short period, this may be appropriate; but it is unlikely to be suitable when the operation of labor markets is considered as an on-going process. Undoubtedly, when actual conditions diverge from those expected or perceived, there will be some tendency for the perceptions to be revised. How these expectations are formed is a highly murky area whose consideration will be postponed until the next chapter. For the present it will suffice to consider the simplest versions, say

$$\tau_t = \overline{\tau}_{t-1} \tag{3.17}$$

and

$$w_t^* = \overline{w}_{t-1} \tag{3.18}.$$

It will be noted from (3.13) and (3.16) that any decrease in unemployment achieved by increasing $\overline{\tau}$ or $\overline{w}$ will tend at least partly to be nullified when perceptions catch up with actual conditions. Furthermore, the effects of changes in wages on labor-market tightness which are fully perceived are unclear. We noted in section two that whether an increase in w^* raised w_m more or less than in proportion was only resolvable through the adoption of strong and quite possibly implausible assumptions, while if the rise in w^* is matched by one in $\overline{w}$, the effect on $\overline{p}_t$ and $\overline{q}_t$ depends on whether this rise in $\overline{w}$ and w_m increases or decreases the probability that jobs which are offered will be accepted. We also noted that the effect of an increase in τ on the intended probability of remaining unemployed was unclear; that is, it was unclear whether $\overline{p}_t$ would increase or decrease when both τ_t and $\bar{\tau}_t$ increased together. Even if $\bar{p}_t$ does decrease when both increase, the total effect on the unemployment rate remains unclear since an increase in τ raises q (whether or not the change in perception is correct) and this tends to raise the unemployment rate. Indeed, all that is clear in this discussion is that the changes in the unemployment rate produced by a perceived change in wages or labor-market tightness are less than those produced by an unperceived change. While it is quite possible that the effects of perceived changes are negligible, there is no reason in the model developed for this to be necessarily the case.

It might not be unreasonable to suppose that the inclusion of the $\bar{w}_t$ and w_t^* terms in (3.13) might be well represented in terms of the variables $Dw_t = (\bar{w}_t - \bar{w}_{t-1})/\bar{w}_{t-1}$ and Dw_{t-1} or $DP_t = (P_t - P_{t-1})/P_{t-1}$, where P_t is the Consumer Price Index. Furthermore, equation (3.13) might easily be adequately approximated by some implicit function,

$$f(u_t, u_{t-1}, Dw_t, DP_t) = 0 \qquad (3.19)$$

even though (3.19) is incomplete in terms of the variables we have been discussing. Finally an adequate linear approximation to either (3.19) or (3.13) might be provided by

$$f_1(u_t) = \hat{\beta}_1 + \hat{\beta}_2 f_2(u_{t-1}) + \hat{\beta}_3 Dw_t + \hat{\beta}_4 DP_t + e_t \qquad (3.20),$$

where $\hat{\beta}$ are least-squares estimates and e_t is the residual. Here "adequate" is used in the sense that the values of $\hat{\beta}$ are significantly different from zero and that

$$\hat{\beta}_2(\partial f_2/\partial u_{t-1})/(\partial f_1/\partial u_t) > 0$$

$$\hat{\beta}_3/(\partial f_1/\partial u_t) < 0$$

and $$\hat{\beta}_4/(\partial f_1/\partial u_t) > 0 \qquad (3.21).$$

If this is the case, then it is also the case that the least-squares equation

$$DW_t = \hat{\gamma}_1 + \hat{\gamma}_2 f_1(u_t) + \hat{\gamma}_3 f_2(u_{t-1}) + \hat{\gamma}_4 DP_t + e_t' \quad (3.22)$$

will have the property that

$$\hat{\gamma}_2 \partial f_1/\partial u_t < 0 \qquad (3.23),$$

with a t-statistic for the hypothesis that γ_2 is zero which is identical to the t-statistic for the hypothesis that β_3 in (3.20) is zero.[15] The relationship between the other $\hat{\gamma}$'s and other $\hat{\beta}$'s is a good deal more complicated, but given that (3.20) fits well and the considerations about the determination of wages developed in section five, it would be no surprise if the other coefficients in (3.22) were also significant, though the crucial point is that of the sign in (3.23) and its significance being the same as that of β_3 in (3.20).

Equation (3.22) is, of course, of the form of many Phillips curves that have been estimated. Clearly, also, the sort of arguments advanced in arriving at (3.25) could be used to account for the inclusion of other variables in (3.20) and (3.22) of the sort which often appear as "intruders" in the Phillips curve.

The reasoning lying behind (3.20) is different from that developed to account for an equation such as (3.22) which is usually taken to be an account of how money wages change in response to economic conditions. (3.20) expresses the conclusion that the unemployment rate will vary with unexpected or unperceived changes in money wages and, so far, we have

---

[15] This straightforward, but apparently seldom realized, fact follows from two well-known facts. First, the least-squares coefficient for a particular independent variable and its standard error can be obtained by first regressing the dependent variable and the particular independent variable on the remaining independent variables and then calculating the simple regression coefficient for the regression of the residual for the dependent variable or that for independent variable. The "t" ratio is also the same provided that the standard error of estimate in the simple regression is adjusted for "degrees of freedom" lost in the first set of regressions. The second fact is that the sign and t-ratio of the coefficient in the simple regression coefficient for y or x are the same as those in the simple regression of x on y.

developed no account of how money wages themselves are determined. However, the presumption that the coefficient of wage change in (3.21) is negative means that there is a presumption that the unemployment coefficient in (3.22) will indicate that the rate of change of money wages increases as the unemployment rate falls. That is, it is quite possible that the Phillips curve arises because of the response of hirings and separations, and so of the unemployment rate, to money wages rather than because of the way money wages are determined.

These arguments do not preclude the possibility that the Phillips curve or an equation of the form of (3.22) would serve as an adequate representation of the determination of money wages. If this is the case, then an identification problem would arise or rather, since both equations are almost certain to be misspecified and their true forms are unknown, a pseudo-identification problem may arise. That is, the coefficients estimated in (3.22) may represent the wage determination process, the unemployment process, or a mixture of both.

It may be objected that the process of proceeding from (3.13) to (3.20) was highly arbitrary and that (3.20) is misspecified. This is certainly correct, but it is questionable if it is any more arbitrary or *ad hoc* than the usual process by which the exact specifications of Phillips curves are arrived at. It is also true that, with the correct specifications, the two equations may be identifiable as a result of differences in the exact, true forms. Indeed, it is argued in section five that the wage determination equation may be of different form from (3.22) and, so, from (3.20). However, such an hypothesis remains doubtful. What remains the case is that with actually specified Phillips curves, the possibility that the empirical relationship stems from an unemployment relationship such as (3.13) remains a definite danger. Although the Phillips curve literature has recognized the danger that prices and wages are simultaneously determined, it has usually ignored the possibility that unemployment and wages are.

The development so far has left wages, vacancies and hiring standards undetermined. We discuss these matters in section five. Before doing so, however, it is sensible to consider labor-force participation. This enters the model through the parameter α_t, which has been considered a constant in this section.

Labor-Force Participation

So far people have been taken only to have the alternatives of accepting and keeping jobs or of searching for other ones. There is obviously also the third possibility of neither working nor searching; that is, of not being in the labor force.

Presumably an individual chooses whether or not to be in the labor force on the basis of which alternative offers the more prospective utility. In turn, the utility to be derived from being in the labor force depends on the real wage and the difficulty to be experienced in getting a job. The analysis in section two can be used to obtain the minimum acceptable wage and the expected utility to be derived from being in the labor force, provided the functions are expressed in terms of the utility to be derived from various wages and the utility costs of searching rather than in terms of the money figures. Thus the utility, as seen by a possible participant, depends on τ and w^*/P where P is an appropriate price index.

The utility to be derived from not being in the labor force presumably also depends on the real income or command over resources available in that situation, R_N/P. This may come from existing wealth, from social assistance payments, from income in kind or from odd-jobs which a person can expect to earn when he is not in the labor force, or from the share in family income earned by others who are in the labor force which would accrue to him.[16] Insofar as such income, R_L/P, is available when he is in the labor force, it should enter the utility to be derived from this alternative also. Thus, letting $U_N(R_N/P)$ and $U_L(\tau, w^*/P, R_L/P)$ be the utilities for not being and being in the labor force, respectively, a particular person will be in the labor force if

$$U_L(\tau, w^*/P, R_L/P) - U_N(R_N/P) = D > 0 \qquad (4.1).$$

---

[16] The analysis could equally well be done in terms of family decision-making. Since only purely heuristic considerations are raised here, it would seem to make little difference which is used.

From the preceding discussion, it may be presumed that

$$\partial U_L/\partial \tau > 0$$

$$\partial U_L/\partial (w^*/P) > 0$$

and $$\partial U_N/\partial (R_N/P) > 0 \qquad (4.2).$$

These will also provide, through (4.1), the partial derivatives of D provided that the alternative source of income does not depend on successful job search by someone else, in which case the partial derivatives of U_N with respect to w^*/P and τ are also presumably positive.

Both R_L/P and R_N/P may be functions of the income of other members of the family. If their wages rise, it is not clear which would increase more, U_L or U_N. If the marginal utility of income is decreasing and can be thought to be independent of other variables affecting the preferences for not working, then U_N might be expected to rise more, provided first, that the costs of holding a job do not exceed the prospective wage so that the net income from working is not less than from not working or, second, that the satisfactions to be derived from working and from income are not strong complements. Otherwise, it seems likely that $\partial D/\partial w < 0$, where w is the income of other members of the family.

It is not clear what the effect of a fall in prices, or a simultaneous increase both in perceived and actual incomes will be on the decision to be in the labor force, since it would raise both terms in (4.1). Since in practice the rate of change of prices and the rate of change of wages have tended to vary together with real wages tending to rise, and since demographic and sociological factors affecting the decision to participate in the labor force have been changing, it is not at all clear that there is much variation which could clearly be ascribed to real wages. On the other hand, if actual wages paid to other members of the family are well represented by the overall level of actual wages, the relationship between these wages $\overline{w}$ and perceived wages, w^*, may be highly important and variations in money wages may appear to be crucial.

Taken for many individuals, of course, (4.1) is not likely to be near zero in the sense that changes in the variables of the magnitudes that are likely to occur will produce changes in the decision to be in the labor force. However, for some the decision is undoubtedly subject to change. We might then expect that the aggregate labor-force participation rate is given by some function

$$L_t/N_t = L(\tau_t, w^*{}_t/P_t, \overline{w}_t/P_t) \qquad (4.3),$$

where N_t is the population, with

$$\partial L/\partial \tau_t > 0,$$

$$\partial L/\partial (w^*_t/P_t) > 0,$$

$$\text{and} \qquad \partial L/\partial (\overline{w}_t/P_t) < 0 \qquad (4.4).$$

The first term of (4.4) is the celebrated discouraged worker effect.[17] The last effect, that higher wages, if unperceived, decrease labor-force participation, arises from the belief that the higher wages paid to some members of a family will make it less attractive for others to seek work expecting only to be paid the former wage rate. If it is presumed that to a first approximation and for short-term models the last two terms in (4.4) are of approximately equal magnitude, then P can be ignored as an argument of (4.3). That is, the effect of a perceived rise in real wages on labor-force participation might be taken to be zero.

Actual tightness in labor markets, $\overline{\tau}$, was not included in (4.3) on the basis of the belief that individuals cannot react to conditions they do not perceive and which do not impinge on them directly. However, it is doubtful if this is appropriate for the aggregate labor-force participation rate. Increased actual labor-market tightness will produce the effect that fewer searchers do not find jobs and therefore more people will receive, or be assured of receiving in the near future, employment income. This in turn means that for their families the attractiveness of working declines. Thus, instead of (4.3) we might suppose that this aspect is adequately captured by assuming

---

17 Cf. eg. Tella (1964)

$$L_t/N_t = f(\tau_t, w_t^*, \overline{w}_t, \tau_t) \qquad (4.5)$$

with $$\partial f/\partial \overline{\tau}_t < 0 \qquad (4.6),$$

and with the other partial derivatives being those given in (4.4). Inequality (4.6) expresses the additional-worker hypothesis of the labor-force participation literature. If we suppose that population is growing at the rate γ, then the parameter α_t of the previous section is some function:

$$\alpha_t = \alpha(\tau_t, \tau_{t-1}, w_t^*, w_{t-1}^*, \overline{w}_t, \overline{w}_{t-1}, \overline{\tau}_t, \overline{\tau}_{t-1}, \gamma) \qquad (4.7).$$

From the formulation of equation (4.5), it follows that

$$\partial\alpha_t/\partial\tau_t > 0$$

$$\partial\alpha_t/\partial w_t^* > 0$$

$$\partial\alpha_t/\partial\overline{w}_t < 0$$

$$\partial\alpha_t/\partial\overline{\tau}_t < 0 \qquad (4.8).$$

From (3.16) of the previous section, $\partial u_t/\partial\alpha_t > 0$ and, the partial derivatives of u_t with respect to the variables being the same as those in (4.8), the short-run labor-force participation response strengthens the effects of those variables on unemployment. It also follows from the way in which (4.7) was formulated that if the values of the variables in t and t-1 are the same, α depends only on γ and, in fact, is equal to it. Thus, on the basis of the formulation, the equilibrium values of the unemployment rate would not be affected by the changes in labor-force participation. Of course, like the rest of the analysis, this proposition is arrived at by ignoring any heterogeneity among various groups in the population. The equilibrium also is still based on exogenously determined values for wages and labor-market demand conditions and refers only to the supply-side of the labor market.

The Decisions of Employers and Labor Unions

A business firm or other type of employer has to make large numbers of decisions concerning prices, investment, production employment, and so on. The choices which it makes are simultaneously conditioned by the situation it regards itself as facing in various markets and its expectations of how these will change. These subjects are surrounded by a great many doubtful elements and it would seem to be unprofitable here to attempt to build a model incorporating them all.

We shall assume for the immediate discussion of wage determination that the output of the firm (and of all firms) can be taken as predetermined for purposes of immediate labor-market adjustment and that the same assumption may be made for the capital stock and methods of production. This limited approach is adopted to allow concentration on the labor market and is not to deny that in a full analysis there is interaction between the determination of labor-market variables and the level of output. Even with the assumption of a given level of output, however, it is not clear that a particular amount of labor is required in the sense that the output will not be produced without these workers.

The obvious source of flexibility arises from variation in the hours worked by a given number of workers. There may also be possibilities for substitution of materials for labor in the short-run and for the postponement of current tasks that are essentially of a maintenance character. Thus, even in the short run, output may only determine a quantity of labor which it would be desirable to employ.

The desirable quantity of labor may, however, depend on other factors besides the quantity of output. If it is feasible to vary the hours worked but only at the expense of paying overtime rates, then the relation of these rates to standard ones may affect the desirable amount of labor. However, if this relationship is constant, it may have no effect on qualitative analysis.[18] Overtime may produce a two-regime model with a structual shift occurring as overtime becomes relevant. This will be ignored here. The problems of overtime, however, undoubtedly cause difficulties, especially for a model to be used with the sorts of data available to us.

---

[18] It is easy to include overtime formally in the model if it is assumed that all workers work a standard period before anyone goes on overtime. This is unlikely to be the case and the adjustment may be a good deal more smooth.

The possibility of substituting materials for labor means that the real wage rate (in terms of materials) should affect the number of workers that it is desirable to employ. Furthermore, if postponable maintenance does not merely change costs in the present and otherwise evaporate, then presumably these tasks remain to be done and the amount of labor demanded will depend both on output and on the past discrepancies between required and actual labor. Although all these considerations could be important, we shall ignore them.

One final aspect affecting production costs is worker morale and efficiency. If morale matters as more than a psychological nuisance to management or as a cause of workers quitting, then it must affect the cost of production. It might be hypothesized that the morale of workers is affected by the relationship of actual wages to the going wage, but this will not be done. The importance of the skill level of employees is less doubtful and has been stressed, for example, by Phelps (1970).

We hypothesize that production costs, other than wages, depend on the amount of output, z_t, the amount of labor, e_t, and the ability of the labor, y_t. The direct cost of production, c_t^p, is then a function

$$c_t^p = c(z_t, e_t, y_t) + w_t e_t \qquad (5.1).$$

It is assumed that

$$\partial c/\partial z_t > 0$$

$$\partial c/\partial e_t < 0$$

$$\partial c/\partial y_t < 0 \qquad (5.2).$$

To obtain labor, the firm has to hire it. Since labor can also quit or be fired, the change in labor employed is the difference between hirings, h_t, and separations which consist of voluntary quits, q_t, and involuntary separations or firings, f_t, including institutionally determined or compulsory retirement. The degree to which a worker is "fired" can vary since he may be laid off with the possibility of later employment or be sent packing unconditionally. We shall ignore this distinction here, partly because data on it are not available. The number of employees is thus given by the identity

$$e_t = e_{t-1} + h_t - q_t - f_t \qquad (5.3).$$

Of these variables, e_{t-1} is predetermined while q_t and h_t are not directly decision variables of the firm.

We have already discussed the hiring possibilities for the firm in section three in connection with equation (3.10). For the employer's decision, two types of perceptions are relevant: what he perceives the distribution of w_m among applicants to be (and so their perceptions of τ and w^*), and what he perceives labor market tightness actually to be. We shall ignore this complexity which leads to no interesting results and presume that the employer uses his perception of labor market tightness, τ, and of the going wage, w^*, for both. Thus, making (3.10) continuous, we assume that the employer regards the distribution of his possible hirings to be given by

$$p(h_t \geq h_o) = H(h_o, \tau, w^*, w_t, \bar{y}_t) = \int_{h_o}^{\infty} p_h(h, \tau, w^*, w_t, \bar{y}_t)dh \qquad (5.4).$$

Where clear in the context we shall refer to (5.4) as H and the distribution as p(h). Here the perceptions refer to his perceptions and w_t and $\bar{y}_t$ are respectively the wage he pays and the minimum skill level he requires. Presumably he regards (5.4) as being characterized by

$$\partial H/\partial \tau_t < 0$$

$$\partial H/\partial w_t^* < 0$$

$$\partial H/\partial w_t > 0$$

$$\partial H/\partial \bar{y}_t < 0 \qquad (5.5).$$

Similarly, from the arguments of section three, we may assume that, for his work force, the number of quits is taken as a random variable with

$$p(q_t \geq q_o) = Q[q_o, (e_{t-1}-f_t), \tau_t, w_t^*, w_t] = \int_{q_o}^{e_{t-1}-f_t} p_q[q, (e_{t-1}-f_t), \tau_t, w_t^*, w_t]dq \qquad (5.6)$$

with

$$\partial Q/\partial \tau_t > 0 \quad , \quad \partial Q/\partial e_{t-1} > 0$$
$$\partial Q/\partial w_t^* > 0 \quad , \quad \partial Q/\partial f_t < 0$$
$$\partial Q/\partial w_t < 0 \qquad (5.7).$$

(We are assuming that those who are fired cannot quit but might quit if they were not fired.)

Quits may indirectly involve costs and it is at this point that firings also enter the picture. The difference between the two is that the workers who leave because they are fired are those whom the employer least wants to keep while this is not necessarily the case for those who quit. Thus firing may be presumed to raise y_t. Whether quits affect y_t is open to question. It is reasonable to suppose that the productivity of workers in any particular category varies among them and that this variation is not fully reflected in their wage rates. The latter aspect may arise from administrative convenience. It may also occur because a person's employer is able to assess his marginal productivity more accurately after some experience with him than other employers who instead would treat him as being about average. Thus the opportunity cost does not reflect fully the value of the employee and the employer can reap some of the rents involved. Stated differently, the hiring rate for an employee may have a risk discount in it which is not fully removed when acquaintance with his abilities removes the risk. If there is any tendency for the more valued workers to be the first to quit when inducements to leave are offered, this will, in effect, impose additional costs on the firm. By the same token, one might expect there to be proportionately fewer such workers the more recent employees there are -- some of whom may need to be fired. We conceptualize these considerations by supposing that they affect y. We may then consider y_t to be a function

$$y_t = y(y_{t-1}, q_t, f_t, \bar{y}_t, h_t, h_{t-1}) \qquad (5.8)$$

with $\partial y_t/\partial y_{t-1} > 0$, $\partial y_t/\partial q_t < 0$, $\partial y_t/\partial f_t > 0$ and $\partial y_t/\partial \bar{y}_t > 0$. The effect of h_t is unclear. If y_t is such that a randomly selected employee, who at least meets $\bar{y}_t$, would be expected to raise y, the derivative is presumably positive and conversely. The assumption which seems to be appropriate is that $\partial^2 y_t/\partial\bar{y}_t\partial h_t>0$. Similarly, the supposed effect of h_{t-1} is that $\partial^2 y_t/\partial f_t\partial h_{t-1}>0$. Although y_t might be presumed to be random, even given q_t and h_t, we can treat it as determinate for simplicity.

The firm has then four decision variables, $w_t, \bar{y}_t, v_t$, and f_t which affect costs by affecting the wage rate, the amount of employment and productivity. Associated with hiring we may assume that there is a training cost, β per person hired.[19] Presumably there are also some costs of trying to fill positions, which we shall assume to be proportional to vacancies, γ per vacancy.

The cost, c_t, involved in labor activities and production is then given by

$$c_t = c(z_t, e_t, y_t) + w_t e_t + \beta h_t + \gamma v_t \qquad (5.9).$$

The assumption that comes to mind to allow the determination of wages, vacancies, firings and skill requirements is that employers set these variables to minimize expected costs,

$$E(c) = \int_0^{(e_{t-1}-f_t)}\int_0^{v_t}[c(z_t, e^a_t, y_t) + w_t e^a_t]p(h)p(q)dhdq$$

$$+ \int_0^{(e_{t-1}-f_t)}\int_{v_t}^{\infty}[c(z_t, e^b_t, y_t) + w_t e^b_t]p(h)p(q)dhdq$$

$$+ \beta[\int_0^{v_t} hp(h)dh + \int_{v_t}^{\infty} v_t p(h)dh] + \gamma v_t \qquad (5.10),$$

---

[19] This could be made variable depending on, say, the number hired and their skill level -- that is, for decision purposes on $\bar{y}$.

where $e_t^a = e_{t-1} + h_t - f_t - q_t$

and $e_t^b = e_{t-1} + v_t - f_t - q_t$.

While perfectly straightforward, minimization of (5.10) is almost totally unrevealing. Since the derivatives of (5.10) are long and tedious we omit the explicit analysis and simply note that in the course of the discussion we have assumed enough about first partial derivatives to permit the possibility of there being a minimum to (5.10) since the first partial derivatives all contain some terms of opposite signs.

The problems of deriving any useful results from the minimization of (5.10) are the usual ones.[20] First, the signs of many of the second partial derivatives of (5.10) were not established in the discussion leading up to (5.10) and only very ad hoc reasoning would provide these signs, at least within the confines of the arguments raised. This difficulty is complicated by the fact that writing out the second partial derivative of (5.10) results in expressions easily occupying the best part of a page and containing a great many different terms whose signs are in question or might well be opposite to each other. For example, terms involving $\partial^2 p(s)/\partial w \partial \tau$ appear when one investigates the effect of changes in labor-market tightness and it is quite possible to argue that this derivative should be positive or negative. The one place where this problem of signs does not arise in acute form is in the case of z_i. It seems reasonable to suppose that increasing output raises the marginal productivity of labor and of skills. If one considers the relevant variables to be some $(k-\bar{y}_t)$ and $(e_{t-1}-f_t)$ -- that is, the extent to which standards are not compromised and the number of employees who are not fired, it is reasonable to suppose that all the second partial derivatives of expected cost with respect to output and the decision variables are negative. However, even if one pushed plausibility arguments to the point of signing all second partial derivatives, it would be of little help because there is no reason to think that the off-diagonal elements of the matrix of second partial derivatives of (5.10) are approximately zero and it is not possible to sign the elements of the inverse of this matrix. All that one could conclude is that for z_i, where the pattern of signs

---

[20] Cf. Archibald (1965).

is definite and can be expressed as all being positive, a change in z_i will lead to changes not all of which taken separately would tend to lower expected employment.

The problems associated with obtaining any qualitative results from assuming minimization of (5.10) arise partly from there being too many variables over which the employer has control. The question arises as to whether the model can be simplified to lead to definite conclusions.[21] One possible candidate for elimination is $\bar{y}$ since it is apparently unobservable and it might be argued that hiring standards do not change. Casual empiricism suggests that this latter hypothesis is very dubious as a general proposition and by itself it is not sufficient to resolve the difficulties. However, with one further elimination, the possibility of qualitative analysis becomes possible provided that one can sign the various derivatives and that the patterns of signs are such that they are informative. It is not, however, at all clear that one can drop one of the other variables and still have a model which accords with prominent features of labor markets where employers do fire people and do at times appear to have definite limits to the number of people they are willing to hire,which it is quite possible they will reach. It is also hard to believe that they have no control over wages. As a result, this way of possibly arriving at qualitative conclusions will not be pursued.

The formulation developed thus leads to four equations for the variables whose values are set by employers:

$$w_t = w(z_t, e_{t-1}, \tau_t, w_t^*, y_{t-1}, h_{t-1}) \quad (5.11)$$

$$v_t = v(z_t, e_{t-1}, \tau_t, w_t^*, y_{t-1}, h_{t-1}) \quad (5.12)$$

$$f_t = f(z_t, e_{t-1}, \tau_t, w_t^*, y_{t-1}, h_{t-1}) \quad (5.13)$$

$$\bar{y}_t = \bar{y}(z_t, e_{t-1}, \tau_t, w_t^*, y_{t-1}, h_{t-1}) \quad (5.14)$$

It will be noted that these equations do not depend on actual labor-market conditions or actual wages being paid by others, but only on the perceived values of these quantities.

---

[21] Though not necessarily the case, the belief that the model is far too simple and should be made more "realistic" is likely to make the problem still worse.

So far, we have ignored a major potential factor in labor markets, namely unions. This has been done partly because in large segments of the economy unions do not play a major role. It is also because it is not clear what their effect is likely to be even in sectors where they are important. In particular, it is not clear that unions can abrogate the mechanisms already described.

There are, of course, large segments of the economy where wage rates are set through collective bargaining between labor and management. But the bargaining does not usually involve the number of workers to be employed. In particular, unions often do not contract to supply labor for hiring nor to prevent workers from quitting, though the bargain may affect the type and amount of firing. To at least a certain extent, then, labor negotiations may be simply a way of transmitting information about w_t^* from workers to management and of providing an orderly way of settling grievances and thereby reducing resignations rather than being clear-cut exercises in the wielding of market power. However, unions do have the power of calling strikes and this may lead to different wage patterns from those which would exist in their absence.

A strike involves losses to the firm and to the employees. Presumably firms wish to avoid the costs of a strike and, in decision-making, this involves calculation both of what a strike would cost and the probability of its occurring. Similarly, from labor's point of view, the calculation may be presumed to rest on the cost of a strike and the expected benefits that will be obtained if a strike occurs. This reciprocal dependence of labor and management on what the other is likely to do makes analysis of what is likely to occur dubious and may tend to make any prediction conditional upon assuming habitual responses on each side.

The expected cost to a worker who expects to be employed after the strike is simply the present wage times the expected duration of the strike less any strike pay or other income he can expect to pick up in other employment while the strike lasts. The latter aspect can be expected to vary with the ease of finding alternative employment which may be proxied by series like the unemployment rate and the vacancy rate. The gain is the present value of the increase in wages won as a result of the strike and so it depends on what the wage rate -- or offer -- already is. If the strike may lead to lower employment after it is over, the expected costs arising from the finding of new employment and the present value of any expected wage differences need also to be added. These expectations need not be the same for all workers.

Labor negotiations are conducted by union representatives who are at least to some extent responsible to their members. This may have two effects. First, insofar as the members with seniority tend to control the union, they may regard a strike with more equanimity the more recent hirings there have been, since this may affect the security of their employment if reductions in the number of employees ensue from a strike or a high wage bargain. If employment has been fluctuating, this aspect may be represented by the number of employees. Second, in evaluating the performance of their leaders, union members may use w_t^*, as may the bargainers, in assessing what it is reasonable to expect as an outcome of the bargaining.

It is presumably crucial to the whole bargaining process that the union and the employer be uncertain about the reactions of each other. This uncertainty pertains to the probability that a strike will occur, its expected duration and to its expected effects. Suppose that at any moment of time these may be represented by probability distributions for a strike occurring, for its duration and for being fired. All depend on the wage demanded, w_d, and on the parameters facing the employer -- as perceived by the employees. Thus, conceptually, we might regard a worker as postulating the expected value of demanding w_d as

$$E(w_d) = [1-p(f)][w_d/r - \sum_{t=0}^{\infty} p(s)w_d p(d_t)/(1+r)^t] + p(f)E(w_m) \tag{5.15}$$

where p(s) is the probability of a strike $p(d_t)$ is the probability of its lasting through period t and p(f) is the probability of being fired (ignoring the time dimension of when one is fired). If we now presume that these functions can be aggregated adequately to get expectations for a union, the union may be imagined to try to maximize some function of $E(w_d)$ and, possibly, of e_t.

Similarly, a strike will impose costs on the firm which presumably depend on the rate of output it intends or expects to produce and its value. To avoid a strike, the firm may add to its labor costs, presuming that the payment of a higher wage would reduce the probability of a strike occurring or reduce the expected duration. Thus to (5.10) is added a term for the expected cost of a strike, depending on the wage offered, the cost effects of a strike and the probability of a strike being called -- as seen by the employer. Formal minimization of (5.10) with this addition, would give the maximum wage the firm would be willing to offer to avoid a strike. Similarly, maximization of the objective function of the union would give a minimum demand.

Such a static approach is not, of course, the end of the story. Since bargaining is a continuous process, it may be worthwhile for either the union or the employer to set a wage that will tend to produce a strike if thereby he can affect the distributions as seen by the other side in future. Similarly, if the employer's maximum is greater than the union minimum, there is a range where the bargain would fall. Only if the union correctly forecasts the employer's reactions, and conversely, would this be likely to produce a definite wage, and it is in the interests of neither party to be completely predictable. If, however, the range of indeterminacy involved is small and both sides have fairly realistic understandings of the situation, the determination of union wages may largely be determined by the factors already discussed.

The factors entering the union's and the employer's considerations about each other are largely those entering the earlier discussion. Thus while one might expect the wage to be affected by the presence of a union -- and in a fuller model the level of output -- and while the parameters would be different for the adjustment processes, there is no reason to suppose that the form of the equations will necessarily be different nor does there seem to be any presumption about what sorts of differences in behavior might ensue. Furthermore, since parameters may vary among sectors in any case, the determination of differences could not necessarily be ascribed to unions in empirical work. Since the discussion of wage determination in the absence of unions leads to no definite predictions about the parameters and since the variables involved remain largely the same where there is bargaining, there seems to be no reason to change the basic nature of the model being considered. This is not to deny, for example, that the expected value of wages, given that a strike occurs, is affected by the strike or that the presence of a union may alter the parameters of the model.

Bargaining considerations may dominate wage determination in the unionized sector and they may also strongly affect relative wages. Changes in the exercise of union power may also have spill-over effects into other sectors, partly by changing w* there. Furthermore, even if the exercise of union power may make it more difficult to obtain employment in the unionized areas, the higher pay may raise the expected value of trying to obtain employment in these industries, leading to quitting and to hiring pressures in the rest of the economy and affecting the duration of unemployment in general.

The existence of collective bargaining may also produce a quite different type of effect on the determination of wages. This is the lengthening of the period between changes in wage rates. Needless to say, even in the absence of collective bargaining, rates of pay are not adjusted all that frequently, but the existence of formal contracts, while possibly lengthening the normal periods between adjustments, may also have the effect of making it less likely that wages will adjust when the need for adjustment becomes apparent. Insofar as this is true, expectational factors may become more important in the process of wage determination since the effects and merits of the terms agreed upon will depend on the circumstances which will arise during the course of the contract as well as on the current situation and it may be very difficult or costly to change terms which have become inappropriate. This is true on both sides of the bargain.

The existence of longish-term contracts may lead to a displacement in time of adjustment as the response to an impetus for changing wages has to wait for the termination of the current contract and for the same reason may delay the process of adjustment throughout the economy. In addition, many observed changes in wages will be the result of increases negotiated on the basis of expectations about what the situation would be at some time in the past rather than on what the situation actually is. The fact that these predetermined wages involve changes as well as levels may again make any straightforward econometric work a bit dubious since it may be introducing substantial and variable lags into the system.

---

[22] One interesting set of findings about these lags is contained in Taylor, Turnovsky and Wilson (1973).

Conclusion

The model developed in the previous section presents at least as many aggregate difficulties as the one in section two and the implications of the difficulties are possibly more serious. First, the decisions of firms depend on their own planned output and it is easily imagined that the composition of output as well as its total matters for the aggregate response. Possibly even more serious is the problem that even if for each firm the conditional value of its perceptions τ and w^*, given some aggregate indexes, can be regarded as positive functions of these indexes and otherwise to be independent of other variables, there is no reason to think that a change in the aggregate will lead to or be associated with qualitatively the same changes in other variables. For example some wages may rise, some fall.

This sort of problem may become especially severe in the case of associating quits with wage increases. If only a few wages rise when the general level of wages is measured as rising the effect on separations might be much smaller than if all wages rose. If indeed a rise in wages is accomplished by only a few rising and if these wages rapidly become embodied in other workers' perceptions, even to a very limited extent, it might well be possible that an increase in wages produces an increase in separations.

The consideration of the possibility of firings complicates the analysis of section three, since in determining unemployment they enter the equations in the same ways that quits did. Since it is not possible to derive the response of firings to various economic conditions with any confidence, parts of the discussion of unemployment in section three become blurred.

It is worth noting that (5.11) does not provide a relationship between wages and current labor-market conditions. It provides, instead, a relationship between wages and both output and perceived labor market conditions. Of course, should the distinction between perceived and actual conditions not matter, so that the two can be treated as the same thing, then actual labor market conditions might be presumed to influence wages. There would then be a Phillips curve type of relationship (though not probably in the same limited range of explanatory variables used in standard Phillips curve analysis) in addition to the unemployment equation (3.13). Whether it would be any simpler than (3.13) or whether it would be separately identifiable remain moot questions. It is, of course, precisely when perceived and actual labor-market conditions are the same that the framework in section three yields no conclusions. Since section five itself yielded no definite qualitative predictions in any case, it can hardly be argued that this line of argument would establish the existence of a Phillips curve or any presumption that the empirical relationship actually represents the process by which wages are determined.

The theory developed in this chapter is seriously deficient in that it does not encompass the way in which expectations or perceptions are formed. It is also very far from yielding any precise specifications for the various equations developed and it is a very long way from the formulation to the data actually available. These problems are the subject of the next chapter.

chapter three

SPECIFICATION, DATA, AND ECONOMETRIC DIFFICULTIES

Perceptions and Unobservable Variables

The considerations developed in the previous chapter, based on assumptions about individual behavior, gave only the weakest guidance about aggregate relationships. They suggested for aggregates in the labor markets models of the general form:

$$H_t = H(\overline{w}_t, w_t^*, \overline{\tau}_t, \tau_t) \qquad (1.1)$$

$$Q_t = Q(\overline{w}_t, w_t^*, \tau_t, e_{t-1}) \qquad (1.2)$$

$$F_t = F(w_t^*, \tau_t, z_t, y_{t-1}, e_{t-1}, H_{t-1}) \qquad (1.3)$$

$$L_t = L(\overline{w}_t, w_t^*, \overline{\tau}_t, \tau_t) \qquad (1.4)$$

$$\overline{w}_t = \overline{w}(w_t^*, \tau_t, z_t, y_{t-1}, e_{t-1}, H_{t-1}) \qquad (1.5)$$

$$\overline{v}_t = \overline{v}(w_t^*, \tau_t, z_t, y_{t-1}, e_{t-1}, H_{t-1}) \qquad (1.6)$$

$$\overline{y}_t = \overline{y}(w_t^*, \tau_t, z_t, y_{t-1}, e_{t-1}, H_{t-1}) \qquad (1.7)$$

$$U_t = U_{t-1} + S_t + F_t + (L_t - L_{t-1}) - H_t = L_t - e_t \qquad (1.8)$$

$$\bar{\tau}_t = \tau [U_{t-1} + S_t + F_t + (L_t - L_{t-1}), \bar{v}_t, \bar{y}_t] \qquad (1.9)$$

$$y_t = y(y_{t-1}, Q_t, F_t, \bar{y}_t, H_t, H_{t-1}) \qquad (1.10).$$

Equations (1.1) - (1.4) give the basic flows of labor into and out of employment and the labor force. Through (1.8) they give unemployment. (1.5) gives the wage-determination equation. (1.6) and (1.7) set the demand-side conditions in labor markets. (1.9) gives the determination of actual tightness which enters other equations. (1.10) yields an equation for skills which enter into other parts of the model.

There are a number of severe problems in attempting to implement the model in (1.1) - (1.10) empirically, in addition to the doubt that the aggregation process yields any valid, constant relationships. Probably the most severe of these is the presence throughout the equations of perceptional or expectational variables. Virtually nothing is known about how these are formed. It might be tempting to treat them by using the standard adaptive expectations framework,

$$x_t = x_{t-1} + \gamma(\bar{x}_{t-1} - x_{t-1}) \qquad (1.11),$$

with $\bar{x}_t$ representing the realized value and x_t the perceived or expected values. There are two objections to this approach. First, it would help very little for a number of expectations are involved, especially since τ is not a measured variable and one would have to resort to expectations on its component parts. As a result, the technique of elimination of expectational variables through use of (1.11) and the structural equations would rapidly yield very complicated expressions unless one were able reasonably to make the rather implausible assumption that the value of γ in (1.11) was the same for all perceptions.

More serious, however, is the basic implausibility of the assumption that (1.11) represents a sensible way of forming expectations. The case where it is known to yield an adequate forecasting model,[1] namely that of a random walk observed with error, hardly seems likely to fit the nature of the systems generating realizations given in (1.1) - (1.10). At the least one would expect the simultaneous nature of that system to affect the perceptions. Furthermore, it is, of course, far from clear exactly what magnitudes are being perceived and it is clear that other variables may well enter the system and might very well affect the formation of expectations or perceptions.

It is worthwhile dwelling on these difficulties for a moment in relation to one specific perception, the going wage, w*, which is clearly not a quantity for which data exist. Among possible elements which might affect the going wage are the projection of past expectations and the past rate of growth of wages; a mechanism to allow for the revision of incorrect previous expectations, and the rates of pay prevailing in various other sectors of the economy from the one where attention is being focussed by the person who is seeking a job or employing labor. It may also be desirable to introduce ability-to-pay considerations and a ratchet on past wages. Ability to pay may enter simply because unusually high profits could indicate that workers are in short supply relative to demand and even if one employer, with whom one is directly in contact, may have no intention of passing on the profits, others who will might be turned up as a result of searching for them. Presumably both for profits and for wages elsewhere, the relationship of current to historic values may be more important than the levels of these variables.

Putting these suggested elements together, we might assume that:

$$w_t^* = J(w_{t-1}^*, \overline{w}_{t-1}, g_w, w_h^e, w_{max}, \pi_t, \pi_h) \qquad (1.12)$$

where w_t is wages,

g_w is the past growth of wages,

w_t^e is (a vector of) wages elsewhere in the economy,

w_h^e is (a vector of) the historic relative structure of wages, an average perhaps

---

[1] Cf. Muth (1960)

of w_t/w^e for past periods,

w_{max} is the past high level of wages,

π_t is the rate of profit, and

π_h is the historic rate of profit.

For a period where wages generally are rising w_{max} is likely to be inoperative.

Any particular specification of (1.12) is likely to be highly arbitrary. Furthermore, it is far from clear that as economic circumstances alter or the nature of the economy shifts, the nature of the formation of expectations may not change. Indeed, unless w* actually does reflect the ex post perceived value of wages fairly well, one might expect the function J to change. Such a possibility, however, could be expected to cause difficulties for any formulation to be used with time-series data.

One possible specification for (1.12) would be to assume that:

$$w_t^* = \alpha_1 w_{t-1}^* + \alpha_2(w_{t-1} - w_{t-1}^*) + \alpha_3 w_{max} + \alpha_4(w_{t-1}^e w^{-e} - w_{t-1})$$

$$+ \alpha_5(p_t - \overline{p}) \qquad (1.13).$$

This formulation combines the adaptive-expectations model for growing series inaccurately observed with other factors coming from more immediate events and also an afterglow of past good fortune. The growth rate of wages is basically contained in $\alpha_1 - \alpha_2$ and assumes that the long-term growth of wages overall can be regarded as coming from a trend-like feature such as the growth of productivity.

Another way of including the past growth of wages is to include it directly, possibly as a straight projection or as an adaptive expectation. For example, (1.12) might be expressed as

$$w_t^* = \alpha_1(w_{t-1} + c_t^*) + \alpha_2 w_{max} + \alpha 3(w_{t-1}^e w^{-e} - w_{t-1}) + \alpha_4(p_{t-1} - \overline{p}) \quad (1.14)$$

with

$$c_t^* = \beta_1 c_{t-1}^* + \beta_2(w_{t-1} - w_{t-2} - c_{t-1}^*) \quad (1.15).$$

This formulation may provide more of a drive to project past wages into the future than (1.13), but it has less of a tendency to keep projecting a particular rate of change irrespective of past experienced wage changes. In (1.13) if expectations are to be fulfilled, only one rate of growth of wages is possible. Any sectoral differences in the rates being projected will lead to problems because this in turn upsets the traditional structure built into the model. Thus in (1.13) the possibility arises of inconsistent expectations about rates of growth in various sectors and inappropriate differentials among sectors. In (1.14) a variety of possible rates of growth of wages may arise depending on the expectations in (1.15). It may be noted that similar forms for the logarithms of w_t^* are available, basically transforming the expectations into ratio form.

The timing of the w terms may be of considerable importance in the workings of the labor market. If the relative-wage terms in (1.13) and (1.14) are immediate, so that their subscripts should be t rather than t-1, current developments on wages elsewhere will reverberate immediately in the labor markets being considered. It should be noticed, however, that if this is the case much of the analysis of chapter two would have to be redone.

So far we have not included price changes in the formation of expectations about wages. It can be argued that price changes should play no role since the going wage represents basically alternative opportunity costs. However, if in the past price changes have been associated with wage changes, they may be taken as predictors of wage changes. At the same time, real wages may be important in affecting worker morale. Either aspect might then lead to a term for changes in prices being included in (1.12)

Because the going wage is a type of forecast, it could be altered, presumably, by circumstances which indicate that usual or habitual forecasting methods will be incorrect.

What sort of change is needed for resetting the initial conditions of an intuitive forecasting procedure or to alter the procedure is unknown, but this possibility may provide a problem to empirical research as well as an opportunity for policy.

The range of choice for formulations about w_t^* is sufficiently complicated to render its inclusion explicitly in empirical models virtually impossible unless somehow it could be observed. These formulations have the further disadvantage that they do not reflect the way in which it was suggested in chapter two that wages are actually determined. It is only sensible to presume that aspects of this determination would condition the formation of the prediction. Since going wages are only one of the many quantities of an expectational nature involved in the wage-employment process and since in all cases simple, explicit prediction formulae have little justification, the attempt to formulate such formulae and introduce them explicitly into models will not be pursued.

The approach taken is to treat the vector of expectational variables x_t as being formulated on the basis of past values of the set of variables involved, $\overline{x}$, and of some others, ξ. That is,

$$x_t = A_1\overline{x}_{t-1} + A_2\overline{x}_{t-2} + \dots + A_N\overline{x}_{t-N} + B_1\xi_{t-1} + \dots + B_N\xi_{t-N} \qquad (1.16).$$

The variables involved in ξ are real domestic product (which in any case is the link between the labor-market and the rest of the economy in the model and from the formulation of chapter two should probably have been treated as an expectational variable) and the rate of change of the Consumer Price Index. This price variable may be relevant for the formation of expectations, especially about wages; but it may also have a role to play in conjunction with wages because of possible real-wage effects especially in connection with labor-force participation.

The truncation in (1.16) is essentially arbitrary. It is introduced to produce feasibility of estimation. The exact length (N) varies in parts of the subsequent investigations but usually involves two years. Restrictions were placed on the sequences $\{a_{ij}\}_m$, m=1,...,N, to permit estimation in two ways. (With monthly data two-years of lags involve twenty-four distinct parameters if restrictions are not imposed.) The first involved the assumption that over some periods the values were all the same. This permits, for example, the inclusion of only past annual averages of a variable rather than all its separate values in the course of the year. The distributed-lag function involved is a step function. It is, of course, arbitrary but it is convenient for exploratory work and it was retained when its performance frequently appeared to outshine other alternatives. Furthermore, it might be argued that people think in terms of averages or changes in them over considerable periods rather than in terms of more smoothly adjusting weighting schemes. The second form of distributed-lag function used was the Almon (1965) polynomial distributed-lag function.

The exact specifications for the variables in (1.16) were to a considerable extent arbitrary and very extensive experimentation was not possible. They, like the details of the lags, will be left until we take up the particular models estimated in later chapters.

The form of (1.16) is particularly convenient when its variables correspond to those in a linearized form of (1.1)-(1.10) because some of the variables seem not to be observable at all and, in effect, will have to be eliminated.[2] The variables involved are current hiring standards, $\bar{y}_t$, and skill levels, y_t. Substituting equation (1.7) into (1.9) eliminates the problems for $\bar{y}_t$, though it introduces all the expectational variables in the system into $\bar{\tau}$. Since $\bar{\tau}$ is not observable (in fact, is only a short-hand expression referring to a combination of various aspects), equation (1.9) has to be used to eliminate it in other equations. This produces effects for the variables in (1.9) which may well be additional to and qualitatively different from the effects they already have via (1.16). y_t is also unobservable, but (1.10) may (in principle) be used recursively to express it as a function of all past values of the system.

---

[2] Other variables mentioned in earlier developments for which it is very doubtful if any worthwhile measures are possible are simply ignored: for example, the costs of seeking work. It is worth noting that the recent major change in unemployment insurance would not be reflected in our data.

Truncating this process and substituting in the equation where y_t occurs might be an adequate way of dealing with the problems.

Having proceeded this far, it was decided to continue and to eliminate Q_t and F_t (which in any event were available only summed together) from $\overline{\tau}_t$ because data on them were available for only part of the period. This elimination allowed estimation over a longer period and a comparable specification for equations involving data similarly restricted in availability.

These implicit substitutions would themselves tend to add lagged terms possibly of the form of (1.16) to the various equations. The coefficients and signs involved which result from the substitutions are largely unknown. This is also true for those in (1.16), especially when a set of perception-variables are involved and terms from different perceptions involving the same variables are collected together. This problem, however, hardly matters since in any case the theory was often vague about the signs of the structural coefficients and in any case econometric difficulties discussed in section three may change the signs of the parameters actually being investigated from those which might arise from considerations of economic theory. But even with these procedures and substitutions accepted as reasonable, a major problem remains with respect to whether relevant data are available.

The Problems of Data

The chief difficulty in investigating labor markets is the diverse nature and dubious quality of the data available. Frequently, the data do not measure what is wanted, measure things in peculiar ways, and are not comparable or complete. The wages data do not refer to the same group as the unemployment data. Both are distinct from the groups covered by labor-flow data. These are not minor problems, especially when studying a subject as complicated as labor markets. This study draws on a number of sources of data, which are not comparable with each other, but have to be used for lack of better measures. A brief review of the series involved should bring out and fix the nature of these difficulties.

a) Unemployment and the Labor Force

The source of the unemployment and labor force data used is the Labour Force Survey.[3] This is a sample survey, currently of about 30,000 households, which has been conducted monthly since 1953. The data pertain to the status of the civilian, non-institutionalized population over the age of thirteen. The data are broken down by age and sex, by region and sex, and by industrial divisions. This is the source of the unemployment rates used, as well as some other information.

The main difficulty in evaluating the unemployment rate arises from labor-force participation. It is quite possible that, as a result of changes in attitudes, responses to questions establishing membership in the labor force among those who are not employed have changed over time in the sense that for groups of people in the same circumstances the answers to participation questions may be different. If this is so, there will be a changing bias in the unemployment rate. The bias would be indistinguishable from changes in structural unemployment. It is also possible that the changes and improvements in the survey which have occurred over time may alter responses. The problems are likely to be most severe among females and the young (for whom often answers are given by their parents).

The data by industrial divisions are suspect since the classification of the unemployed may be rather haphazard. The classification is based on industry of last employment (rather than of job search). The data for some divisions are not available prior to 1965 or are lumped with data for other divisions. This was serious only when the services sector was investigated.

The Labour Force Survey also produces data on the duration of unemployment and of the status of people in the previous month, cross-classified by their status in the current month, (referred to as gross-movements data). Unfortunately these data are not internally consistent. The numbers who are currently recorded as having been unemployed in the previous month do not agree with the numbers who have been unemployed for one month or more and they do not begin to agree with

---

[3] Cf. Statistics Canada, 71-001, <u>The Labour Force</u> (monthly).

the number who were recorded during the month before as unemployed.[4] These data were not available cross-classified with other aspects when this study was undertaken.

b) Hirings and Separations

Data[5] on hirings and separations were collected until August, 1966. At that time the series were discontinued and have not been replaced by an alternative set of numbers. They were based on a semi-annual survey of establishments with 10 or more employees or of firms with more than one establishment irrespective of the number of employees. The reason for the termination of these series is not clear.

This set of data recorded on a monthly basis hirings and separations and end-of-month employment. Part-time workers, and those on strike or lock-out were included, but casual workers with less than six days employment were excluded. Unlike the Labour Force Survey, persons on temporary lay-off (under 30 days) are included among the employed rather than among the separated. No distinction was made between new hires and rehires of persons who had been on longer-term lay-off. Data on voluntary and involuntary separations were not available. The series excluded fishing, trapping, and public administration and, due to this restriction, and to that on size of establishments, they pertained to about 70 per cent of employment. It is worth noting, probably because of difficulties involved in casual employment, that the difference between the hirings and separations does not necessarily yield the change in recorded employment.

c) Vacancies and Placements

A third body of data concerns placements and vacancies. These data were extracted from the records of the Canada Department of Manpower and Immigration, including those of its predecessor, the National Employment Service.[6] They are

---

4 The gross-movements data are unpublished.

5 Cf. Dominion Bureau of Statistics, 72-006, Hirings and Separations Rates in Certain Industries (semi-annual to August 1966).

6 A discussion of this body of data is found in Thomson (1966).

administrative statistics arising out of the operations of the federal government's employment service. This aspect presents a serious disadvantage to these numbers since they are partial and are subject to any trends in the role of this service which may have occurred. On the other hand, they are the only statistics available in this area and, given their basic nature and the inherent limitations of administrative statistics, they appear to be of high quality.

The data are built up from three basic series. The first is vacancies notified representing orders placed with the employment agency for workers. They pertain to positions either currently available or available within 30 days. The second is placements, representing basically vacancies filled by the agency. They are separated into regular and casual placements. Third is vacancies cancelled representing vacancies which were notified as being no longer available either because they had been filled, though not through the auspices of the employment service, or because the employers no longer desired to fill the positions. Unfortunately, the reasons for cancellation are not specified. The residual series is unfilled vacancies which are the vacancies remaining unplaced and uncancelled at the end of the month. These data are available with standard industrial classification, to the level used here.[7]

d) Wages

There is a severe lack of solid or comparable information on wages in Canada which is surprising in view of the importance of wages both in their own right and in connection with inflation. A wage is basically a price -- the price for a certain amount (in time) of labor.[8] Considered in this light, wages are similar to other prices in the economy. However, since typically an employee devotes himself to a single employer, there are problems in what the price actually is, or, equivalently, what the amount is. This

---

[7] They are also available on a regional basis. It is worth noting that things aren't quite as simple as described with these data. A running count is kept, together with periodic, end-of-month checkings of these totals, and discrepancies do appear.

[8] This, of course, ignores piece-work.

might suggest that the weekly wage or salary would be the appropriate measure. However, it is widely recognized that in practice and over short periods of time there is a direct trade-off between work and leisure so that, speaking very roughly, a worker who works less than full-time should receive proportionately less. Similarly, overtime receives additional pay, often at a substantially increased hourly rate. In some cases, the hourly rate of pay may suffice as an indication of the price of labor, but care must be exercised since the conditions of employment, including the amount of time a worker can expect to spend on the job, may still be relevant in establishing what the price is. Thus a worker might well treat different hourly rates as representing the same "price" if they are accompanied by different hours of work. In spite of this difficulty, probably either an hourly, straight-time rate or a weekly salary could be taken as the price of labor, depending on the nature of the job and whether the basic work unit is an hour or a week.

A second major problem with what a wage rate is arises from fringe benefits of one kind or another that are given to employees. These usually have connotations of income in kind rather than of simple monetary remuneration. In general, such a form of payment can be expected to be worth less to the employees than the receipt in money of the amount which they cost employers, were fringe benefits not often tax exempt.

Even if the wage rate for a particular, specific form of employment were measured satisfactorily, aggregation problems arise in obtaining a figure for some wider class of labor. It is clear that the solutions to these problems available in the existing series are not particularly happy ones. "Labor" is a highly diversified factor of production, just as "goods" represent a highly diversified bundle of individual commodities. The diversification is over talents and acquired skills. If one had available the wage rates for given types of jobs or types of labor, then one would expect that the wage rate for "labor" would be formed as an index number representing a weighted average of the rates of pay received by different individuals or in specific types of job. No such figure with widespread coverage, collected frequently, is produced by Canadian statistical agencies. Instead, one must rely on figures which have at least some short-comings.

The series which would appear to come closest to what one would probably desire are Index Numbers of Average Wage Rates, which are published on an annual basis by the Canada Department of Labour.[9] These numbers cover non-office occupations. The data are derived from an annual survey of wage rates conducted by the Canada Department of Labour covering the last pay period in the third quarter of each year. They are based on the average wage rates which are calculated for each occupation which is included within each industry for which an index is formed in each of the five regions of Canada. These rates (which are in themselves current weighted averages) are then aggregated to form index numbers using weights based on occupation - region - industry non-office employment over the period 1963-65. (The indexes themselves are published with 1961 = 100). The main drawbacks of these series are (a) they are only annual, (b) they cover only non-office occupations, and (c) the peculiar combination of current averaging followed by base-weighted averaging. This latter point is quite possibly of minor importance. The advantage of the series is that it is based on wage rates, and that occupational variations in employment within firms are not reflected into variations in the indexes without at least some sorts of changes in wage rates.

Two other series prepared by the Canada Department of Labour are also in the form of average wage rates. These cover base rates (the straight-time hourly wage rates of the lowest paid qualified workers in each negotiating unit) paid under collective agreements involving negotiating units covering five hundred or more employees. The construction industry is omitted entirely. The group of workers covered constitutes approximately one sixth of the labor force. The series on rates in force is a chain index (since the population shifts). Its weights are the total number of employees involved in each year. The second series records average increases granted under agreements settled in a period. In the case of contracts covering more than one year, the total increase is prorated to annual rates. The method of prorating is open to doubt.

---

[9] Cf. Canada Department of Labour, Wage Rates, Salaries and Hours of Labour, Ottawa, Information Canada (annual).

The limitations of these series are quite clear. First is the limitation of coverage to only large collective agreements. Second is the concentration on base rates. Third is the rather narrow sectoral breakdown provided -- usually manufacturing, broken into durable and non-durable and non-manufacturing industries -- and rather limited coverage in terms of years on these aspects since data are available only from 1965.

Luckily, data on contracts involving bargaining units of five hundred employees or more were available for the period 1953-1968. Rates of change of base rates for all major groups were formed. The calculations involved computing the annual rates of increase provided in each contract signed in the time period considered and averaging them over the contracts signed, using the number of employees involved as weights. The paucity of separate contracts in most areas precluded calculation of quarterly series except for all contracts together and for manufacturing. No contract information was available in a form which could be easily processed in construction and in the finance, insurance and real estate group. It should be stressed that the contracts involved in different observations differ. Because of limitations in coverage one cannot use differences between settlements and the wage-rate index to make direct inferences about differences between union and non-union rates of pay.

The other series available cover average earnings of one form or another. There are two series, which we employ, which are available at monthly intervals for a fairly lengthy span of time. These are Average Hourly Earnings,[10] and Average Weekly Wages and Salaries.[11] Average Hourly Earnings apply only to workers for whom a record of hours worked is maintained. They are available only for Mining, Manufacturing and Construction. Average Weekly Wages and Salaries cover all wage earners and salaried employees rendering current services or on paid absence. Both are derived from a survey of establishments having twenty or more employees. Of these series most concentration is placed on Average Weekly

---

[10] Cf. Statistics Canada, 72-003, Man-Hours and Hourly Earnings with Average Weekly Wages (monthly).

[11] Cf. Statistics Canada, 72-002, Employment and Average Weekly Wages and Salaries (monthly).

Wages and Salaries, since its basic notion can be supplemented in areas where it does not exist by use of average labor income data in public administration calculated by dividing government payrolls by the number of government employees from the Labour Force Survey. Some implicit breaks in these series occurred with the revision of the SIC. The break occurs at the end of 1956, but apparently had a negligible effect on the series.

Use of earnings series is not without problems. Even for the same workers, a measure such as weekly wages will fluctuate with the amount of work done in a particular period. The same is true for hourly earnings if overtime occurs. Equally serious, any shifts in the composition of employment among different categories of employment receiving different rates of pay will lead to changes in these figures. That is, regarded as an index number, the weights for individual wages vary from period to period with the changes in the composition of employment. On *a priori* grounds, one would expect to find that seasonally or cyclically unstable forms of employment would receive higher wage rates. It is also likely that cyclical variations in employment do not strike uniformly across the wage rate structure of firms. As a result, changes in economic activity may easily produce changes in the measures based on average pay even when the same rates of pay prevail in each separate job.[12] If this is so, studies which relate such "wage rate" data to the level of unemployment should be treated with care since there is a danger that relationships found may be spurious or have a quite different interpretation from the standard one. This aspect of the data, stemming from our not having proper indexes of wage rates, does mean that some inevitable ambiguity is introduced into studies using such figures. The advantages of using them are their broad coverages and the frequency with which they are collected. Results based on them are of advantage in that they are comparable to those found by earlier investigators. Thus the studies by Vanderkamp (1966) and by Bodkin, Bond, Reuber, and Robinson (1967) employed Average Hourly Earnings data while Kaliski (1964) used Average Weekly Wages and Salaries.

---

[12] The point is hardly new. Cf. e.g. Eckstein (1968)

Econometric Difficulties

Studies of labor-market activity and, particularly, the wage and employment adjustment mechanisms face a number of econometric problems. The first is that the relationship being considered is part of a simultaneous equation system determining other variables in the systems. There is a tendency in such situations for economists to claim that single equation methods are "bad" and to have recourse to simultaneous equation statistical techniques such as two-stage least squares.[13]

Simultaneous equation techniques are not used in this study for a number of reasons. First, the substitutions for endogenous variables which are not observable, which were discussed in section one, means that we are not estimating the structural form but a semi-reduced form version in any case. Indeed, in the equations later studied, the only endogenous variables appearing as explanatory variables are vacancies, which appear in the equation for hirings or placements and wages which appear in that equation and the one for separations. Both appear in some of the unemployment and gross-movements equation. These variables themselves, taken to correspond to ones determined by employers, depend only on expectational or lagged variables. If the disturbances in the equations generating these variables were independent of those in the hirings and separations equations, the model could be treated as recursive, and, in a linear form, least squares would be the appropriate estimator. (If this assumption does not hold, there will be an observationally equivalent form but the coefficients in it will not be the standard ones.) Second, even if this were not the case, the alledged inferiority of least-squares may be illusory even with a correctly specified model.[14]

---

13 These techniques are discussed in standard econometric texts such as Johnson (1970) or Goldberger (1964).

14 The main finite-sample evidence, thrown up by simulation experiments, is ambiguous. Cf. e.g. Cragg (1967). Even if this were not so, such results would have to be treated with suspicion. Cf. Thornber (1968). The usual prejudice is primarily based on asymptotic results whose relevance to small-sample situations remains to be demonstrated.

Third we have no intention of developing complete multi-equation models for more than a subsegment of the labor market and, even if we did, there would be no hope that it would be correctly specified. The very wide variety of possible versions of the Phillips curve itself well illustrates the problems of hoping to get correct specification throughout a model. In such a case, where misspecification has to be recognized to be a real danger, the alleged superiority in finite-sample situations of simultaneous equation estimators is even more dubious. Fourth, while some solution to the other econometric problems is possible within the single equation context -- or at least an analysis of the difficulties can be conducted -- no such developments have been made for the simultaneous equation model. Finally the preceding studies have mainly concentrated on the single equation approach[15] and it is far from clear that single equation regression analysis is not the correct technique in any case. That is, the relevant question may be what is the distribution of the dependent variable, given the values of the "explanatory" variables, even though they are stochastic or endogenous. In terms of the Phillips curve, the question is what rate of change of wages can be expected given the level of unemployment and not the simultaneous equation question of what, given the values of some predetermined variables, is the rate of change of wages that can be expected from these variables directly and what arises from the accompanying value of unemployment. This is particularly likely to be the relevant question in the Phillips curve since it is highly implausible to suppose that the Phillips curve, at least in its simple form, is a properly specified structural equation. In addition, the models used are highly non-linear when regarded as a simultaneous-equation system and appropriate estimations are not available.

---

[15] Such simultaneity as is recognized has involved primarily prices rather than unemployment.

The second type of econometric problem arises from the fact that our variables can only be regarded as proxies for the relevant economic forces. There are, as we saw in the previous section, shortcomings in the data to be used. Furthermore, even if they did measure with complete accuracy the quantitites which they represent, the data available would not in all likelihood measure the correct economic variables. This is particularly the case with the use of various lagged values of the dependent variables to attempt to represent expectational variables.

The situation in stylized form may be described as follows:[16]

$$Y_t = X_t\beta + \varepsilon_t \tag{3.1}$$

where Y_t is the dependent variable, X_t a 1 x K vector of "true" explanatory variables, β a vector of coefficients and ε_t a random disturbance. Instead of observing X_t, we observe:

$$Z_t = X_t\Gamma + N_t \tag{3.2}$$

Here Γ is a K x K matrix of coefficients and N_t are disturbances. Then Z_t is used in place of X_t in "estimating" β. Even if Γ is a diagonal matrix, the signs of the coefficients, a, which are actually being estimated in the (true) relationship

$$Y_t = Z_t a + U_t \tag{3.3}$$

are not necessarily the same as those of β. This gives strong reason for not judging an estimated relationship on the basis of the "correctness" of signs rather than goodness of fit. In addition, if there is a second set of proxies, say

$$Q_t = X_t D + M_t \tag{3.4}$$

then the coefficients for both Z_t and Q_t in the (population) regression of Y_t on Z_t and Q_t may be non-zero. However, if one has competing, alternative proxies for a given variable,

---

[16] Further discussion of these problems and derivation of the results mentioned may be found in Cragg (1970).

the one giving the better fit is the one which is closer to the true variable in the sense of the disturbance in (3.3) having the smaller variance. One might be still wiser to use one of them as an instrumental variable. These findings mean that one cannot necessarily preclude the possibility that variables which have no theoretical place in an equation will turn out to have a non-negligible effect, possibly with a "peculiar" sign based on reasoning which ignores their proxy nature. This should be kept in mind throughout the investigations that follow. It is worth noting that these problems are similar in effect to those found by Theil (1954) for aggregation -- a set of problems which may also affect this study.

There can be little doubt that the problems of inappropriate data plague this investigation. As we noted in the previous section, the wage measures available probably bear only a remote resemblance to what is wanted. The same is true of vacancies which are used among the proxies for labor-market tightness. Since they are operating statistics for an agency which receives only a fraction of vacancies they cannot possibly be the appropriate figures. Furthermore it is not at all clear that the action of trying to fill a job by placing a vacancy with the agency or by making other attempts to fill a job (which would result in the recording of a vacancy in the recently instituted Job Vacancy Survey) corresponds to the rather passive action of setting a maximum number one is willing to hire. They are likely not to be the same unless it is simply impossible to hire someone without making the requisite efforts -- and certainly it is not the case that notifying the vacancy to a Canada Manpower Centre is necessary for filling jobs.

The third econometric problem concerns the measurement or representation of wage changes where they are the dependent variable. Much of the recent literature on wages has involved the comparison of measures of the quarterly rates of change of wages with various other variables. There are, however, some strong problems with the usual form employed for the rate of change of wages. This form, using quarterly data, is:

$$R_4(W_t) = \frac{(W_t - W_{t-4})}{W_{t-4}} = W_t/W_{t-4} - 1 \qquad (3.5).$$

The reason for the use of R_4 is that it is claimed that most wages are not variable in a period as short as a quarter so that at a more disaggregate level only the annual change has meaning.[17] This makes a good deal of sense. However, its main implication is that one should only use $R_4(W_t)$ at annual intervals. Used quarterly, each individual wage change will tend to be "counted" four times because the same change enters into the dependent variable in each of the three quarters succeeding the original occurrence of the change. By the same token, in regression models the disturbance terms from individual changes get counted four times with a tendency to produce strong auto-correlation in the residuals and to overstate the precision with which the individual equations fit the data.

Specifically, suppose that wages can be divided into four classes: W_t^1, W_t^2, W_t^3, W_t^4, depending on the quarter in which changes in them occur. Suppose also that the rate of change of each can be described by:

$$\Delta W_t^j / W_{t-1}^j = x_t \beta + \varepsilon_t \qquad (3.6),$$

when t refers to the same quarters as j; $W_t^j/W_{t-1}^j = 0$, when t refers to a different quarter from j. Here x_t is a vector of independent variables at observation t, β a vector of coefficients and ε_t is a disturbance term.

Then

$$R_4(W_t) \simeq \sum_{i=0}^{3} \sum_{j=1}^{4} \Delta W_{t-1}^j / W_{t-i-1}^j = \sum_{i=0}^{3} x_{t-i}\beta + \sum_{i=0}^{3} \varepsilon_{t-1} \qquad (3.7).$$

Similarly

$$R_4(W_{t-1}) \simeq \sum_{i=0}^{3} x_{t-i+1}\beta - \sum_{i=0}^{3} \varepsilon_{t-i-1} \qquad (3.8).$$

---

17 The argument seems to go back to Dicks-Mireaux and Dow (1959). The empirical basis is faulty. Some wages can be changed frequently; others are only determined every two or three years. These latter provide for raises and this means that some wage increases do not occur at the point of time when they are actually determined. To make matters worse, some wage changes arise as a result of a contract signed a good deal earlier. Attempts to deal with this problem are found in Taylor, Turnovsky and Wilson (1973). See also Wilton (1969) and Sparks and Wilton (1969) for approaches based on considering contracts explicitly.

It will be noted that three of the four terms in each of the sums in (3.8) also occur in (3.7). If we assume that the ε_t in (3.6) are independently distributed with variance σ^2 and mean 0, then the variance of $\sum_{i=0}^{3} \varepsilon_{t=i}$ is $4\sigma^2$, while its covariance with $\sum_{i=0}^{3} \varepsilon_{t-i-1}$ is $3\sigma^2$, giving an autocorrelation coefficient of 0.75 and leading one to expect, heuristically, a Durbin-Watson statistic of approximately 0.5. The autocorrelation is not, however, simply the first-order variety.

If these arguments were correct, the obvious equation to estimate is (3.6), but in most cases the data do not allow one to separate out the wages which did change in a particular quarter from the ones which did not. The alternative to using (3.7) or (3.6) is to use:

$$R_1(W_t) = \Delta W_t / W_{t-1} = \sum_{j=1}^{4} \Delta W_t^j / \sum_{j=1}^{4} W_{t-1}^j \qquad (3.9).$$

Only one of the four terms in the numerator of (3.9) is non zero. Thus for the first quarter, $R_1(W_t)$ is actually:

$$R_1(W_t) = \Delta W_t^1 / \sum_{j=1} W_{t-1}^j \qquad (3.10).$$

If we let $\alpha_1 = W_{t-1}^1 / \sum_{j=1}^{4} W_{t-1}^j$, then,

$$R_1(W_t) = \alpha_1 X_t \beta + \alpha_1 \varepsilon_1 \qquad (3.11).$$

The model for R_1 is given by virtually the same model as (3.7). However, in succeeding quarters the values of α_i may change, and it is only if one can assume that one fourth of the wages change each quarter that one can legitimately use $R_1(W_t)$ in succeeding quarters, and this cannot be strictly correct.

The problem is made worse by the fact that one does not use an index of wage rates for W_t, but instead one is usually forced to rely on an average earnings series of some sort. There is, as we shall see in chapter four, a pronounced seasonal pattern in the earnings figures. This arises partly from different average lengths of the work week and, possibly more importantly, from changes in the typical industrial and occupational mix over the year. This feature leads to a strong temptation to use $R_4(W_t)$ which tends to eliminate the seasonal. It is not entirely correct, even here, unless it is presumed that all groups in the course of a year get the same percentage increases; for the shifting implicit weights which come from changes in the industrial composition of employment means that the composition of the figures being used varies from quarter to quarter. The same problem arises with the use of seasonally-adjusted data. We shall largely ignore these last problems, which are part and parcel of the difficulties that arise from trying to use average earnings figures as if they were an index of wage rates.

One is then left with four choices: (1) to use $R_4(W_t)$ quarterly and ignore the autocorrelations, (2) to use $R_1(W_t)$ with seasonal dummies or with seasonally-adjusted data and hope that otherwise the coefficients can be treated as being the same from quarter to quarter, (3) to use $R_1(W_t)$ with proportionality constraints on the coefficients in succeeding quarters, rather than equality constraints, a procedure which greatly increases computational complexities with little else to recommend it, and (4) to try to work with R_4 in the form provided by the approximation in (3.8). The last alternative again imposes computational burdens that do not seem worth undertaking without strong reasons.[18] So one seems left for sensible, practical purposes with alternatives (1) and (2), at least in exploratory work.

An alternative possibility is to assume that the model should be specified in logarithms. It will be noted that (3.6) is a finite-change approximation for $d \log W = dW/W$. The alternative would be to use:

---

[18] The technique is to use Aitken's generalized least squares. Given that the errors in (3.6) are independent of each other and that the same proportion of wages change in each quarter, it is straightforward to calculate the autocorrelation matrix of the residuals using $R_4(W_t)$. However, there is no real advantage to this in that it is a way of returning to the specification for $R_1(W_t)$ except insofar as the original averaging in calculating $R_4(W_t)$ eliminates the seasonal factor. This procedure was used by Taylor, Turnovsky and Wilson (1973). Of course, the results will differ from those using $R_1(W_t)$ especially if the underlying specification implicitly is different.

$$\Delta \log W_t = \log W_t - \log W_{t-1} \qquad (3.12).$$

If W were aggregated logarithmically, this would eliminate most of the problems arising from different values of α_i, but it is in fact aggregated arithmetically and there are again difficulties with use of (3.12).

The final econometric problem is that of choosing between various alternative specifications for an equation, especially where different variables or forms are involved. The solution adopted for this when it was a serious difficulty was a Bayesian one. Alternative specifications were given equal prior probabilities. Within each regression model use was made of the improper priors for the parameters β and σ:

$$f(\beta,\sigma) \propto K\left|X'X/T\right|^{1/2}(2\pi)^{K/2}\,\sigma^{-(K+1)} \qquad (3.13).$$

This is equivalent to the more usual suggestion of being "flat" on β and log σ, except that the priors are essentially "flat" on parameters measured in terms of the standard deviations of y and x, given other variables, to avoid problems that would otherwise arise from rescaling (whether deliberately or inadvertently) the variables. This is especially necessary since the readily comparable units of measurement are not obvious for various alternatives. Given the data, D, assuming that the disturbances are normally distributed yields posterior probabilities for the alternative specifications, H_i, of

$$p(H_i|D) \propto (2\pi)^{-(T-K_i)/2}T^{-K_i/2}(S_i)^{-T} \qquad (3.14)$$

where S_i is the standard error of estimate of the regression, K_i the number of elements in β and T the number of observations.

When the dependent variables are the same and the number of parameters the same, comparison of the posterior probabilities in (3.14) is equivalent to comparing the standard errors of estimate. When one hypothesis is a proper subset of another, the odds in favor of the wider hypothesis over the other is a monotonic function of the usual F-statistic for testing the null hypothesis that the narrower one is correct against the alternative of the wider hypothesis.

When in fact all sensible alternatives are not examined or when the qualitative results are the same, results will be reported in terms of the more usual F and t-statistics rather than in terms of the odds in (3.14), since these parts of the investigations are largely arbitrary in any case.

Summary of Theoretical and Specification Considerations

A number of important points emerge from our discussion in this chapter and the preceding one. They may be summarized:

1) Theoretical considerations suggest that the workings of the labor market and the determination of wage changes and other quantities are a complicated business. Theory does not suggest:
   a) the form for the equations
   b) the signs of many of the parameters.

2) Expectational variables probably play a very strong role. These refer not only to wage changes and price changes, but to all quantities. There is no way presently of establishing how they are formed or of measuring them.

3) Added to the problems of specification and the unobservable nature of many of the variables, the aggregate nature of the data available, their weaknesses, and the need to represent the unobservable determinants by proxy variables mean that in any case:
   a) identification problems may arise
   b) estimated coefficients are not necessarily representative of theoretical quantities.

As a result, much of the later work must be regarded as associative and descriptive rather than as being a set of tests of and estimates for well-established models. While specification has been guided by the theoretical considerations and the practice of others, little confidence can be held that the results are anything but indicative of processes that might be at work.

chapter four

SEASONALITY IN LABOR MARKETS

Introduction

Virtually all aspects of labor-market activities show pronounced seasonal patterns. These are not simply the result of the school year and summer employment of students, for seasonal components of marked degree occur throughout the labor force. Instead, the seasonal components also reflect the nature of the Canadian climate and the resulting seasonal characteristics of many industries.

Although in many of the series involved it might in principle be possible to observe the seasonal component directly, the necessary data are not presently being gathered. Thus, for example, the Labour Force Survey does not inquire into the intended length and nature of attachment to the labor force. One is therefore driven to estimate the seasonal components from the total figures available.

The nature and length of the series available and the questions being raised in this study make it unprofitable to attempt detailed time-series analysis of the data, but at the same time it is not clear how the problems associated with seasonality should be handled.

The two usual ways of handling seasonal problems in regression models are to use seasonal dummy variables and seasonally varying coefficients or to use seasonally-adjusted data. The first has the large disadvantage of greatly increasing the number of parameters to be estimated. This is especially the case since there is every reason to suppose, and later evidence in this chapter tends to confirm this supposition, that seasonal patterns in one variable vary with other variables. With the lags built into the models, only 15, and sometimes fewer years of observations, were available and the procedure would become prohibitively cumbersome both in terms of lost degrees of freedom and in terms of the size of models involved. In any case, with much of the variance of the data, both of dependent variables and independent variables, being in the seasonal variations and with the strong possibility that these seasonal components are connected both with seasonal and non-seasonal components of other variables, there is a very real danger that the estimated coefficients would be uninterpretable and would be a variable mixture of seasonal and non-seasonal factors producing severe misspecification problems. Suppose that the true model were:

$$Y_t^{s(j)} = \gamma_j + X_t^{s(j)} \beta_j + X_t^{NS} \gamma_j + \varepsilon_{tj}^{s(j)} \qquad (1.1)$$

$$Y_t^{NS} = \delta_o + X_t^{NS} \delta_1 + \varepsilon_t^{NS} \qquad (1.2)$$

$$Y_t = Y_t^{s(j)} + Y_t^{NS} \qquad (1.3)$$

$$X_t = X_t^{s(j)} + X_t^{NS} \qquad (1.4)$$

where the superscript s(j) is the seasonal component when the season in which t falls is j and NS is the non-seasonal component. Then, unless $X_t^{s(j)}$ are a series of constants, there will be no model of the form

$$Y_t = \alpha_j + X_t \Theta_j + \varepsilon_t \qquad (1.5)$$

for which the seasonally varying coefficients α_j and Θ_j are constants for different observations for the same season.

Since the procedure of using seasonally varying parameters was unfeasible and of dubious validity, the alternative of using seasonally-adjusted data was adopted although it is quite probably just as arbitrary, and the unresolved problem of the possibility of "lost" degrees of freedom from the procedure remains worrying. However, rather than use these data completely blindly, this chapter examines the seasonal patterns that are revealed by the standard seasonal-adjustment procedures and suggests one further adjustment that may be useful with data with a seasonal component as large as those which are present in the data which we examine.

Seasonal adjustment was performed using the standard Census method II of seasonal adjustment as embodied in the X-11 computer program. [1] We assume that the seasonal patterns have been captured adequately by this procedure. [2] This method has the strength of being able to deal with a seasonal pattern which is changing (slowly). However, it does assume that seasonal components tend to average to zero in the course of the year. If, instead, the seasonal component can be thought of as an additional (non-negative) term which is added to a non-seasonal term, then over the course of the year the average of the seasonal component will sum to some positive value. Furthermore, if the seasonal pattern is changing, this additional term will give rise to variations in the seasonally-adjusted data which stem from the seasonal components. In addition, if the seasonal amplitude in one series is related to the seasonal amplitude in another, then there will be some association between the seasonally-adjusted series stemming from this connection between the seasonals. Similarly, if the amplitude of the seasonal component in one series is related to the non-seasonal component in the other, there may be an association present in the seasonally-adjusted series based on this relationship rather than, or as well as, any association between the non-seasonal components.

The further adjustment made to the data is based on these

---

[1] Cf. Shiskin, Young and Musgrave (1967).

[2] This may not be as unreasonable as it sounds, at least not in relation to alternative procedures. For a discussion of the statistical and conceptual difficulties in seasonal adjustment and some justification in the belief that standard seasonal adjustment may work, cf. Grether and Nerlove, (1970).

considerations. We presume that the seasonal amplitude is related to general economic conditions, proxied specifically by the seasonally-adjusted unemployment rate.[3]

A quadratic trend was also used. It was also presumed that the usual seasonal low (or in some cases, where the seasonal component might be considered negative, the high) represents a zero seasonal component. The seasonally-adjusted data were then further adjusted by multiplication by the estimated ratio of the seasonal low to the seasonally-adjusted data to yield the alternative data. The details of this procedure will become clear in the next section when it is applied. It should, however, be stressed that we are examining the standard picture of seasonality revealed by the usual seasonal-adjustment procedure and are not investigating in a more structural way the roots of seasonal behavior.

Seasonality in Employment and the Labor Force - by Age and Sex

Seasonal adjustment was done to the data from the Labour Force Survey for the period from January 1953, through November 1970, the period for which data were available when this work was begun. The extent of seasonal fluctuations in employment and labor-force participation may be indicated by the average absolute differences between the raw and the seasonally-adjusted figures, expressed as a percentage of the seasonally-adjusted labor force. Table I summarizes these quantities for the age-sex breakdown of the labor force. Not surprisingly, the seasonal is much more pronounced for the younger workers, but it is not negligible for any group. A striking feature is the much greater tendency for the female labor force than for the male to adjust with seasonal employment.

The seasonal patterns in labor-force participation and employment cannot be expected to be constant.[4] They may alter

---

[3] We could have continued iteratively, having "purged" the unemployment rate of the seasonal average to use this to establish the seasonal pattern again and so on. The crudeness of the procedure used makes this not seem worthwhile.

[4] Cf. Smith (1964).

either because of a changing importance in the economy of seasonal industries or because of changes in the extent of seasonal swings in industries. They may also be affected by levels of economic activity. To investigate these possibilities, regressions were fitted to the ration of the raw to the seasonally-adjusted figures multiplied by 100 for employment and the labor force. The independent variables were 12 monthly dummies, these dummies multiplied by time, and these dummies multiplied by a seasonally-adjusted unemployment rate. "Time" was defined as a variable increasing by one twelfth per month and taking the value zero in December, 1962. The unemployment rates used were those for the separate groups involved, that for males aged 25-44, and the overall unemployment rate.[5] There was little to choose between the various unemployment rates, though the second one seemed to hold a slight edge and was used in subsequent calculations.

Table II reports the values of $\bar{R}^2$ for these regressions. By and large, they are very high even when only the dummy variables are used, shown in the first column of the table. The addition of time to these dummy variables improved the fit significantly. The values of $\bar{R}^2$ for this addition appear in the second column of Table II. A further significant improvement occurred with the inclusion of any one of the unemployment rates, as shown in the last three columns. Thus it is the case that the recorded seasonal patterns have been changing and that they are affected by unemployment.

Table III records the estimated regression coefficients calculated for the different groups. The seasonal patterns are indicated fairly well by the coefficients for the dummy variables, though clearly they are altered by the other terms A positive coefficient for time indicates that the seasonal patterns are getting larger if the corresponding coefficient for the dummy variable is greater than unity. Similar indications are given by the coefficients for unemployment. Significance tests at the 0.05 level are reported only for the coefficients of the trend and of unemployment.

Unemployment is a derived number calculated as the differ-

---

[5] The group rate was not tried fully in the regressions for the labor force.

ence between the labor force and employment. The unemployment rate is this quantity divided by the labor force. Seasonality in the unemployment rate arises from seasonality in both the labor force and employment, and it may be regarded as being derived from the seasonality in these quantities.[6] If the seasonality of the labor force and employment change with the unemployment rate and over time, one would expect these changes also to be reflected in unemployment and the unemployment rate. If one uses the coefficients reported in Table III to establish the seasonal patterns in employment and in the labor force, the implied ratio of the raw to the seasonally-adjusted unemployment rate becomes a non-linear function of the seasonally-adjusted unemployment rate. Thus, letting E_p be the predicted ratio of raw to seasonally-adjusted employment based on the regressions and L_p be the corresponding ratio for the labor force and letting E_s and L_s be seasonally-adjusted employment and labor force, the ratio of the raw to the seasonally-adjusted unemployment rate, R, can be expressed as:

$$R = \{1 - (E_s/L_s) \times (E_p/L_p)\} \;/\; \{1 - E_s/L_s\} \qquad (2.1).$$

Values for this ratio were calculated using the 1969 annual-average value for the seasonally-adjusted unemployment rate and the trend. Also calculated were the derivatives of R with respect to time and with respect to the male unemployment rate for those 25-44. The results are shown in the last three columns of Table III. These calculations show some very wide seasonal swings, largely the result, probably, of imprecision in the other estimates.

An alternative procedure is to estimate the regressions for the ratio of unemployment to seasonally-adjusted unemployment. For this purpose, we used unemployment seasonally-adjusted rather than the difference between the seasonally-adjusted labor force and seasonally-adjusted employment. It is calculated only for groups where the size of the numbers involved (reported to the nearest ten thousand) makes seasonal adjustment a sensible procedure. The results are summar-

---

[6] However, it may be noted that the usually quoted seasonally-adjusted unemployment rate is obtained by seasonal adjustment of the unemployment rate itself.

ized in Table IV. Again there are pronounced seasonals. The magnitudes of the seasonals have been changing significantly over time and they are significantly affected by the unemployment rate for males aged 25-44. While there is generally broad conformity in the the patterns of the seasonals among groups, there are also some important differences.

A summary of the findings of the regressions is contained in Table V. Here we report, using 1969 average values for the seasonally-adjusted unemployment rate and the trend, the month in which the calculated ratio of the raw to the seasonally-adjusted figures is at a maximum and a minimum for the labor force and employment, and at a minimum for the unemployment rate and for unemployment. Also reported are the seasonal components defined as the absolute difference in the predicted ratio of the raw to the seasonally-adjusted values in the month indicated from the average of the predicted ratios for a year, using 1969 values for the trend and the annual average values in 1969 for unemployment of males aged 25-44.

The effect of the trend and of the unemployment rate for males 25-44 are also indicated in Table V. The comparison is in terms of the difference produced by a one unit change in the trend, T, (that is, an additional year) or by a change of one percentage point in the seasonally-adjusted unemployment rate for males 25-44, U. Where maximum values are considered, these effects are indicated by the change produced in the difference between the calculated seasonal factors and their annual averages. The negative of this quantity is used when minimum values are being considered. Thus a positive value for these quantities indicates that the seasonal has become more pronounced with increasing values of time or of the unemployment rate for males 25-44.[7]

Several interesting things emerge from Table V. First, there is considerable variety both within groups and between groups in the timing of seasonal maxima and minima. For a substantial number of the groups, employment and the labor force do not reach their maxima or minima in the same months,

---

[7] These calculated quantities may somewhat overstate the effect since in some cases it is possible to change the predicted month of highest or lowest seasonal by using other values for time and unemployment.

though the difference is rarely more than one month. It is fairly rare for one of these to be the month in which the calculated ratio for unemployment or for the unemployment rate is at its minimum. Second, there is a good deal of variety in the signs as well as in the magnitudes of the effects of the trend and of unemployment on the seasonals in the labor force and on employment. Furthermore, there is substantial ambiguity about the effects on unemployment since the effects calculated are often different for the level of unemployment and for the unemployment rate even when the month is the same. It will be noted that the seasonal components of the labor force and employment tend to be much larger among the younger workers, as might be expected. In the first three age groups, there is a noticeable tendency for the male seasonals in these quantities to be larger than the female seasonals, though the reverse is, if anything, the case for other age groups.

Seasonal unemployment arises from the seasonals in employment and the labor force, and it can occur either because the amplitudes of the seasonal components are different or because the seasonal patterns are not the same. As can be seen from Tables III to V, both of these possibilities are at work in the Canadian economy. It is, indeed, a feature of the data that often seasonal unemployment is higher than average when the labor force or employment are at their highest or lowest points.

To bring out these characteristics of the seasonal patterns, a number of adjustments were made to the seasonally-adjusted employment and labor force. First, we calculated what values of the labor force and employment would have been if each of the monthly seasonally-adjusted figures had occurred in the months at which each reached its maximum, rather than in the month when they were actually observed. In performing these calculations, the coefficients shown in Table III and the months indicated in Table V were used. The calculated figures can be taken to represent the experience the economy would have had if all the seasonal employment and labor force were present at all times. Second, these quantities were calculated for the months in which employment and the labor force in each group reach their minima. This corresponds to the experience that would result if all seasonal employment and the labor force did not occur. Finally, the quantities were calculated for the months in which unemployment reaches its minimum.[8] This corresponds to those occasions when employment most nearly catches up to the labor force.

The results of these adjustments are shown in Table VI. The unemployment figures are expressed as percentages of the labor force defined using similar definitions. If the seasonally-adjusted labor force is used for the denominator qualitatively similar results are achieved, though the differences are smaller. A number of interesting features emerge from these calculations. First, it will be noted that for males the months of maximum employment and the labor force yield unemployment rates which are well below the seasonally-adjusted rates while those for the months of the minima show higher rates. Exactly the reverse is true for females. For the younger workers, both sets of unemployment rates are typically higher than the seasonally-adjusted rate. For this group, also, the relative positions of the unemployment rates based on highest and lowest seasonals in employment and the labor force have been reversed over time according to the calculations.

The overall effects of trends on the differences between the seasonally-adjusted unemployment rates and the rates as further adjusted are shown in Table VII. The differences between the rates standardized for the months of maximum employment and labor-force participation and the seasonally-adjusted rate have been getting larger. Since, typically, these differences are negative, the effect has been to bring the two figures closer together. The reverse is the case for the month of minimum employment and the labor force and these unemployment rates have also been getting closer to the seasonally-adjusted rates for the males, but not for the females.

These results indicated that the trends in the seasonal patterns of employment and of the labor force have been such that seasonal variations in unemployment have been becoming a less pronounced feature of the economy. One interesting feature of the calculations is that the worsening in unemployment rates, which at first sight appears to be present in the seasonally-adjusted unemployment rates, tends to disappear when the rates are standardized to the months of minimum employ-

---

[8] The calculations were based on the unemployment rate figures when seasonally-adjusted unemployment could not be calculated sensibly.

ment and the labor force. It is worth noting that the results summarized in Table V indicate that this narrowing of the differences among the various unemployment rates cannot be attributed simply to a diminution in the seasonal components of employment and the labor force. The narrowing occurs for groups such as the younger workers or women aged 25 or over, for whom the underlying trends are basically positive. The diminution of the seasonality in the unemployment rate cannot therefore be taken as indicating necessarily that unemployment of a seasonal nature has been getting smaller. Instead, the results indicate that seasonality in employment, though it has been increasing for many groups, has been proving less able to meet the needs of the seasonal labor force and to provide temporary employment to full-time participants in the labor force.

The extent of seasonality in employment and the labor force can be indicated by comparing the levels calculated for the minimum month and for the maximum month. The calculations are shown in Table VIII, using the 1969 values for the trend and unemployment rate. These figures are undoubtedly underestimates of the extent of seasonality for there must be some seasonal jobs which are held in the months of minimum employment and some seasonal participants in the months of minimum labor-force participation. Even so, the extent of seasonality is very large and only part of it is reflected in seasonal unemployment.

Prior to 1953, the Labour Force Survey did not exist as a monthly exercise. Surveys were taken, usually on a quarterly basis though often not in the same month in the quarter nor did the data pertain to the second week in the month. The unemployment rates found in these surveys are often taken to indicate the unemployment rates existing in these years, and, in particular, annual averages of the figures are used to represent the unemployment rate. The different timing of the taking of unemployment rates and the strong seasonal patterns in unemployment rates raise the question whether these earlier figures are comparable to figures for later years.

To investigate this question, seasonal factors calculated on the basis of the results in Table III were used to adjust data for each of the age-sex groups on employment and the labor force. The factors for the month in which the survey week ended were assumed to apply, even though the exact week was different. The unemployment rate was calculated on the basis of the differences between adjusted labor force and adjusted employment.

The results are summarized in Table IX. It will be noted that the adjustment raised the average unemployment rate in every year except 1947. The average difference is slightly over three tenths of a percentage point, or about 11 per cent of the average of the annual unemployment rates calculated from the raw data. This exercise serves to illustrate both that seasonal patterns do strongly affect the unemployment rate and inferences drawn from it and that the data from the earlier period are not clearly comparable to later figures.

Seasonality in Employment, Unemployment and the Labor Force - by Region and Sex

The data from the Labour Force Survey may also be broken down regionally for studying the nature of seasonal unemployment. Essentially the same procedures were used as were employed in the previous section except that in the regressions the seasonally-adjusted unemployment rates for males in the regions involved were used in place of the seasonally-adjusted rate for males 25-44. As in the case of the age-sex breakdown, the seasonal pattern was strong and varied significantly with time and with unemployment. The results of the regressions are summarized in Table X. The quantities correspond to those presented in Table V.

It will be noticed that seasonality was larger for males than for females for all regions and quantities, except for the labor-force seasonality based on minimum months in Quebec, Ontario, and British Columbia. For the males, a fairly clear interregional pattern showed up. Seasonality in the labor force was most pronounced in the Maritimes followed by the Prairies, Quebec, British Columbia, and Ontario, with some ambiguity in the relative standing of the last two. For employment the ordering is the Maritimes, Quebec, the Prairies, British Columbia, and Ontario.

The picture for females is more muddied. Based on the months of maximum employment and the labor force, the ordering for both is British Columbia, the Maritimes, Ontario, Quebec, and the Prairies. Based on the minimum months, British Columbia still leads the pack, but the other regions show different patterns, especially with respect to the labor force. The trends in these seasonals also show very mixed patterns, and the same is true of unemployment. In terms of the months involved there is some variation, but it is not great except for female employment in the Prairies and the calculated month of minimum unemployment among the females.

The regional data were further adjusted to the months of maximum and minimum employment and labor-force participation and to the month of minimum unemployment. The results are recorded in Table XI for the various regions. The trends involved are shown in Table XII. As in the case of the age-sex breakdown, the trends in seasonality have been tending to pull the various rates together. Also, as in the case of the age-sex breakdown, the extent of difference among the unemployment rates is only a partial reflection of the underlying seasonality in employment. Table XIII summarizes the percentage seasonals involved by considering the months of maximum and minimum employment and labor force.

As is evident from the various tables, there is a great deal of variety among the regions both in the amount of seasonality they experience and in the size of the unemployment rates they experience. These are summarized in Table XIV, where various regional quantities are expressed as a proportion of the Ontario values. It will be noted that, except in the case of British Columbia, the differences are more pronounced among the males than among the females.

Seasonal Patterns in Hirings, Separations and Vacancies

As might be expected from the investigations of the Labour Force Survey data, virtually all variables representing labor flows have very pronounced seasonal patterns. This seasonality causes strong problems for analysis since seasonal adjustment simply averages these seasonal patterns, but with many of the series it seems less likely that one can sensibly adjust to obtain more permanent components of behavior. Thus, for example, to adjust all flows to their minimum months would often produce data with large inconsistencies among themselves. In this section we investigate the seasonal patterns present in the hirings-separations data and in the vacancies-placements data, in aggregate and at the division (one digit) level of the Standard Industrial Classification.

The seasonal patterns were once more investigated through use of regressions for the ratio of the raw to the seasonally-adjusted data. The independent variables were monthly dummies, these dummies multiplied by the time trend and these dummies multiplied by the seasonally-adjusted unemployment rate.[9] Without exception, both the trend and the unemployment rate were very highly significant whenever there were sufficient data with a sufficient number of reported digits to permit sensible seasonal adjustment.

The results in this section are summarized more briefly than in the earlier ones. The summary is in terms of a number of quantities. Particularly, the minimum and the maximum seasonal factors using the 1970 values for the trend and an unemployment rate of 4.7 per cent are reported. The corresponding months are also listed. In many instances, several months have seasonal factors which are almost the same as the ones recorded. Furthermore, in some instances the distributions of the seasonal factors are bi-modal so that there is some ambiguity about when seasonal minima and maxima occur. The listing of the months, then, cannot be taken to indicate a precise dating of well-defined maxima and minima. Instead, they are presented to give precision to what was actually used, especially in derived calculations. The extent of seasonality is indicated by the ratio of the difference between the maximum and minimum seasonal factors divided by the maximum factor, which we designate by S. Also reported are the derivatives of S with respect to the unemployment proportion and with respect to time (increasing by one unit per year).

Table XV reports these quantities for the hirings, separations, and the corresponding employment figures. In both the hiring and the separation series, the seasonals are very strong, with the maximum factor being almost double the minimum one. Rather surprisingly, overall both tend to reach their seasonal lows in February, though in several industries the low in hirings precedes the low point in separations. On the other hand, hirings reach their maximum in most industries in May or June, while separations reach their peak in September or a later month. The seasonal in employment is much less

---

[9] This rate, rather than that of males 25-44, was used by inadvertance, and it did not seem worth redoing the calculations especially when spot checking indicated that no substantive differences arose from using the other rate.

marked, but it is not trivial. In most instances it reaches its minimum in the December-March period and its maximum at the end of July or August.

The dependence of the seasonal ratio, S, on unemployment shows some mixed patterns. For hirings, the derivative is calculated to be positive except for the finance, insurance and real estate group (F.I.R.) and for community, business and personal services. In separations, it is also negative in mining and in manufacturing and this effect then shows up in the all-industry total. In employment, the derivative is positive except in mining and services.

The effect of the trend on hirings is very mixed. It is negative in mining, construction, trade and F.I.R. For other industries it is positive. In the total, the negative effects predominate. For separations, the seasonal has been becoming more pronounced, except in the case of construction. This is also true of employment, with the additional exception of the services group. For purposes of comparison, the fourth panel of Table XV reports the seasonal patterns in the employees reported series from the establishment survey used to obtain the Weekly Wages and Salaries data. The fifth panel records the quantities for the employment reported from the Labour Force Survey. There is fairly good agreement on the seasonal timings and relative magnitudes of the seasonals. There is less agreement in the trends. The employees reported show more signs of diminishing trends than the others. There is also little agreement on the effect of unemployment, with the Labour Force Survey showing more cases where the effect is negative than is the case for the others. To what extent these differences represent the differences in coverage or the shortcomings in the data and seasonal-adjustment procedures (compounded by the different time-spans over which the equations were fitted) is an open question. In any case, it would be dangerous to draw any conclusions except that seasonality is both an important and a not well-understood aspect of these data.

The very large seasonal in hirings and separations occurs in series which are already surprisingly large relative to employment. Table XVI records the average over the period from 1953-1966, when the data were available, of the ratios of hirings and of separations to employment. Also reported are summaries of the results of regressing these ratios on monthly dummies, these dummies multiplied by time and by unemployment. The main thing brought out is the surprisingly high turnover that is reported. Hirings and separations averaged over six per cent of employment per month. While some of the industries with high turnover represent special forms of organization, such as construction, even in some of the more usual sectors such as mining and manufacturing the recorded turnover exceeds five per cent. At the seasonal minimum, turnover was calculated to exceed four per cent on average and in no case was it calculated at less than two per cent. At the maximum, turnover ran about eight per cent for the total and was calculated at more than five per cent in all industries.

Table XVII records the seasonal patterns in the vacancies and placements data. There is quite a bit of variety shown among sectors in the patterns, with public administration being particularly likely to exhibit peculiar patterns. Overall in terms of vacancies, the labor market appears to be tightest or most active in September when vacancies notified are at their maximum and unfilled vacancies are highest at the end of August. This is also the month of highest regular placements using the industrial composite, though the behavior of public administration dominates the total picture. It is also the month when the unemployment rate tends to be at its seasonal low point. The low point of the year comes in February with vacancies notified and placements reaching their minima while unfilled vacancies reach their low at the end of January or December. While the latter aspect is in conformance to those present in the hirings and separations data, the former does not agree. Hirings are highest in the late spring and employment is highest at an earlier time of the summer. The difference suggests the possibility that in filling summer jobs for students, employers tended not to make as much use of the National Employment Service as in their other hiring activities. Thus, there is, in fact, quite a bit of difference between the placements series and the hirings series in the timing and magnitude of the seasonal patterns. There is better agreement on the trends, but the aggreement among the series about the effects of unemployment are weak. Overall, higher unemployment tends to decrease the seasonal in all cases considered in Table XVI, except for regular placements where the positive effect coming from public administration dominates the negative effect coming from the private sector. This might be taken to indicate that use of the government employment service by employers on a seasonal basis increases when labor markets are tighter. With the important exception of unfilled vacancies, the trends in the seasonals in these data are tending to become stronger, though there are several exceptions in particular industries.

Table XVIII summarizes the seasonals in the gross movements of the labor force data. Results have been omitted in cases where the regressions did not yield sensible coefficients because of the small numbers in the cells of the original data. The seasonals are quite large except for those remaining in employment and those remaining out of the labor force. There is a considerable scattering in the months when the seasonals reach their maxima and minima. As a result, the derived statistics are not fully comparable amongst each other. The main things of interest are the negative trends throughout the figures pertaining to unemployment in the previous month and the positive coefficients for the effect of unemployment.

It is virtually impossible to standardize the gross movements data to try to remove seasonal activity rather than simply to average it as seasonal adjustment. The hirings-separations data can be adjusted by taking the months of minimum employment and hirings as the basis of the calculations and letting separations be the residual. However, this can produce negative values for the residuals. The case for trying to obtain consistent adjustment is still more dubious for the vacancies-placements data, and little attempt to deal with the matter further is made. For all these series, all parts are adjusted when it is decided to try to make further adjustments to the seasonally-adjusted data to place them on a minimum-month basis.

Seasonal Patterns in Average Weekly Wages and Salaries and Average Hourly Earnings

There are some very pronounced seasonal movements in the earnings variables used in this study to proxy wage rates. Table XIX summarizes the patterns found, basing the estimates on the 1970 values for the trend and an unemployment rate (overall) of 4.7 per cent. Though the seasonal movements tend not to be as large as in some of the series, they are not negligible in relation to the typical changes in these quantities from year to year. This is especially the case of forestry and construction where the very strong seasonal in employment is reflected in the weekly wages and salaries figures.

Without exception in the regressions run, both the unemployment term and the time trend were very highly significant.

In most cases, based on the estimates of Table XIX, the effects of higher unemployment are to increase the seasonal. The effect is far from being entirely negligible. A one per cent change in the unemployment rate increases the estimated seasonal in average hourly earnings by two tenths of one percentage point. The time trends are all positive except in the case of services.

There is surprisingly little in the way of coherent patterns about the estimates of the months involved for the points when the seasonals reach either their minima or their maxima. In some industries, the minimum is reached in the summer, in others in the winter. This finding is probably the result of two forces pulling in opposite directions. The first force is that seasonal workers are likely to be paid less than regular staff and so pull the rate down when seasonal employment is high. On the other hand, when employment is low, regular employees may be working short-time so that their earnings are reduced. It is worth noting that in all three cases where average hourly earnings are available, which are less subject to the second problem than average weekly wages and salaries, the figures reach their low points in the months of July or August and reach their highest seasonal values between December and February.

This aspect of the seasonal patterns is brought out more clearly in Table XX, where we compare the seasonal patterns summarized in Table XIX with the patterns for employees reported. A matching was judged to have occurred when the months recorded were within two months of each other and for at least one series the seasonal factors for the corresponding and intervening months were in the same relationship to unity as in the month when the maximum or minimum occurred. It will be noted that by and large the depressing effect of seasonal employees on wages seems to be the predominant one for the low points. This is true except for AWWS in manufacturing and construction (where no pattern is evident). On the other hand, there is also a strong tendency for employees to be low when the average earnings are high on a seasonal basis.

It is evident that it would be perilous to assume that one could purge the earnings series of seasonality on the basis of these patterns. On the other hand, the dependence of the seasonal in these figures on economic conditions, and the association of this seasonal with the seasonal in employment, which also varies with unemployment, makes it dangerous to assume that variations in the seasonally-adjusted data do not in part reflect the intensity of the seasonal. Thus, despite the danger, estimates will be made later in the study using earnings data adjusted to the month in which they are highest for all industries except in those cases for AWWS where the month in which these quantities are lowest corresponds to low employment. In those cases adjustment is to seasonal minimum. It is hoped, though the hope is slender, that these adjusted data may more accurately represent an average of the wages of regularly employed, full-time people.

Conclusions

There are three main features of the data which are highlighted by the investigations of this chapter. These are:

(a) seasonal fluctuations of very marked extent occur throughout data indicating conditions prevailing in labor markets in Canada;

(b) these seasonal fluctuations and their patterns have been changing over time;

(c) the seasonals in the data were found to be related in a highly significant way to the seasonally-adjusted unemployment rate.

It little matters that these conclusions are established on the basis of the rather arbitrary methods of seasonal adjustment for their main implications apply to the dangers of using data seasonally adjusted in the standard way.

It should by now be very evident that seasonal unemployment is not a straightforward matter either numerically or conceptually. It is not simply a reflection of certain jobs being of a seasonal nature with seasonal unemployment reflecting the times when these jobs are not available. There is also a pronounced seasonal movement in the labor force, which in the case of some female groups is larger than the seasonal movements in employment. This movement is probably not simply a reflection of when jobs are available. In the case of younger workers and some females, it may reflect the seasonal nature and attractiveness of other endeavors in which they engage. By the same token, the seasonality in employment for these groups may reflect employers' responses to the knowledge that the workers will be available on a seasonal basis, so that some of the seasonality in employment is a response to seasonality in the labor force rather than the labor force responding to seasonality in employment.

It is, then, virtually impossible to separate seasonal unemployment clearly from non-seasonal unemployment. Unemployment rates tend to reach their minima at the rather fortuitous times when the seasonal movements in the labor force bring it closest to the strongly seasonally-fluctuating employment, and it would not appear to be very sensible to interpret the resulting unemployment rates as reflecting what rate would occur should there be no seasonality in the economy. By the same token, the other two unemployment rates calculated are of only dubious value in indicating what would be the effects of removing seasonality because its existence should affect both employment and the labor force in the months involved. The pattern which is evident is that at their minimum seasonal values, the labor-force figures and employment figures would produce an unemployment rate which is higher than indicated by the seasonally-adjusted figures (taking the labor force as a whole) while at their maxima the rates are lower. This should not be interpreted as meaning that seasonal participants in the labor force enjoy better unemployment rates than persons with more permanent adherence to it. It is quite possible that a very substantial amount of seasonal employment goes to people whose labor-force participation is not seasonal.

Unfortunately, seasonality also cannot be ignored when making further investigation of the various quantities involved. This is particularly the case because of the trends that were found to prevail throughout the seasonal factors and because of their dependence on unemployment rates. Since seasonality is a much more predictable feature than other aspects of the data, one might expect reactions to it to be quite different from reactions to non-seasonal changes in the quantities. Since seasonally-adjusted data contain an average of seasonal components, it is quite possible that relations among seasonally-adjusted data are affected in part by the relations among seasonal components. If it could be presumed that the various quantities adjusted to the months when the seasonal components were smallest were the relevant measurements of non-seasonal aspects of the data, then it would be possible to investigate relationships purged of seasonality.

Needless to say, these are largely matters of speculation which will not be resolved until a great deal more is known about seasonality and other characteristics of the statistics. The more modest procedure that will be followed in this study is to see what indications of the nature of the problems are given by use of alternatively calculated series. The procedure has large elements of being pulled up by its own boot straps. This is especially so because the seasonal factors studied and adjusted in this chapter are not based on a model which is clearly relevant or appropriate or which shows understanding of the nature of the seasonality; but instead is based on a blind, though routine, procedure of seasonal adjustment.

TABLE I

SEASONAL PATTERNS - AGE-SEX BREAKDOWN, 1969

PERCENTAGES OF THE LABOR FORCE

Age	14-19	20-24	25-34	35-44	45-54	55-64	65+
Males							
Seasonal Employment*	14.9	5.4	1.6	1.3	1.5	2.2	4.5
Seasonal Labor Force*	16.3	4.8	0.5	0.3	0.4	0.9	3.6
Seasonal Unemployment*	2.3	1.4	1.1	1.0	1.2	1.3	1.0
Seasonally-Adjusted Unemployment Rate	12.4	7.5	4.0	3.7	3.7	4.9	5.2
Females							
Seasonal Employment*	9.2	1.2	1.4	1.5	1.8	1.3	3.0
Seasonal Labor Force*	10.8	1.2	1.5	1.4	1.5	1.2	2.8
Seasonal Unemployment*	1.5	0.2	0.3	0.2	0.4	0.2	0.5
Seasonally-Adjusted Unemployment Rate	8.9	3.8	2.8	2.3	2.5	1.7	2.9

* Calculated as the average of ratio of absolute difference between raw and seasonally-adjusted figures to the seasonally-adjusted labor force.

TABLE II

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE BY AGE AND SEX

(Values of $\overline{R}^2$ for regressions of the monthly ratio of the raw to seasonally-adjusted employment data)*

A. Employment

		Dummies	Time	Group Unemployment/Group Labor Force	Unemployment Rate Males 25-44	Overall Employment Rate
Males	14-19	0.98837	0.99417	0.99923	0.99655	0.99645
	20-24	0.97462	0.98923	0.99234	0.99614	0.99579
	25-34	0.95859	0.98261	0.99083	0.99372	0.99309
	35-44	0.96679	0.98812	0.99438	0.99587	0.99543
	45-54	0.96708	0.99050	0.99546	0.99623	0.99591
	55-64	0.98427	0.99480	0.99640	0.99822	0.99804
	65+	0.97876	0.98662	0.98599	0.99027	0.99009
Females	14-19	0.96311	0.99370	0.99502	0.99502	0.99469
	20-24	0.70021	0.91778	0.96415	0.93829	0.93469
	25-34	0.87365	0.95402	0.97340	0.96013	0.95959
	35-44	0.88123	0.94070	0.94273	0.96477	0.96260
	45-54	0.89422	0.94321	0.95361	0.96655	0.96474
	55-64	0.69347	0.84205	0.86873	0.85842	0.85853
	65+	0.43666	0.76341	0.83339	0.84311	0.83682

B. Labor Force

Males	14-19	0.97993	0.99607		0.99696	0.99802
	20-24	0.92787	0.99376		0.99565	0.99527
	25-34	0.97034	0.98535		0.99253	0.99052
	35-44	0.92875	0.98277		0.98863	0.98469
	45-54	0.94507	0.98651		0.99051	0.98804
	55-64	0.94629	0.97386		0.98569	0.98043
	65+	0.96442	0.97717		0.98011	0.97703
Females	14-19	0.94779	0.99274		0.99550	0.99336
	20-24	0.62078	0.91173		0.92859	0.95743
	25-34	0.84286	0.94396		0.94968	0.97317
	35-44	0.89424	0.94307		0.96344	0.94506
	45-54	0.86886	0.92968		0.95660	0.94069
	55-64	0.67921	0.85153		0.86669	0.86654
	65+	0.47346	0.77962		0.83571	0.84118

*Column 1 - Regressions contain only monthly dummy variables
Column 2 - Regressions contain monthly dummy variables and those variables multiplied by time
Columns 3-5 - Regressions contain monthly dummy variables, those variables multiplied by time and those variables multiplied by unemployment rate mentioned.

TABLE III

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE - SEX BREAKDOWN
(Regression Coefficients and Calculations)
A. Ages 14-19

Group	Month	Employment			Labor Force			Unemployment Rate[1]		
		Dummies	Time	Unemployment[2]	Dummies	Time	Unemployment[2]	R	δR/δt	δR/δO
Males	Jan.	83.0	-0.279*	-0.087	85.4	-0.383*	0.432*	130.5	-0.73	4.19
	Feb.	82.7	-0.094	-0.372*	85.0	-0.297*	0.263	127.5	-1.61	5.26
	March	84.4	-0.072	-0.546*	86.4	-0.309*	0.077	122.3	-1.90	5.19
	April	87.7	0.112	-0.378*	88.5	-0.046	0.061	110.5	-1.26	3.50
	May	96.4	0.176*	-0.172	96.3	0.292*	-0.350*	101.3	0.84	-1.29
	June	109.8	0.398*	-0.541*	110.7	0.673*	-0.462*	120.2	1.58	0.57
	July	134.6	0.461*	2.325*	142.0	0.881*	-0.194	105.1	1.97	-12.01
	Aug.	135.9	0.322*	1.434*	134.2	0.255*	0.172	64.2	-0.28	-6.47
	Sept.	97.0	-0.568*	0.315	93.9	-0.498*	0.205	76.8	0.42	-0.80
	Oct.	95.6	-0.426*	0.291	93.1	-0.416*	0.227	78.6	0.00	-0.45
	Nov.	92.2	-0.202*	0.073	91.0	-0.190*	0.130	93.0	0.08	0.46
	Dec.	90.3	-0.205*	-0.037	89.1	-0.276*	0.343	98.3	-0.57	3.04
Females	Jan.	89.4	-0.422*	0.291*	90.1	-0.526*	0.395*	104.2	-1.19	1.19
	Feb.	88.7	-0.192*	0.253*	88.2	-0.386*	0.407*	84.7	-2.35	1.88
	March	89.2	-0.221*	0.157	89.0	-0.342*	0.191*	88.9	-1.46	0.42
	April	91.2	-0.144*	-0.090	91.0	-0.190*	-0.136	91.8	-0.55	-0.54
	May	95.2	0.112*	-0.326*	95.4	0.182*	-0.482*	101.3	0.75	-1.67
	June	102.5	0.250*	-0.553*	103.2	0.403*	-0.095	134.8	1.35	4.46
	July	125.7	0.800*	-0.406*	129.8	1.004*	-1.053*	124.4	1.38	-4.77
	Aug.	124.2	0.675*	-0.219	123.9	0.671*	-0.484*	89.2	0.02	-2.17
	Sept.	100.0	-0.345*	0.028	99.6	-0.335*	0.027	96.6	0.09	0.01
	Oct.	97.9	-0.161*	0.653*	97.1	-0.121*	0.690*	96.4	0.41	0.41
	Nov.	97.8	-0.175*	0.219	96.4	-0.172*	0.364*	91.3	0.02	1.57
	Dec.	97.4	-0.229*	0.214	96.8	-0.275*	0.156	87.2	-0.53	-0.60

[1] R is the calculated ratio of the raw to the seasonally-adjusted unemployment rate based on the estimated regression coefficients and using 1969 values for t and unemployment rate for males 25-44.
* Significant at the 0.05 level

[2] Seasonally-adjusted unemployment rate for males 25-44.

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE - SEX BREAKDOWN
(Regression Coefficients and Calculations)
B. Ages 20-24

Group	Month	Employment			Labor Force			Unemployment Rate[1]		
		Dummies	Time	Unemployment	Dummies	Time	Unemployment	R	δR/δt	δR/δU
Males	Jan.	94.0	0.043*	-0.305*	96.1	-0.120*	-0.115*	132.9	-2.06	5.37
	Feb.	93.6	0.006	-0.428*	96.2	-0.179*	0.042	139.8	-2.32	6.08
	March	93.5	0.082*	-0.532*	96.2	-0.165*	0.008	138.6	-3.14	7.00
	April	94.5	-0.091*	-0.310*	96.6	-0.176*	-0.024	133.3	-1.04	3.71
	May	102.5	0.108*	-0.131	102.3	0.150*	-0.155*	100.2	0.50	-0.29
	June	106.5	0.161*	0.384*	106.1	0.264*	-0.155*	80.6	1.23	6.21
	July	108.6	0.163*	0.393*	107.9	0.347*	-0.199*	82.4	2.12	6.68
	Aug.	109.1	0.213*	0.188*	108.0	0.293*	-0.278*	74.4	0.97	-5.33
	Sept.	100.3	-0.284*	0.683*	99.4	-0.146*	0.165*	77.4	1.69	6.42
	Oct.	99.3	-0.221*	0.441*	97.7	-0.140*	0.175*	74.9	0.99	-3.33
	Nov.	98.1	-0.149*	0.229*	97.3	-0.088*	0.109*	90.1	0.77	-1.51
	Dec.	97.6	-0.087*	-0.113	97.0	-0.086*	0.072	101.5	0.01	2.36
Females	Jan.	98.5	-0.077*	0.012	99.0	-0.112*	0.033	108.6	-0.89	0.54
	Feb.	98.6	-0.065*	-0.024	99.6	-0.110*	-0.012	118.5	-1.13	0.31
	March	99.3	0.002	-0.041	99.6	-0.027	0.060	112.1	-0.73	2.56
	April	100.7	-0.039*	0.011	99.9	-0.025	-0.030	78.3	0.35	-1.05
	May	100.1	0.044*	-0.326*	100.7	0.064*	0.181*	166.7	0.46	12.48
	June	102.1	0.184*	-0.113	101.9	0.172*	0.085	111.4	-0.31	4.83
	July	100.5	0.231*	0.200*	99.5	0.244*	-0.066	52.0	0.44	-6.69
	Aug.	100.0	0.105*	-0.179*	100.0	0.115*	-0.252*	60.2	0.30	-11.02
	Sept.	101.1	-0.113*	0.164*	101.5	-0.073*	-0.295*	73.5	1.00	-11.72
	Oct.	99.8	0.009	-0.025	99.5	0.038*	0.043	104.7	0.73	1.72
	Nov.	100.3	-0.161*	0.133*	99.8	-0.125*	-0.037	77.8	0.89	-4.37
	Dec.	100.0	-0.140*	-0.149*	100.1	-0.174*	0.113*	121.2	-0.89	6.66

TABLE III (continued)

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE - SEX BREAKDOWN
(Regression Coefficients and Calculations)
C. Ages 25-34

Group	Month	Employment			Labor Force			Unemployment Rate[1]		
		Dummies	Time	Unemployment	Dummies	Time	Unemployment	R	δR/δt	δR/δU
Males	Jan.	97.7	0.061*	-0.234*	99.2	0.016*	0.026*	152.5	-1.09	6.26
	Feb.	97.4	0.107*	-0.254*	99.2	0.008*	0.010	150.7	-2.39	6.38
	March	96.8	0.145*	-0.205*	99.0	0.021*	0.041*	154.2	-3.01	5.92
	April	97.9	0.083*	-0.149*	99.2	0.013*	0.042*	133.9	-1.70	3.89
	May	100.2	-0.041*	0.098*	100.2	-0.007*	0.001	97.2	0.81	-2.32
	June	101.5	-0.083*	0.231*	100.8	-0.009*	-0.014	74.2	1.76	-5.84
	July	101.5	-0.096*	0.267*	100.4	-0.017*	-0.034*	60.4	1.89	-7.23
	Aug.	102.5	-0.049*	0.085	101.0	0.007*	-0.061*	61.2	1.34	-3.50
	Sept.	101.4	-0.058*	0.266*	100.5	-0.025*	-0.022*	58.2	0.78	-6.91
	Oct.	101.5	-0.075*	0.149*	100.6	-0.011*	-0.045*	72.7	1.53	-4.65
	Nov.	100.5	-0.035*	0.078	100.1	-0.004	-0.017	87.6	0.74	-2.28
	Dec.	99.8	0.030*	-0.083*	99.5	0.021*	0.047*	102.3	-0.23	3.12
Females	Jan.	98.5	0.137*	0.124*	98.7	0.102*	0.199*	108.3	-1.22	2.58
	Feb.	98.3	0.025	-0.042	99.2	0.054*	-0.070	135.0	0.99	-0.95
	March	99.8	0.080*	-0.082	99.8	0.063*	-0.057	99.0	-0.59	0.87
	April	99.4	0.108	0.013	99.9	0.106*	-0.003	114.6	-0.08	-0.55
	May	99.8	0.002	0.109*	99.7	0.012	0.018	99.0	0.35	-0.03
	June	100.6	-0.053*	0.101	100.4	-0.048*	0.072	90.5	0.17	-1.00
	July	97.8	-0.141*	0.008	97.4	-0.140*	0.011	86.3	0.01	0.11
	Aug.	97.9	-0.177*	-0.037	97.5	-0.197*	0.025	86.9	-0.97	2.24
	Sept.	101.4	0.083*	-0.008	101.6	0.093*	-0.113	95.8	0.35	-3.58
	Oct.	101.7	0.018	0.087	101.7	0.048*	0.036	101.4	1.02	-1.73
	Nov.	102.7	-0.033*	-0.112	102.4	-0.010	-0.096	98.1	0.78	0.54
	Dec.	102.7	-0.059*	-0.240*	101.8	-0.090*	-0.106	78.1	-1.09	4.60

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE - SEX BREAKDOWN
(Regression Coefficients and Calculations)
D. Ages 35-44

Group	Month	Employment			Labor Force			Unemployment Rate[1]		
		Dummies	Time	Unemployment	Dummies	Time	Unemployment	R	δR/δt	δR/δU
Males	Jan.	97.5	0.076*	-0.073*	99.2	0.026*	0.033*	145.8	-1.32	2.76
	Feb.	97.5	0.068*	-0.145*	99.2	0.022*	0.023*	152.6	-1.22	4.38
	March	97.6	0.089*	-0.161*	99.2	0.035*	0.030*	150.7	-1.43	4.97
	April	98.6	0.061*	-0.107*	99.7	0.027*	-0.008	132.0	-0.89	2.58
	May	100.4	-0.014*	0.027*	100.3	-0.014*	-0.007	94.0	0.01	-0.88
	June	101.3	-0.058*	0.149*	100.6	-0.022*	-0.027*	71.4	0.93	-4.57
	July	101.1	-0.072*	0.202*	100.5	-0.014*	0.035*	79.3	1.50	-4.32
	Aug.	101.6	-0.049*	0.113*	100.7	-0.012*	-0.045*	68.4	0.96	-4.11
	Sept.	101.5	-0.037*	0.147*	100.6	-0.025*	-0.022*	62.3	0.30	-4.39
	Oct.	101.4	-0.051*	0.085*	100.4	-0.017*	-0.012	71.3	0.88	-2.52
	Nov.	100.4	-0.046*	0.096*	100.2	-0.013*	-0.016	90.5	0.86	-2.91
	Dec.	99.9	0.027*	-0.123*	99.7	0.006*	0.009	103.6	-0.54	3.44
Females	Jan.	98.9	-0.152*	-0.262*	99.0	-0.147*	-0.173*	120.8	0.25	3.92
	Feb.	98.1	0.002	-0.100*	98.9	-0.004	-0.147*	125.0	-0.26	-1.99
	March	99.1	0.109*	-0.138*	99.2	0.085*	-0.088*	105.0	-1.03	2.14
	April	100.3	-0.058*	-0.128*	100.5	-0.037*	-0.129*	114.0	0.90	-0.02
	May	101.9	0.012	-0.169*	101.4	0.005	-0.040	97.5	-0.29	5.41
	June	101.1	-0.124*	0.159*	101.1	-0.073*	0.112	108.5	2.15	-1.99
	July	96.5	0.081*	0.341*	96.5	0.069*	0.290*	87.6	-0.51	-2.17
	Aug.	98.3	-0.090*	0.017	98.1	-0.051*	0.019	104.6	1.70	0.09
	Sept.	101.3	-0.049*	0.237*	100.8	-0.042*	0.216*	77.9	0.28	-0.83
	Oct.	101.2	0.152*	0.096	100.9	0.128*	0.110	82.0	-0.97	0.60
	Nov.	100.2	0.040*	0.339*	100.6	0.030*	0.227*	95.5	-0.42	-4.67
	Dec.	102.5	-0.008	-0.249*	102.4	-0.009	-0.259*	118.0	2.98	-0.37

TABLE III (continued)

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE - SEX BREAKDOWN
(Regression Coefficients and Calculations)
E. Ages 45-54

Group	Month	Employment			Labor Force			Unemployment Rate[1]		
		Dummies	Time	Unemployment	Dummies	Time	Unemployment	R	δR/δt	δR/δU
Males	Jan.	97.1	0.113*	-0.123*	99.0	0.029*	0.024*	148.9	-2.22	3.84
	Feb.	97.0	0.089*	-0.159*	99.1	0.003*	0.013	161.7	-1.49	4.50
	March	97.3	0.091*	-0.181*	99.2	0.026*	0.014	157.0	-1.72	5.12
	April	98.3	0.053*	-0.045*	99.6	0.022*	0.026*	135.0	-0.82	1.84
	May	100.7	-0.015*	0.013	100.5	-0.010*	-0.021*	92.4	0.13	-0.88
	June	101.3	-0.045*	0.201*	100.6	-0.021*	-0.002	66.4	0.61	-5.26
	July	101.5	-0.049*	0.157*	100.4	0.008*	-0.010	63.0	1.06	-4.34
	Aug.	102.3	-0.091*	0.053	101.0	-0.037*	-0.085*	63.4	1.38	-3.61
	Sept.	102.1	-0.087*	0.132*	99.6	-0.021*	0.002	35.0	1.71	-3.40
	Oct.	101.7	-0.084*	0.109*	100.5	-0.029*	-0.001	69.1	1.42	-2.86
	Nov.	100.7	-0.012	0.027	100.0	-0.002	0.030*	84.2	0.26	0.08
	Dec.	99.5	0.028*	-0.068*	99.5	0.012*	0.020*	105.4	-0.42	2.30
Females	Jan.	95.9	0.089*	0.258*	96.3	0.080*	0.323*	123.2	-0.38	2.51
	Feb.	96.8	0.070*	0.123*	97.6	0.043*	0.124*	124.2	-1.08	0.09
	March	97.1	-0.069*	0.237*	97.9	-0.089*	0.185*	118.2	-0.78	-2.10
	April	100.1	-0.064*	-0.011	100.0	-0.060*	0.044	105.5	0.16	2.15
	May	102.7	-0.145*	-0.214*	102.4	-0.131*	-0.182*	97.1	0.54	1.23
	June	102.8	-0.154*	-0.208*	102.1	-0.141*	-0.122	89.4	0.49	3.32
	July	97.8	0.060*	0.060	97.7	0.039*	0.004	81.2	-0.83	-2.23
	Aug.	99.4	0.042*	-0.197*	99.3	0.069*	-0.238*	98.0	1.07	-1.62
	Sept.	105.2	0.065*	-0.517*	104.6	0.051*	-0.495*	76.4	-0.52	0.72
	Oct.	102.7	-0.002	-0.142	102.5	0.006	-0.185*	88.5	0.31	-1.67
	Nov.	99.9	0.143*	0.254*	100.3	0.156*	0.130	101.1	0.50	-4.74
	Dec.	100.8	-0.033	0.113	100.9	-0.027*	0.059	97.7	0.23	-2.09

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE - SEX BREAKDOWN
(Regression Coefficients and Calculations)
F. Ages 55-64

Group	Month	Employment			Labor Force			Unemployment Rate[1]		
		Dummies	Time	Unemployment	Dummies	Time	Unemployment	R	δR/δt	δR/δU
Males	Jan.	96.7	0.067*	-0.142*	97.2	0.053*	0.035	121.4	-0.29	3.51
	Feb.	96.2	0.043*	-0.109*	97.9	0.023*	0.098*	146.3	-0.41	4.04
	March	96.6	0.051*	-0.096*	98.2	0.046*	0.089*	144.6	-0.12	3.59
	April	97.6	0.070*	0.077*	98.9	0.037*	0.118*	123.7	-0.65	0.77
	May	101.2	-0.020*	0.047*	100.9	-0.025*	0.018	91.4	-0.10	-0.56
	June	102.1	0.007	0.127*	101.2	0.020*	-0.007	74.8	0.25	-2.56
	July	101.5	-0.073*	0.241*	100.9	-0.045*	-0.008	74.2	0.53	-4.81
	Aug.	102.4	-0.102*	0.090*	101.8	-0.052*	-0.124*	80.1	0.95	-4.14
	Sept.	102.5	-0.026*	0.100*	101.5	-0.036*	-0.116*	63.4	-0.21	-4.20
	Oct.	102.8	-0.067*	-0.045	101.5	-0.050*	-0.123*	71.8	0.31	-1.54
	Nov.	100.9	0.031*	-0.030	100.4	0.005	-0.065*	83.7	-0.50	-0.67
	Dec.	99.3	0.005	-0.123*	99.5	0.013	-0.049*	110.7	0.15	1.45
Females	Jan.	99.9	0.023	-0.170	99.8	-0.024	-0.059	99.5	-2.73	6.46
	Feb.	99.8	0.084*	-0.287*	100.1	0.104*	-0.208*	143.1	1.11	4.66
	March	99.7	0.281*	0.009	100.1	0.286*	-0.063	109.1	0.26	-4.08
	April	100.5	0.149*	-0.101	101.1	0.173*	-0.216*	119.2	1.33	-6.51
	May	102.5	-0.042	-0.112	102.9	-0.125*	-0.201*	68.3	-4.78	-5.15
	June	101.8	-0.016	-0.073	101.5	-0.040	0.001	88.7	-1.38	4.23
	July	97.1	-0.004	0.072	96.4	0.016	0.190	94.2	1.19	7.03
	Aug.	97.6	0.020	0.125	97.6	-0.005	0.203	112.3	-1.47	6.14
	Sept.	101.3	-0.208*	0.170	100.7	-0.155*	0.169	88.9	3.04	-0.04
	Oct.	98.9	-0.028	0.442*	99.8	-0.068*	0.284*	99.0	-2.31	-9.10
	Nov.	99.2	-0.179*	0.210	99.2	-0.176*	0.204	100.0	0.18	-0.35
	Dec.	100.0	-0.000	0.000	100.0	0.000	0.000	100.0	0.00	0.00

TABLE III (continued)

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE - SEX BREAKDOWN
(Regression Coefficients and Calculations)
G. Ages 65 & Over

Group	Month	Employment			Labor Force			Unemployment Rate[1]		
		Dummies	Time	Unemployment	Dummies	Time	Unemployment	R	δR/δt	δR/δU
Males	Jan.	93.8	-0.106*	-0.221*	94.9	-0.076*	-0.041	138.7	0.61	3.50
	Feb.	93.9	-0.024	-0.217*	95.2	-0.028	-0.0222	138.7	-0.07	3.75
	March	93.9	0.152*	-0.163*	95.8	0.047*	0.017	134.6	-2.01	3.40
	April	96.7	0.086*	0.343*	97.8	0.051*	0.295*	112.1	-0.65	-0.92
	May	104.0	0.147*	-0.113	104.0	0.178*	-0.261*	94.1	0.55	-2.60
	June	102.3	0.008	0.376*	101.9	0.019	0.170	80.4	0.20	-3.62
	July	103.3	0.043	0.074	103.0	0.056*	-0.105	84.3	0.24	-3.18
	Aug.	105.1	-0.091*	0.067	103.6	-0.118*	0.093	71.6	-0.51	0.49
	Sept.	105.0	-0.017	0.120	104.0	0.038	-0.027	80.1	0.97	-2.58
	Oct.	104.5	-0.075*	-0.037	103.6	-0.018	-0.148	84.5	1.01	-1.99
	Nov.	99.7	-0.096*	0.073	99.1	-0.082*	0.118	94.2	0.25	0.84
	Dec.	97.1	-0.001	-0.213*	97.3	-0.036	-0.071	112.6	-0.65	3.68
Females	Jan.	103.1	-0.420*	-0.526*	103.7	-0.313*	-0.584*	138.3	3.73	-1.73
	Feb.	98.5	0.470*	0.098	99.4	0.664*	-0.153	143.0	6.00	-8.05
	March	100.4	0.423*	-0.057	99.7	0.327*	0.328	102.4	-3.12	12.47
	April	103.3	-0.114	-0.483*	103.4	-0.214*	-0.504*	76.1	-3.40	-0.82
	May	100.3	0.510*	0.424	102.0	0.443*	0.266	118.9	-2.19	-5.02
	June	95.0	0.298*	1.113*	94.4	0.259*	1.095*	68.0	-1.22	-0.25
	July	89.5	0.274*	1.186*	89.7	0.259*	1.136*	96.3	-0.51	-1.70
	Aug.	92.9	-0.656*	0.761*	95.7	-0.683*	-0.032	83.8	-1.12	-29.40
	Sept.	102.8	-0.499*	-0.594*	101.9	-0.561*	-0.478	67.2	-2.36	3.89
	Oct.	104.6	0.022	-0.675*	103.7	-0.086	-0.378	79.8	-3.58	9.71
	Nov.	112.0	-0.317*	-1.620*	111.3	-0.332*	-1.451*	94.4	-0.51	5.41
	Dec.	100.0	-0.000	-0.000	99.5	-0.013	0.155	99.6	-0.44	5.19

TABLE IV

SEASONAL PATTERNS IN UNEMPLOYMENT
AGE-SEX BREAKDOWN

Males

		14-19 years	20-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65 and over
Dummies	Jan.	133.9	185.7	210.5	214.2	211.9	180.7	179.8
	Feb.	136.4	197.5	208.8	207.0	218.7	188.2	165.7
	Mar.	140.1	221.9	277.4	206.9	274.8	177.9	173.3
	Apr.	113.6	163.2	187.8	170.2	160.9	161.3	137.2
	May	88.4	99.3	88.4	91.5	85.6	85.0	84.6
	June	129.6	70.3	46.9	47.6	52.7	56.5	68.6
	July	126.3	59.1	43.0	44.8	39.0	52.3	55.7
	Aug.	81.5	55.0	36.5	43.7	35.3	53.8	57.9
	Sept.	51.6	49.5	37.2	38.8	33.7	46.3	63.1
	Oct.	56.6	45.7	40.3	42.9	40.9	45.0	66.1
	Nov.	75.2	72.3	69.3	68.6	76.8	75.3	67.2
	Dec.	85.4	95.4	102.0	105.9	114.3	108.2	131.1

TABLE IV (Continued)

Males

		14-19 years	20-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65 and over
Time	Jan.	-2.30*	-3.80*	-2.67*	-3.35*	-3.07*	-3.18*	-3.15
	Feb.	-2.43*	-4.02*	-3.03*	-2.38*	-2.50*	-2.43*	-2.80*
	Mar.	-3.25*	-6.05*	-5.58*	-3.27*	-7.41*	-0.84*	-3.48*
	Apr.	-2.10*	-2.65*	-2.51*	-1.45*	-1.70*	-1.59*	-2.49*
	May	0.66*	0.98	1.10	-0.06	0.07	0.63*	1.49*
	June	3.81*	2.09*	1.39*	1.14*	0.59	0.83*	1.03*
	July	3.86*	2.58*	1.51*	1.67*	1.38	1.14*	1.82*
	Aug.	1.17*	1.66*	1.69*	1.03*	1.20	1.11*	0.66
	Sept.	-0.14	1.25*	0.44	0.74*	1.12	0.55*	1.20*
	Oct.	0.11	0.94	1.01	1.17*	1.24	1.07*	1.45*
	Nov.	-0.05	0.95	0.57	0.84*	0.65	0.31	0.98*
	Dec.	-0.90*	-0.13	-0.33	-0.67	-0.30	-0.13	-1.34*

Males

		14-19 years	20-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65 and over
Unemployment	Jan.	-2.65*	-8.73*	-10.95*	-11.93*	-11.42*	-6.93*	-7.07*
	Feb.	-2.68*	-9.44*	-9.99*	-9.74*	-11.45*	-7.76*	-3.40*
	Mar.	-3.90*	-13.41*	-21.90*	-9.59*	-21.62*	-5.76*	-5.54*
	Apr.	-0.90	-5.94*	-9.21*	-6.53*	-5.52*	-5.78*	-3.20*
	May	0.08	-0.04	0.76	0.43	1.08	1.22	0.88
	June	-3.35*	1.11	3.93	3.70*	2.82	3.30*	1.33
	July	-2.85*	2.20	3.69	3.42*	4.39	2.83*	3.59
	Aug.	1.15	3.26	5.48	4.00*	5.26	2.76*	2.17
	Sept.	3.84*	2.62	4.42	4.37*	5.23	4.02*	1.28
	Oct.	3.59*	4.44	4.97	4.96*	5.00	5.14*	1.14
	Nov.	2.00*	2.32	2.57	2.55	1.93	2.51*	3.73
	Dec.	1.55*	0.93	0.57	0.42	-0.92	-0.14	-3.31*
$\bar{R}^2$		0.962	0.928	0.916	0.973	0.901	0.975	0.926

* Significant at 0.05 level.

TABLE IV (continued)

SEASONAL PATTERNS IN UNEMPLOYMENT
AGE-SEX BREAKDOWN

Females

		14-19 years	20-24 years	25-34 years	35-44 years
Dummies	Jan.	125.0	127.6	161.0	144.8
	Feb.	100.6	150.8	122.6	210.3
	Mar.	119.3	122.7	114.2	110.7
	Apr.	79.4	109.3	127.3	105.6
	May	80.7	114.0	84.8	60.1
	June	176.0	83.3	78.1	85.5
	July	152.2	76.3	82.1	102.0
	Aug.	110.7	82.7	99.1	83.4
	Sept.	91.6	83.2	88.7	69.1
	Oct.	73.4	88.4	99.6	85.0
	Nov.	66.9	71.9	87.9	118.2
	Dec.	75.5	94.2	90.1	100.8
Time	Jan.	-4.08*	-2.23*	-5.06*	-2.17*
	Feb.	-3.65*	-3.35*	-1.06*	-7.83*
	Mar.	-4.02*	-1.08*	-1.27*	-0.97
	Apr.	-0.47	-0.41	-1.18*	0.99
	May	1.35*	0.66*	1.03*	1.45*
	June	5.35*	0.90*	0.64	0.56
	July	1.12*	0.50	0.68	-0.33
	Aug.	0.84*	0.86*	-0.68	2.37*
	Sept.	0.44	2.93*	1.80*	0.57
	Oct.	0.69	0.73*	1.87*	-0.78
	Nov.	0.29	0.83*	0.91*	0.19
	Dec.	-0.97*	-0.42	-0.86*	-0.15

* Significant at 0.05 level.

Unemployment	Jan.	-2.95*	-1.88*	-5.07*	-3.83*
	Feb.	0.17	-5.45*	-0.54	-13.30*
	Mar.	-4.93*	-1.07	0.36	0.17
	Apr.	1.19	-1.24	-3.42*	0.76
	May	0.70	-3.86*	0.92	6.13*
	June	-9.23*	0.92	1.89	0.22
	July	-4.29*	2.38	-0.15	-2.09
	Aug.	-0.98	1.37	-1.51	1.20
	Sept.	1.08	2.14	-0.43	1.08
	Oct.	3.80*	1.36	-1.22	2.00
	Nov.	4.35*	5.10*	1.89	-4.45
	Dec.	0.98	0.79	0.83	0.66
$\bar{R}^2$		0.856	0.838	0.838	0.796

* Significant at 0.05 level.

TABLE V

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE-SEX BREAKDOWN
SUMMARY OF REGRESSION RESULTS

	Month	Seasonal (% of Seasonally-adjusted data)	Effect of T (% of Seasonally-adjusted values per annum)	Effect of U (% of Seasonally-adjusted values per one percentage point change in U.)
Males 14-19				
Employment Maximum	July	47.37	0.49	2.13
Labor Force Maximum	July	48.29	0.91	-0.27
Employment Minimum	Feb.	19.00	0.06	0.56
Labor Force Minimum	Feb.	15.86	0.27	-0.19
Unemployment Rate Min.	Aug.	38.15	0.16	6.57
Unemployment Minimum	Sept.	34.45	0.02	-4.17
Females 14-19				
Employment Maximum	July	30.23	0.80	-0.42
Labor Force Maximum	July	33.38	1.01	-1.05
Employment Minimum	Jan.	12.46	0.42	-0.27
Labor Force Minimum	Feb.	13.02	0.38	-0.41
Unemployment Rate Min.	Feb.	14.55	2.18	-1.87
Unemployment Minimum	March	28.09	3.76	4.08
Males 20-24				
Employment Maximum	Aug.	11.55	0.22	0.15
Labor Force Maximum	July	9.77	0.35	-0.19
Employment Minimum	Feb.	7.90	-0.01	0.47
Labor Force Minimum	March	4.97	0.16	-0.02
Unemployment Rate Min.	Aug.	27.78	-1.00	4.89
Unemployment Minimum	Sept.	30.41	-1.77	-4.34
Females 20-24				
Employment Maximum	June	2.98	0.19	0.11
Labor Force Maximum	June	3.49	0.17	0.10
Employment Minimum	Jan.	2.07	0.08	-0.01
Labor Force Minimum	Jan.	1.69	0.11	-0.05
Unemployment Rate Min.	July	46.77	-0.42	6.21
Unemployment Minimum	July	10.86	-0.49	2.33
Males 25-34				
Employment Maximum	Aug.	2.50	-0.05	0.06
Labor Force Maximum	Aug.	8.59	0.00	-0.06
Employment Minimum	March	2.88	-0.01	0.23
Labor Force Minimum	Feb.	0.66	0.00	-0.01
Unemployment Rate Min.	Sept.	42.2	-0.74	6.31
Unemployment Minimum	Sept.	45.06	-0.97	-6.56

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE-SEX BREAKDOWN
SUMMARY OF REGRESSION RESULTS

	Month	Seasonal (% of Seasonally-adjusted data)	Effect of T (% of Seasonally-adjusted values per annum)	Effect of U (% of Seasonally-adjusted values per one percentage point change in U.)
Females 25-34				
Employment Maximum	Oct.	2.16	0.02	0.09
Labor Force Maximum	Oct.	2.22	0.05	0.04
Employment Minimum	Aug.	3.56	0.17	0.03
Labor Force Minimum	Aug.	3.91	0.20	-0.02
Unemployment Rate Min.	Dec.	21.34	1.07	-4.39
Unemployment Minimum	Aug.	29.76	0.41	1.04
Males 35-44				
Employment Maximum	Sept.	1.82	-0.04	0.13
Labor Force Maximum	July	0.51	-0.01	0.04
Employment Minimum	Feb.	2.52	-0.07	0.16
Labor Force Minimum	Feb.	0.57	-0.02	-0.02
Unemployment Rate Min.	Sept.	39.51	-0.31	3.93
Unemployment Minimum	Sept.	39.54	-1.01	-5.53
Females 35-44				
Employment Maximum	Oct.	2.87	0.17	0.08
Labor Force Maximum	Oct.	2.35	0.13	0.10
Employment Minimum	Jan.	3.08	0.14	0.27
Labor Force Minimum	Jan.	2.67	0.14	0.18
Unemployment Rate Min.	Sept.	25.17	0.11	0.84
Unemployment Minimum	Sept.	19.88	-1.24	-2.14
Males 45-54				
Employment Maximum	Sept.	1.95	-0.09	0.12
Labor Force Maximum	June	0.52	-0.02	-0.28
Employment Minimum	Feb.	2.95	-0.09	0.17
Labor Force Minimum	Jan.	0.61	-0.03	-0.23
Unemployment Rate Min.	Sept.	63.49	-1.72	3.17
Unemployment Minimum	Sept.	36.65	-1.85	-7.33
Females 45-54				
Employment Maximum	Sept.	3.70	0.06	-0.50
Labor Force Maximum	Sept.	3.08	0.05	-0.47
Employment Minimum	March	2.52	0.07	-0.26
Labor Force Minimum	March	2.06	0.09	-0.21
Unemployment Rate Min.	Sept.	23.66	0.50	-1.10

TABLE V (continued)

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
AGE-SEX BREAKDOWN
SUMMARY OF REGRESSION RESULTS

	Month	Seasonal (% of Seasonally-adjusted data)	Effect of T (% of Seasonally-adjusted values per annum)	Effect of U (% of Seasonally-adjusted values per one percentage point change in U.)
Males 55-64				
Employment Maximum	Sept.	2.67	-0.02	0.09
Labor Force Maximum	June	1.39	0.02	0.00
Employment Minimum	Feb.	3.92	-0.04	0.12
Labor Force Minimum	Jan.	2.23	-0.05	-0.05
Unemployment Rate Min.	Sept.	35.46	0.20	3.77
Unemployment Minimum	Sept.	34.27	-0.76	-4.40
Females 55-64				
Employment Maximum	March	1.80	0.27	-0.01
Labor Force Maximum	March	2.76	0.28	-0.09
Employment Minimum	July	2.63	0.01	-0.05
Labor Force Minimum	July	2.76	-0.02	-0.17
Unemployment Rate Min.	May	33.60	4.31	5.42
Males 65+				
Employment Maximum	Sept.	5.35	-0.02	0.11
Labor Force Maximum	May	4.27	0.18	-0.27
Employment Minimum	Jan.	7.77	0.11	0.23
Labor Force Minimum	Jan.	5.85	0.08	0.05
Unemployment Rate Min.	Aug.	30.60	0.51	-0.42
Unemployment Minimum	Aug.	27.83	-1.04	-2.86
Females 65+				
Employment Maximum	May	5.67	0.51	0.45
Labor Force Maximum	May	6.33	0.46	0.32
Employment Minimum	Aug.	9.27	0.66	-0.79
Labor Force Minimum	Aug.	9.63	0.66	-0.02
Unemployment Rate Min.	Sept.	30.16	1.64	-4.75

TABLE VI

SEASONAL PATTERNS IN UNEMPLOYMENT
AGE-SEX BREAKDOWN
STANDARDIZED UNEMPLOYMENT RATES
ANNUAL AVERAGES

A. All Ages

	Males				Females				Total			
	Adjusted				Adjusted				Adjusted			
	Season-ally	Max. E+L	Min. E+L	Min. U.	Season-ally	Max. E+L.	Min. E+L	Min. U.	Seas-onally	Max. E+L	Min. E+L	Min. U.
1953	3.4	1.3	6.5	1.1	1.6	2.7	1.7	1.2	3.0	1.6	5.4	1.2
1954	5.1	2.7	8.4	2.6	2.6	4.1	2.7	2.0	4.6	3.0	7.1	2.5
1955	4.9	2.7	8.1	2.5	2.6	4.0	2.7	2.1	4.4	3.0	6.9	2.4
1956	3.9	1.9	6.8	1.7	1.9	3.2	2.0	1.4	3.4	2.2	5.7	1.6
1957	5.4	3.2	8.5	2.9	2.3	3.9	2.4	1.8	4.6	3.3	7.0	2.7
1958	8.1	5.5	11.6	5.3	3.6	5.8	3.8	2.9	7.1	5.6	9.7	4.8
1959	6.9	4.6	10.2	4.3	3.0	5.0	3.2	2.4	6.0	4.7	8.5	3.9
1960	8.1	5.6	11.5	5.4	3.6	5.8	3.8	2.8	6.9	5.7	9.5	4.7
1961	8.4	5.9	11.8	5.6	3.7	6.0	3.9	3.0	7.1	5.9	9.7	4.9
1962	6.8	4.9	9.7	4.4	3.3	5.2	3.4	2.5	5.9	4.9	8.1	3.9
1963	6.4	4.6	9.2	4.0	3.3	5.1	3.4	2.6	5.5	4.8	7.6	3.6
1964	5.3	3.9	7.9	3.2	3.0	4.6	3.1	2.3	4.6	4.1	6.6	2.9
1965	4.4	3.3	6.9	2.4	2.7	4.1	2.8	1.9	3.9	3.5	5.7	2.3
1966	4.0	3.1	6.3	2.2	2.6	3.9	2.6	1.8	3.6	3.4	5.2	2.1
1967	4.6	3.6	7.0	2.7	3.0	4.5	3.0	2.1	4.1	3.9	5.8	2.5
1968	5.5	4.4	7.9	3.4	3.4	5.1	3.5	2.5	4.8	4.6	6.5	3.1
1969	5.2	4.3	7.5	3.3	3.6	5.2	3.6	2.6	4.7	4.6	6.3	3.1

TABLE VI (continued)

SEASONAL PATTERNS IN UNEMPLOYMENT
AGE-SEX BREAKDOWN
STANDARDIZED UNEMPLOYMENT RATES
ANNUAL AVERAGES

B. Both Sexes

	Ages 14 - 24				Ages 25+			
	Adjusted				Adjusted			
	Seas-onally	Max. E+L	Min. E+L	Min. U	Seas-onally	Max. E+L	Min. E+L	Min. U
1953	4.6	4.0	7.9	2.1	2.5	0.9	4.7	0.9
1954	6.9	6.0	10.5	4.1	3.9	2.0	6.2	2.0
1955	6.6	6.0	10.1	4.0	3.7	2.0	6.0	1.9
1956	5.3	5.1	8.3	2.8	2.9	1.3	5.0	1.3
1957	7.3	6.9	10.6	4.6	3.9	2.2	6.1	2.1
1958	11.0	10.1	14.7	7.9	5.9	4.0	8.4	3.9
1959	9.4	9.1	12.8	6.5	5.0	3.3	7.3	3.1
1960	11.0	10.5	14.4	7.9	5.8	4.1	8.2	3.8
1961	10.8	10.6	14.2	7.7	6.1	4.4	8.5	4.1
1962	9.3	9.6	12.2	6.5	4.9	3.4	7.1	3.1
1963	9.2	9.8	11.9	6.5	4.5	3.0	6.5	2.8
1964	7.9	8.9	10.2	5.5	3.7	2.4	5.6	2.1
1965	6.5	7.8	8.4	4.2	3.1	1.9	4.9	1.7
1966	5.9	7.6	7.6	3.8	2.8	1.8	4.5	1.5
1967	6.9	8.4	8.6	4.6	3.2	2.1	4.9	1.8
1968	8.2	9.6	10.0	5.8	3.7	2.6	5.5	2.2
1969	7.9	9.6	9.5	5.7	3.6	2.5	5.2	2.2

TABLE VII

SEASONAL PATTERNS IN UNEMPLOYMENT RATES

AVERAGE EFFECT OF TREND ON DIFFERENCE BETWEEN STANDARDIZED AND SEASONALLY-ADJUSTED RATES

PER CENT OF SEASONALLY ADJUSTED LABOR FORCE PER YEAR

Group	Max. E. + L.	Min. E. + L.	Min. U.
Males 14-24	0.274	-0.187	0.078
Males 25+	0.052	-0.024	0.023
Males Total	0.098	-0.057	0.034
Females 14-24	0.108	-0.016	-0.048
Females 25+	0.000	-0.011	-0.021
Females Total	0.039	-0.012	-0.031
All 14-24	0.208	-0.120	0.029
All 25+	0.025	-0.021	0.013
Total	0.082	-0.045	0.017

TABLE VIII

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
ESTIMATED SIZE OF SEASONAL AS PERCENTAGE OF
ESTIMATES FOR MAXIMUM MONTHS USING 1969 VALUES

Age-Sex Breakdown

	Employment	Labor Force
Males 14-19	45.2	43.4
Males 20-24	17.4	13.5
Males 14-24	29.8	27.4
Males 25-34	5.2	1.5
Males 35-44	5.3	1.1
Males 45-54	4.8	1.1
Males 55-64	6.4	3.5
Males 65+	12.5	9.8
Males 25+	5.6	1.9
All Males	11.4	8.4
Females 14-19	32.2	38.6
Females 20-24	4.9	5.1
Females 14-24	17.9	21.7
Females 25-34	5.6	6.0
Females 35-44	5.8	4.9
Females 45-54	6.0	5.0
Females 55-64	4.4	4.7
Females 65+	14.1	15.0
Females 25+	5.8	5.5
All Females	10.1	11.5
All 14-24	24.9	25.0
All 25+	5.7	3.0
All	11.0	9.4

TABLE IX

UNEMPLOYMENT RATES, 1947 - 1952

(Annual Averages of Available Data)

	Average of Raw Data	Average of Data Adjusted for Seasonality
	%	%
1946	3.4	4.0
1947	2.3	2.0
1948	2.3	2.6
1949	2.9	3.5
1950	3.6	4.1
1951	2.4	2.8
1952	2.9	3.0

Source: Statistics Canada and Table III.

TABLE X

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE
REGION - SEX BREAKDOWN
SUMMARY OF REGRESSION RESULTS

	Month	Seasonal	Effect of T	Effect of U
Males - Atlantic				
Employment Maximum	July	12.06	0.13	0.37
Labor Force Max.	July	8.24	0.21	-0.09
Employment Minimum	March	10.82	-0.07	0.35
Labor Force Min.	February	5.13	0.08	-0.10
Unemployment Rate Min.	September	44.26	-0.40	2.48
Females - Atlantic				
Employment Maximum	July	4.07	0.26	-0.17
Labor Force Max.	July	3.97	0.25	-0.17
Employment Minimum	March	3.87	-0.17	-0.13
Labor Force Min.	March	3.25	-0.15	-0.16
Unemployment Rate Min.	December	17.67	2.83	-1.02
Males - Quebec				
Employment Maximum	July	7.50	0.05	0.18
Labor Force Max.	July	5.93	0.18	-0.13
Employment Minimum	February	5.72	-0.05	0.19
Labor Force Min.	March	2.44	0.05	-0.06
Unemployment Rate Min.	September	29.81	-1.03	1.36

	Month	Seasonal	Effect of T	Effect of U
Females - Quebec				
Employment Maximum	July	3.25	0.29	-0.03
Labor Force Max.	July	3.03	0.27	-0.07
Employment Minimum	January	3.47	0.13	0.06
Labor Force Min.	January	3.02	0.19	-0.04
Unemployment Rate Min.	December	7.99	0.48	-0.50
Males - Ontario				
Employment Maximum	August	5.15	0.06	-0.11
Labor Force Max.	July	5.15	0.16	-0.10
Employment Minimum	February	3.48	-0.02	0.14
Labor Force Min.	January	2.05	0.06	-0.06
Unemployment Rate Min.	September	33.50	0.67	2.58
Females - Ontario				
Employment Maximum	August	3.64	0.10	-0.21
Labor Force Max.	July	3.53	0.15	-0.34
Employment Minimum	February	3.41	0.06	-0.10
Labor Force Min.	February	3.33	0.10	-0.14
Unemployment Rate Min.	December	15.47	-0.08	-1.76

TABLE X, (continued)

	Month	Seasonal	Effect of T	Effect of U
Males - Prairies				
Employment Maximum	August	7.49	-0.07	-0.02
Labor Force Max.	July	6.31	0.07	-0.21
Employment Minimum	January	5.43	-0.08	0.09
Labor Force Min.	February	3.67	0.00	-0.17
Unemployment Rate Min.	September	52.05	-1.67	6.34
Females - Prairies				
Employment Maximum	May	2.01	-0.07	-0.64
Labor Force Max.	July	2.12	-0.02	0.31
Employment Minimum	February	3.33	-0.15	0.59
Labor Force Min.	February	3.28	-0.09	0.64
Unemployment Rate Min.	September	24.15	-0.64	-2.53
Males - British Columbia				
Employment Maximum	July	6.00	0.02	-0.02
Labor Force Max.	July	4.89	0.10	-0.10
Employment Minimum	January	4.47	-0.12	0.07
Labor Force Min.	December	2.41	0.11	-0.04
Unemployment Rate Min.	September	32.87	-1.37	2.39

	Month	Seasonal	Effect of T	Effect of U
Females - British Columbia				
Employment Maximum	July	4.57	0.00	0.15
Labor Force Max.	July	4.83	0.06	0.08
Employment Minimum	January	4.37	0.02	-0.09
Labor Force Min.	January	3.76	0.09	-0.02
Unemployment Rate Min.	September	17.33	0.60	-2.06

TABLE XI

SEASONAL PATTERNS IN UNEMPLOYMENT REGION-SEX BREAKDOWN
STANDARDIZED UNEMPLOYMENT RATES
ANNUAL AVERAGES - (a) MALES

	Atlantic Region				Quebec				Ontario			
Year	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U
1953	6.5	3.1	13.4	2.7	4.2	1.9	8.1	1.0	2.4	0.9	4.9	1.8
1954	7.6	3.8	14.8	3.7	6.6	3.7	10.8	3.2	4.4	3.0	7.1	3.5
1955	7.6	3.9	14.6	3.7	6.9	4.1	11.1	3.6	3.6	2.4	6.1	2.8
1956	7.1	3.6	13.8	3.3	5.5	3.2	9.4	2.4	2.8	1.6	5.1	2.0
1957	10.0	5.5	17.5	5.7	7.0	4.4	11.0	3.8	3.9	2.8	6.3	3.1
1958	14.9	8.8	23.7	9.8	10.2	6.8	14.6	6.8	6.2	5.2	8.9	5.1
1959	13.1	7.6	21.2	8.3	9.1	6.2	13.3	5.9	5.2	4.3	7.6	4.2
1960	12.9	7.6	20.8	8.1	10.5	7.4	14.9	7.3	6.3	5.5.	8.8	5.2
1961	13.7	8.2	21.7	8.8	10.8	7.6	15.0	7.6	6.4	5.7	8.8	5.2
1962	12.9	7.7	20.5	8.1	8.8	6.3	12.6	5.8	4.9	4.3	7.0	3.8
1963	11.7	7.0	18.9	7.2	8.6	6.3	12.4	5.8	4.2	3.7	6.2	3.2
1964	9.7	5.8	16.0	5.6	7.3	5.5	10.8	4.7	3.5	3.1	5.3	2.5
1965	8.8	5.4	14.8	5.0	6.1	4.8	9.3	3.7	2.7	2.3	4.3	1.8
1966	7.6	4.7	13.1	4.0	5.4	4.4	8.3	3.1	2.6	2.4	4.1	1.7
1967	8.1	5.1	13.5	4.4	6.0	4.9	9.0	3.7	3.3	3.2	4.9	2.3
1968	9.0	5.7	14.7	5.2	7.6	6.2	10.8	5.3	3.7	3.6	5.3	2.6
1969	8.9	5.7	14.3	5.1	7.8	6.4	10.8	5.5	3.3	3.3	4.7	2.2

	Prairies				British Columbia			
Year	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U
1953	2.0*	0.0*	4.7	0.0	4.5	2.4	10.0	1.8
1954	2.7	0.0	5.5	0.5	5.9	3.9	11.2	3.1
1955	3.3	0.3	6.1	1.0	4.1	2.2	9.2	1.6
1956	2.4	0.0	4.9	0.3	2.8	1.0	7.5	0.5
1957	3.0	0.3	5.6	0.9	5.8	3.9	10.4	3.2
1958	4.6	1.7	7.5	2.2	9.7	7.7	14.3	6.8
1959	3.8	1.2	6.4	1.6	7.0	5.2	11.3	4.5
1960	4.8	2.2	7.6	2.5	9.6	7.7	13.8	6.9
1961	5.4	2.7	8.1	3.0	9.6	7.8	13.6	6.9
1962	4.4	2.1	6.9	2.3	7.4	5.6	11.0	5.0
1963	4.2	2.1	6.6	2.1	7.0	5.4	10.4	4.7
1964	3.4	1.6	5.6	1.5	5.2	3.9	8.3	3.2
1965	2.9	1.3	5.0	1.2	4.2	3.0	7.0	2.3
1966	2.3	1.0	4.1	0.8	4.8	3.7	7.5	3.0
1967	2.6	1.3	4.4	1.0	5.5	4.4	8.0	3.7
1968	3.3	2.0	5.2	1.6	6.4	5.3	8.7	4.5
1969	3.0	1.9	4.8	1.5	5.2	4.2	7.3	3.5

TABLE XI, (continued)

SEASONAL PATTERNS IN UNEMPLOYMENT REGION-SEX BREAKDOWN

STANDARIZED UNEMPLOYMENT RATES

ANNUAL AVERAGES - (b) FEMALES

	Atlantic Region				Quebec				Ontario			
Year	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U
1953	1.5	1.6	2.5	2.7	2.3	2.5	3.4	3.3	1.1	0.5	1.9	0.7
1954	2.6	2.7	3.6	3.7	3.5	3.5	4.7	4.4	2.2	1.3	3.0	1.8
1955	2.5	2.5	3.4	3.4	3.7	3.7	4.9	4.6	2.0	1.2	2.7	1.5
1956	2.0	1.9	2.8	2.7	3.0	3.0	4.0	3.8	1.3	0.7	1.9	0.8
1957	2.5	2.6	3.5	3.4	2.9	2.9	4.0	3.7	2.1	1.4	2.7	1.7
1958	3.7	3.7	4.6	4.5	4.6	4.4	5.9	5.4	3.2	2.2	3.8	2.9
1959	3.2	3.1	4.0	3.8	4.0	3.8	5.1	4.7	2.6	1.9	3.2	2.3
1960	2.9	2.9	3.8	3.4	4.8	4.5	6.0	5.5	3.1	2.3	3.7	2.8
1961	3.9	3.7	4.6	4.2	4.7	4.5	5.9	5.3	3.3	2.5	3.8	3.0
1962	4.3	4.2	5.1	4.5	3.7	3.5	4.6	4.1	3.0	2.4	3.4	2.6
1963	3.1	3.0	3.8	3.2	4.1	3.9	5.0	4.5	2.9	2.4	3.2	2.5
1964	2.8	2.7	3.5	2.7	3.5	3.4	4.2	3.8	2.7	2.4	3.0	2.3
1965	3.3	3.2	3.9	3.0	3.4	3.4	4.0	3.6	2.2	2.1	2.5	1.8
1966	3.1	3.0	3.7	2.7	3.0	3.0	3.4	3.0	2.3	2.2	2.5	1.8
1967	3.0	2.7	3.5	2.3	3.6	3.4	3.9	3.5	2.7	2.5	2.9	2.3
1968	3.3	3.1	3.9	2.7	4.0	3.8	4.4	4.0	3.2	3.1	3.4	2.8
1969	4.2	4.1	4.8	3.6	5.0	4.7	5.3	4.8	2.8	2.7	2.9	2.4

Year	Prairies Seasonally	Prairies Max. E+L	Prairies Min. E+L	Prairies Min. U	British Columbia Seasonally	British Columbia Max. E+L	British Columbia Min. E+L	British Columbia Min. U
1953	1.2	2.9	2.3	0.3	2.0	1.1	3.5	1.5
1954	1.7	3.9	2.8	0.9	2.4	1.7	3.9	2.2
1955	2.0	4.5	2.9	1.2	2.4	1.9	4.0	2.0
1956	1.4	3.0	2.3	0.6	2.5	2.1	4.1	1.9
1957	1.3	3.4	2.2	0.6	2.8	2.1	3.9	2.3
1958	2.1	5.4	2.8	1.5	5.2	4.4	6.0	5.1
1959	1.5	3.9	2.2	0.8	4.5	4.1	5.7	4.3
1960	2.3	5.4	2.8	1.7	5.2	4.7	6.1	5.2
1961	2.5	5.9	3.0	2.0	5.1	4.5	5.8	4.9
1962	2.4	4.9	2.8	1.8	4.5	4.2	5.4	4.2
1963	2.3	4.4	2.6	1.7	5.1	4.8	5.8	4.6
1964	2.2	3.4	2.5	1.5	5.6	5.5	6.4	4.9
1965	1.6	2.3	1.9	0.9	4.2	4.2	5.0	3.4
1966	1.5	1.5	1.8	0.8	3.9	3.9	4.6	3.1
1967	1.6	1.6	1.7	0.8	4.2	4.4	4.9	3.6
1968	2.1	2.7	2.2	1.5	5.0	5.0	5.5	4.3
1969	2.5	2.6	2.5	1.9	4.4	4.7	5.0	3.7

TABLE XI (continued)

SEASONAL PATTERNS IN UNEMPLOYMENT REGION-SEX BREAKDOWN

STANDARDIZED UNEMPLOYMENT RATE

ANNUAL AVERAGES - (c) BOTH SEXES

Year	Atlantic Region				Quebec				Ontario			
	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U
1953	5.5	2.8	11.3	2.7	3.8	2.0	7.0	1.5	2.1	0.8	4.2	1.5
1954	6.6	3.6	12.6	3.7	5.9	3.7	9.4	3.5	3.8	2.6	6.1	3.1
1955	6.5	3.6	12.4	3.6	6.2	4.0	9.7	3.8	3.2	2.1	5.3	2.5
1956	6.1	3.3	11.6	3.2	5.0	3.2	8.2	2.7	2.4	1.4	4.3	1.7
1957	8.4	4.9	14.5	5.2	6.1	4.0	9.4	3.8	3.4	2.5	5.4	2.7
1958	12.5	7.8	19.7	8.7	8.8	6.3	12.5	6.5	5.4	4.5	7.6	4.5
1959	11.0	6.7	17.5	7.3	7.9	5.6	11.3	5.6	4.5	3.7	6.5	3.7
1960	10.7	6.6	17.0	7.0	9.1	6.8	12.6	6.8	5.4	4.6	7.4	4.5
1961	11.2	7.1	17.4	7.6	9.2	6.9	12.7	7.0	5.5	4.8	7.4	4.6
1962	10.7	6.9	16.6	7.2	7.4	5.6	10.6	5.4	4.3	3.7	6.0	3.5
1963	9.5	6.1	15.1	6.2	7.4	5.7	10.4	5.4	3.8	3.3	5.3	3.0
1964	7.9	5.1	12.8	4.8	6.3	5.0	9.0	4.5	3.2	2.9	4.6	2.4
1965	7.3	4.8	11.8	4.4	5.4	4.4	7.8	3.7	2.5	2.3	3.7	1.8
1966	6.3	4.3	10.4	3.7	4.7	4.0	6.9	3.1	2.5	2.3	3.6	1.7
1967	6.6	4.4	10.6	3.8	5.3	4.5	7.4	3.7	3.1	3.0	4.3	2.3
1968	7.3	5.0	11.4	4.5	6.5	5.5	8.9	4.9	3.6	3.5	4.7	2.7
1969	7.5	5.2	11.4	4.7	6.9	5.9	9.2	5.3	3.1	3.1	4.1	2.3

	Prairies				British Columbia			
Year	Season-ally	Max. E+L	Min. E+L	Min. U	Season-ally	Max. E+L	Min. E+L	Min. U
1953	1.8	0.0	4.2	0.0	4.0	2.1	8.5	1.7
1954	2.6	0.5	5.0	0.6	5.2	3.4	9.6	2.9
1955	3.1	1.1	5.5	1.1	3.8	2.2	8.0	1.7
1956	2.2	0.4	4.4	0.4	2.7	1.3	6.7	0.8
1957	2.7	0.9	4.9	0.8	5.1	3.5	8.9	3.0
1958	4.1	2.6	6.4	2.1	8.6	6.9	12.4	6.4
1959	3.3	1.9	5.4	1.4	6.4	5.0	9.9	4.4
1960	4.2	3.0	6.4	2.3	8.6	7.0	11.9	6.4
1961	4.6	3.6	6.8	2.7	8.4	7.0	11.6	6.4
1962	3.9	2.8	5.8	2.1	6.6	5.3	9.5	4.8
1963	3.7	2.7	5.6	2.0	6.4	5.2	9.1	4.6
1964	3.1	2.1	4.7	1.5	5.3	4.4	7.8	3.7
1965	2.5	1.6	4.1	1.1	4.2	3.3	6.4	3.0
1966	2.1	1.1	3.4	0.8	4.5	3.7	6.6	3.0
1967	2.3	1.4	3.6	1.0	5.1	4.4	7.1	3.6
1968	2.9	2.2	4.3	1.6	5.9	5.2	7.7	4.4
1969	2.9	2.2	4.1	1.6	5.0	4.4	6.6	3.6

TABLE XII

SEASONAL PATTERNS IN UNEMPLOYMENT RATES

AVERAGE EFFECT OF TREND ON DIFFERENCE BETWEEN STANDARDIZED AND SEASONALLY-ADJUSTED RATES

PER CENT OF SEASONALLY-ADJUSTED LABOR FORCE PER YEAR

Group	Max. E + L	Min. E + L	Min. W
Males:			
Atlantic Region	0.088	-0.153	0.026
Quebec	0.140	-0.100	0.080
Ontario	0.099	-0.084	0.025
Prairies	0.146	-0.069	0.049
B.C.	0.078	-0.227	0.068
Females:			
Atlantic Region	0.000	-0.028	-0.127
Quebec	0.000	-0.070	-0.081
Ontario	0.049	-0.047	0.001
Prairies	-0.017	-0.031	0.017
B.C.	0.066	-0.067	-0.032
Both Sexes:			
Atlantic Region	0.066	-0.119	-0.002
Quebec	0.102	-0.086	0.037
Ontario	0.085	-0.068	-0.017
Prairies	0.069	-0.067	0.041
B.C.	0.075	-0.179	0.041

TABLE XIII

SEASONAL PATTERNS IN EMPLOYMENT AND LABOR FORCE

ESTIMATED SIZE OF SEASONAL AS PERCENTAGE OF ESTIMATES FOR MAXIMUM MONTHS USING 1969 VALUES

REGION-SEX BREAKDOWN

	Employment	Labor Force
Males:		
Atlantic	20.4	12.4
Quebec	12.3	7.9
Ontario	8.2	6.9
Prairies	12.0	9.4
B.C.	9.8	6.9
Females:		
Atlantic	7.6	6.9
Quebec	6.5	6.0
Ontario	6.8	6.7
Prairies	5.2	5.3
B.C.	8.6	8.2
Both Sexes:		
Atlantic	16.5	10.7
Quebec	10.5	7.3
Ontario	7.7	6.8
Prairies	9.9	8.1
B.C.	9.4	7.3

TABLE XIV

REGIONAL DIFFERENCES IN SEASONALITY AND UNEMPLOYMENT RATES AS A PROPORTION OF ONTARIO FIGURES USING 1969 VALUES

	Atlantic	Quebec	Prairies	B.C.
(a) Males:				
Employment	2.5	1.5	1.5	1.2
Labor Force	1.8	1.1	1.4	1.0
Unemployment Rate - Seasonally Adjusted	2.7	2.4	0.9	1.6
Unemployment Rate - Max. E + L	1.7	1.9	0.6	1.3
Unemployment Rate - Min. E + L	3.0	2.3	1.0	1.6
Unemployment Rate - Min. U	2.3	2.5	0.7	1.6
(b) Females:				
Employment	1.1	1.0	0.8	1.3
Labor Force	1.0	0.9	0.8	1.2
Unemployment Rate - Seasonally Adjusted	1.5	1.8	0.9	1.6
Unemployment Rate - Max. E + L	1.5	1.7	1.0	1.7
Unemployment Rate - Min. E + L	1.7	1.8	0.9	1.7
Unemployment Rate - Min. U	1.5	2.0	0.8	1.5

	Atlantic	Quebec	Prairies	B.C.
(c) Both Sexes:				
Employment	2.1	1.4	1.3	1.2
Labor Force	1.6	1.1	1.2	1.4
Unemployment Rate - Seasonally Adjusted	2.4	2.2	0.9	1.6
Unemployment Rate - Max. E + L	1.7	1.5	0.7	1.4
Unemployment Rate - Min. E + L	2.8	1.9	1.0	1.6
Unemployment Rate - Min. U	2.0	2.3	0.7	1.6

TABLE XV

SEASONAL PATTERNS - HIRINGS AND SEPARATIONS DATA

SUMMARY OF REGRESSION RESULTS* - JANUARY 1953 - AUGUST 1966

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
			(a) Hirings				
Agriculture	Feb.	May	0.284	2.571	0.889	1.404	0.0105
Forestry	April	May	0.359	2.039	0.824	1.578	0.0132
Mining	Dec.	June	0.846	1.579	0.464	0.568	-0.0055
Manufacturing	Dec.	June	0.668	1.477	0.548	1.104	0.0019
Construction	Dec.	May	0.652	1.493	0.564	4.793	0.0114
T.C.U.	Feb.	May	0.624	1.553	0.598	2.376	0.0084
Trade	Feb.	June	0.719	1.299	0.446	0.690	-0.0014
F.I.R.	Dec.	June	0.696	1.501	0.537	-0.302	-0.0040
Services	Feb.	Nov.	0.639	1.764	0.638	-1.799	0.0145
All Industries Covered	Feb.	May	0.678	1.353	0.499	0.971	-0.0018

* Derivatives with respect to the unemployment rate refer to the proportion rather than the per cent unemployed.

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
			(b) Separations				
Agriculture	Mar.	Nov.	0.239	1.757	0.864	3.528	0.0161
Forestry	May	Dec.	0.436	1.512	0.712	3.287	0.0110
Mining	Feb.	Sept.	0.593	1.535	0.614	-0.434	0.0119
Manufacturing	Feb.	Sept.	0.651	1.342	0.515	-0.624	0.0081
Construction	Feb.	Dec.	0.670	1.431	0.532	3.392	-0.0017
T.C.U.	Mar.	Sept.	0.652	1.650	0.605	1.391	0.0178
Trade	Feb.	Sept.	0.732	1.175	0.377	0.102	0.0055
F.I.R.	Feb.	Sept.	0.787	1.381	0.430	-1.611	0.0052
Services	Nov.	Dec.	0.490	1.171	0.582	-6.085	0.0370
All Industries Covered	Feb.	Sept.	0.728	1.382	0.472	-0.407	0.0083

TABLE XV, (continued)

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
			(c) Employment				
Agriculture	Mar.	July	0.728	1.249	0.417	1.088	0.0138
Forestry	April	Aug.	0.543	1.513	0.586	0.332	0.0081
Mining	Dec.	July	0.966	1.054	0.083	-0.063	0.0029
Manufacturing	Jan.	Aug.	0.968	1.038	0.068	0.125	0.0008
Construction	Feb.	Aug.	0.806	1.161	0.307	0.698	-0.0024
T.C.U.	Mar.	July	0.970	1.032	0.061	0.076	0.0011
Trade	Feb.	July	0.970	1.017	0.047	0.036	0.0007
F.I.R.	Feb.	July	0.988	1.019	0.030	0.006	0.0008
Services	Feb.	Nov.	0.979	1.012	0.033	-0.095	-0.0003
All Industries Covered	Feb.	July	0.950	1.028	0.077	0.007	0.0003

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
			(d) Employees Reported (1953-1970)				
Forestry	Apr.	Aug.	0.624	1.310	0.524	0.878	0.0037
Mining	Apr.	July	0.975	1.036	0.059	0.314	0.0001
Manufacturing	Dec.	Aug.	0.981	1.027	0.046	0.246	-0.0002
Construction	Dec.	Aug.	0.848	1.129	0.249	1.592	-0.0003
T.C.U.	Feb.	Aug.	0.956	1.046	0.086	0.552	-0.0007
Trade	Feb.	Dec.	0.970	1.052	0.078	0.245	-0.0015
F.I.R.	Apr.	July	0.993	1.011	0.018	-0.190	0.0011
Services	Jan.	Aug.	0.952	1.066	0.106	0.283	0.0009
Ind. Comp.	Feb.	Aug.	0.965	1.036	0.068	0.194	-0.0007

TABLE XV, (continued)

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
			(e) Employment - LFS				
Agriculture	Jan.	July	0.826	1.198	0.310	-0.279	0.0040
Forestry	Apr.	Aug.	0.613	1.248	0.509	-0.265	0.0062
Mining	Apr.	Aug.	0.944	1.053	0.103	-0.328	0.0051
Manufacturing	Jan.	Aug.	0.968	1.044	0.073	0.113	0.0014
Construction	Mar.	Aug.	0.859	1.143	0.248	0.814	-0.0063
T.C.U.	Feb.	Aug.	0.958	1.049	0.086	-0.243	0.0015
Trade	Feb.	July	0.967	1.037	0.067	0.089	0.0010
F.I.R.	Apr.	Aug.	0.977	1.023	0.044	-0.039	0.0029
Services	Jan.	June	0.984	1.027	0.042	-0.092	0.0022
All Industries	Feb.	July	0.956	1.057	0.095	0.144	-0.0001

TABLE XVI

RATIO OF HIRINGS AND SEPARATIONS TO EMPLOYMENT

SEASONAL PATTERNS BASED ON REGRESSION RESULTS

Industry	Mean	Minimum Seasonal	Maximum Seasonal	S	$\partial S/\partial U$	$\partial S/\partial T$
			(a) Hirings			
Agriculture	0.131	0.049	0.318	0.846	2.238	0.0067
Forestry	0.339	0.090	0.705	0.872	-1.969	0.0444
Mining	0.052	0.045	0.090	0.494	-1.320	-0.0020
Manufacturing	0.052	0.034	0.077	0.555	-0.552	0.0022
Construction	0.171	0.100	0.231	0.568	3.213	-0.0112
T.C.U.	0.033	0.022	0.054	0.597	1.719	0.0061
Trade	0.056	0.037	0.067	0.441	-0.610	-0.0007
F.I.R.	0.040	0.029	0.062	0.525	-0.306	-0.0038
Services	0.063	0.039	0.100	0.608	-0.776	0.0156
All Industries Covered	0.065	0.043	0.085	0.490	1.493	-0.0012

TABLE XVI, (continued)

Industry	Mean	Minimum Seasonal	Maximum Seasonal	S	$\partial S/\partial U$	$\partial S/\partial T$
		(b) Separations				
Agriculture	0.126	0.052	0.268	0.804	2.925	-0.0123
Forestry	0.340	0.128	0.706	0.582	6.531	0.0240
Mining	0.051	0.040	0.090	0.550	-1.378	0.0058
Manufacturing	0.050	0.038	0.076	0.502	-1.146	0.0080
Construction	0.169	0.109	0.265	0.587	3.101	0.0035
T.C.U.	0.033	0.023	0.055	0.577	0.374	0.0104
Trade	0.054	0.041	0.063	0.350	1.398	-0.0051
F.I.R.	0.036	0.035	0.058	0.405	-0.440	0.0028
Services	0.058	0.045	0.073	0.386	-1.014	-0.0005
All Industries Covered	0.063	0.044	0.079	0.438	-0.465	0.0104

TABLE XVII

SEASONAL PATTERNS - VACANCIES AND PLACEMENTS DATA

SUMMARY OF REGRESSION RESULTS, AUGUST 1953 - NOVEMBER 1970

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	∂S/∂U	∂S/∂T
			(a) Vacancies Notified				
Agriculture	Dec.	July	0.093	2.744	0.966	0.013	0.0011
Fish. & Trap.	Feb.	May	0.477	1.871	0.745	-0.147	0.0051
Forestry	Mar.	May	0.458	2.126	0.784	1.414	0.0002
Mining	Dec.	Sept.	0.721	1.245	0.421	-4.126	0.0161
Manufacturing	Dec.	Aug.	0.627	1.419	0.558	-0.187	0.0007
Construction	Dec.	Sept.	0.605	1.461	0.586	-1.924	-0.0027
Trade	Dec.	Sept.	0.674	1.407	0.521	-1.569	0.0090
T.C.U.	Feb.	Dec.	0.564	1.552	0.637	-1.090	0.0268
F.I.R.	Dec.	May	0.737	1.152	0.360	1.564	-0.0018
Services	Dec.	Aug.	0.717	1.268	0.435	-0.682	0.0021
P.A.	Sept.	Dec.	0.531	2.804	0.810	2.054	0.0016
Ind. Comp.	Feb.	Sept.	0.747	1.308	0.429	-1.436	0.0021
All Industries Covered	Feb.	Sept.	0.693	1.306	0.469	-1.264	0.0015

TABLE XVII, (continued)

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
			(b) Regular Placements				
Agriculture	Jan.	Sept.	0.114	2.522	0.955	0.079	0.0044
Fish. & Trap.	Aug.	June	0.000	1.827	1.000	-37.438	0.0792
Forestry	Dec.	May	0.476	2.421	0.803	0.299	0.0089
Mining	Dec.	June	0.651	1.346	0.516	-0.466	-0.0051
Manufacturing	Dec.	Sept.	0.598	1.484	0.597	-0.370	0.0031
Construction	Feb.	Sept.	0.613	1.423	0.569	-1.359	-0.0036
Trade	Jan.	Sept.	0.722	1.300	0.445	-0.328	-0.0040
T.C.U.	Feb.	Dec.	0.596	1.910	0.688	-1.306	0.0168
F.I.R.	Dec.	June	0.681	1.202	0.433	0.909	-0.0090
Services	Dec.	Sept.	0.678	1.226	0.447	-0.753	0.0025
P.A.	Sept.	Dec.	0.404	4.195	0.904	1.414	0.0030
Ind. Comp.	Feb.	Sept	0.743	1.314	0.434	-1.048	0.0005
All Industries Covered	Feb.	Dec.	0.688	1.277	0.461	0.465	0.0108

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
			(c) Casual Placements				
Agriculture	Jan.	July	0.024	4.481	0.995	-0.017	0.0001
Fish. & Trap.*	-	-	-	-	-	-	-
Forestry	Feb.	May	0.404	2.418	0.833	1.574	0.0045
Mining	Dec.	Feb.	0.512	1.572	0.674	-3.320	0.0332
Manufacturing	Feb.	Sept.	0.854	1.293	0.339	0.291	-0.0073
Construction	Feb.	Oct.	0.601	1.584	0.621	-0.006	0.0020
Trade	Mar.	Oct.	0.765	1.328	0.423	-0.267	0.0276
T.C.U.	Feb.	Oct.	0.559	1.411	0.604	1.012	0.0380
F.I.R.	Feb.	Jan.	0.867	1.253	0.309	-2.133	0.0157
Services	Feb.	July	0.678	1.281	0.471	-0.450	0.0041
P.A.	Aug.	Apr.	0.599	1.732	0.654	-2.203	0.0103
Ind. Comp.	Feb.	Oct.	0.722	1.252	0.424	-0.539	0.0065
All Industries Covered	Feb.	July	0.520	1.952	0.734	-0.427	-0.0099

* Observations were such that sensible seasonal patterns could not be calculated.

TABLE XVII, (continued)

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	∂S/∂U	∂S/∂T
			(d) Unfilled Vacancies				
Agriculture	Dec.	July	0.188	2.594	0.928	0.276	-0.0001
Fish. & Trap.	Jan.	Sept.	0.370	3.294	0.888	-0.018	0.0113
Forestry	Mar.	May	0.389	1.709	0.773	1.269	-0.0036
Mining	Mar.	Sept.	0.808	1.217	0.336	-2.921	0.0231
Manufacturing	Dec.	Aug.	0.729	1.405	0.481	0.893	0.0004
Construction	Dec.	Sept.	0.597	1.578	0.621	-0.905	-0.0047
Trade	Dec.	Sept.	0.670	1.422	0.529	-0.507	-0.0014
T.C.U.	Jan.	Nov.	0.616	2.296	0.732	-0.474	0.0154
F.I.R.	Nov.	May	0.864	1.147	0.247	1.274	-0.0103
Services	Dec.	Aug.	0.761	1.248	0.390	-0.605	0.0014
P.A.	Aug.	Nov.	0.541	3.333	0.838	1.219	-0.0012
Ind. Comp.	Dec.	Aug.	0.751	1.255	0.402	-0.383	-0.0032
All Industries Covered	Jan.	Aug.	0.766	1.224	0.374	-1.235	-0.0025

TABLE XVIII

SEASONAL PATTERNS - GROSS MOVEMENTS DATA

SUMMARY OF REGRESSION RESULTS, MARCH 1961 - NOVEMBER 1970

Current Month	Previous Month	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
				(a) Both Sexes				
E	E	Feb.	Aug.	0.966	1.059	0.087	0.051	-0.001
U	E	Sept.	Jan.	0.645	1.781	0.638	1.044	0.001
N	E	-	-	-	-	-	-	-
E	U	Nov.	May	0.561	1.566	0.641	1.436	-0.012
U	U	Oct.	Mar.	0.616	1.551	0.603	0.828	-0.008
N	U	May	Sept.	0.365	2.985	0.878	2.635	-0.013
E	N	Jan.	July	0.462	2.726	0.830	0.777	-0.004
U	N	-	-	-	-	-	-	-
N	N	July	Mar.	0.851	1.056	0.194	-0.011	0.028

TABLE XVIII, (continued)

Current Month	Previous Month	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
				(b) Males				
E	E	Feb.	Aug.	0.961	1.072	0.104	-0.002	-0.001
U	E	June	Jan.	0.615	1.870	0.671	0.824	-0.002
N	E	-	-	-	-	-	-	-
E	U	Nov.	May	0.490	1.685	0.709	1.367	-0.008
U	U	Sept.	Mar.	0.575	1.637	0.649	0.286	-0.004
N	U	-	-	-	-	-	-	-
E	N	Feb.	July	0.422	2.635	0.839	2.827	0.002
U	N	Aug.	June	0.413	2.857	0.854	0.136	0.000
N	N	Aug.	Mar.	0.624	1.238	0.496	-0.266	0.048

Current Month	Previous Month	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	$\partial S/\partial U$	$\partial S/\partial T$
				(c) Females				
E	E	Sept.	Aug.	0.960	1.033	0.071	0.122	0.002
U	E	June	Jan.	0.768	1.427	0.462	0.644	-0.004
N	E	-	-	-	-	-	-	-
E	U	June	Sept.	0.619	1.492	0.585	3.057	-0.009
U	U	June	Mar.	0.887	1.286	0.310	1.683	-0.026
N	U	-	-	-	-	-	-	-
E	N	Jan.	July	0.508	2.040	0.751	0.842	-0.003
U	N	-	-	-	-	-	-	-
N	N	July	Mar.	0.841	1.031	0.184	0.959	0.014

TABLE XIX

SEASONAL PATTERNS IN EARNINGS DATA

SUMMARY OF RESULTS BASED ON PERIOD JANUARY 1955 - NOVEMBER 1970

ESTIMATES AS OF 1970

Industry	Month of Minimum	Month of Maximum	Minimum Month Factor	Maximum Month Factor	S	∂S/∂U	∂S/∂
			A. Average Weekly Wages and Salaries				
Forestry	June	February	0.934	1.061	0.120	0.222	0.0054
Mining	July	January	0.978	1.022	0.043	0.230	0.0022
Manufacturing	December	April	0.968	1.010	0.041	0.130	0.0005
Construction	December	September	0.818	1.041	0.215	0.776	0.0067
Trade	November	July	0.983	1.015	0.032	0.025	0.0004
TCU	December	February	0.990	1.012	0.021	0.161	0.0005
FIR	February	April	0.991	1.009	0.018	-0.131	0.0004
Services	September	February	0.994	1.007	0.014	0.099	-0.0007
Industrial Corp.	December	October	0.970	1.006	0.036	-0.141	0.0002
			B. Average Hourly Earnings				
Mining	August	February	0.984	1.012	0.028	-0.014	0.0013
Manufacturing	August	December	0.987	1.011	0.024	0.183	0.0003
Construction	July	January	0.975	1.025	0.049	0.329	0.0018

TABLE XX

CORRESPONDENCE OF SEASONAL TIMINGS
IN AVERAGE EARNINGS AND EMPLOYEES REPORTED

Industry	AWWS Low	AWWS High	AHE Low	AHE High
Forestry	H	L	-	-
Mining	H	N	H	L
Manufacturing	L	N	H	L
Construction	L	H	H	L
T.C.U.	N	L	-	-
Trade	H	L	-	-
F.I.R.	H	L	-	-
Services	H	L	-	-

H - Employees reported reach seasonal maximum in the same month or within two months with intervening seasonal factors of similar magnitude.

L - Employees reported reach seasonal minimum in same month or within two months with intervening seasonal factors of similar magnitude.

N - No apparent agreement.

chapter five

CHANGES IN THE STRUCTURE OF UNEMPLOYMENT AND VARIOUS RELATIONSHIPS AMONG THE VARIABLES

Introduction

The key quantity in many wage-change studies is the unemployment rate. It is the crucial aspect in trade-off analyses. It is also considered a key quantity in its own right. But before proceeding to build models for it based on the considerations raised in chapter two and to investigate its relationship to wage changes, it is desirable to examine the data on unemployment and their relationships to other series which may be relevant to the wage-determination process. It is also desirable to examine other relationships which are present in some of the other series.

The main reason for interest in the relationship between wage changes and unemployment is the belief that wages respond to excess demand or excess supply in labor markets or, more loosely, to the pressures being exerted on these markets. But, whatever else it may indicate, the unemployment rate does not measure excess demand. At best it is a measure of gross excess supply, and this exists even with excess demand for labor. Labor markets do not operate perfectly and there is always likely to be some unemployment, even when there is very strong demand for labor. The reasons for this phenomenon were examined more extensively in chapter two. It arises partly because one can always expect some labor turnover and, even in the best of circumstances, some time is required before one can find another job; and partly from the mismatching of people available for work and the jobs available due to location, skill or other aspects. To these reasons must be added the seasonal nature of many jobs in Canada.

These considerations apply to the demand side as well as to the supply side of labor markets. It takes time to find employees even when they are readily available and for some jobs employees may not be available. Unfortunately, there is no presumption that the length of time involved in overcoming these difficulties is the same on the supply and demand side so that zero excess demand would be indicated by equality of unemployment and vacancies, though the connection between unemployment and vacancies is nevertheless of interest. For the same reason, one cannot distinguish between frictional-structural unemployment and deficient-demand unemployment clearly. The most one could hope to do would be to establish minimum amounts of unemployment below which no amount of excess demand could push the figures. It is, however, possible to make some evaluation of whether the frictional-structural problem is getting better or worse in the sense of whether with given unemployment rates these problems are getting more or less severe.

The simultaneous existence of demand and supply for labor is evidence of the imperfect ability of labor markets to function to allocate labor. Changes in these quantities would indicate changes in these abilities. The changes could arise either because the markets are operating with different efficiencies to overcome difficulties in matching jobs and workers or because the difficulties are becoming greater. In terms of the recorded data, however, there may be a quite different reason for changes. This possibility arises from the data themselves and their method of collection, as we noted in chapter three, which may be subject to drifts over time.

In this chapter we examine first the composition of the unemployment figures using an age-sex and a region-sex breakdown. The main purpose of this investigation is to establish how the structure depends on the unemployment rate and trends in the structure. Section two investigates questions of labor-force participation. Section three looks at employment rates. Section four examines the duration of unemployment. Section five investigates the gross movements data. Section six then calculates and summarizes the effects which changing compositions of employment have had on unemployment rates and looks at information on the structure of unemployment.

After this investigation of unemployment we proceed to examine other inter-connections in the data: the relation of hirings to placements and the inter-relationships among various employment series in section six, the connection between unemployment and vacancies in section seven, and the structure of wage change that emerges from examining data for different sectors and from different sources, in section eight.

Labor-Force Participation

Labor-force participation rates can play an important role in affecting unemployment rates by altering the composition of the labor force and by affecting the translation of employment figures into unemployment numbers. We have already seen that the participation rates exhibit marked seasonal patterns which have changing trends and which are affected by unemployment. To a considerable extent the seasonal patterns in participation also conform to the seasonal patterns in employment. We now turn to the trends in the participation rates themselves.

Participation rates presumably depend on four types of influence. First are trends in socio-economic conditions and attitudes involving such things as school attendance or the desirability of women being housewives. Second are economic factors affecting the work-leisure choice. Third are conditions prevailing in labor markets. Finally, since information is poor and entering or leaving the labor force to do other things may require some preparation, one might expect to find some adaptive behavior.

Time-series studies of labor-force participation have concentrated on the third aspect. It has become usual [1] to distinguish between two hypotheses, each of which was embodied in the models of section four of chapter two. The first is the discouraged-worker hypothesis which says, essentially, that people enter or leave the labor force when they feel that the prospects of finding jobs are strong or weak. The second is the additional-worker hypothesis. This maintains that when the main earner in a family becomes unemployed

---

[1] Cf. Tella (1964).

other members seek work to tide the situation over. Some of the seasonal patterns examined in the previous chapter conform to these hypotheses. Less attention has been paid to other aspects of labor-force participation, though the study by Officer and Anderson (1969) provides a notable exception.[2]

There is a good deal of collinearity among the variables used in labor-force participation studies, coming partly from trends. There is also substantial serial correlation in the participation rates themselves. To a very large extent the results and their interpretation depend on how these problems are handled, especially the latter one; and allowing for these aspects removes a substantial amount of the seeming support for the simple versions of the hypotheses. If one includes a lagged dependent variable or allows for auto-correlation by the Hildreth-Lu (1960) technique, the significance of other variables often becomes fairly minimal.

To investigate participation rates, regressions were run using monthly data for each of the age-sex categories. After some experimentation with various lag schemes, the unemployment rates used were (a) the rate for the group lagged one month (U_{-1}), (b) the average of this rate over the preceding six months ($\bar{U}_{-1}$), (c) the current unemployment rate for males aged 25-44 (U_p), and (d) this rate averaged over the current and preceding five months ($\bar{U}_p$).

In addition to these unemployment rates, the regressions also included the lagged ratio of the number who had been without work and seeking work for more than three months, seasonally adjusted, to the total number who were unemployed, seasonally adjusted, to try to get at the discouraged-worker hypothesis. This variable is indicated by S/U_{-1}. Also included in the regressions were a constant, time and its square (centered with a zero value in December, 1961, and monthly increments of one twelfth) and either a lagged dependent variable or allowance for first-order auto-correlation of the residuals by the Hildreth-Lu technique. The coefficient in either case is denoted by ρ.

---

[2] Cross-section studies, on the other hand, have provided a good deal of insight into some of these matters. Cf.eg. Allingham (1967), Allingham & Spencer (1968), Ostry (1968), Spencer & Featherstone (1970) and Swidinsky (1969).

Since the seasonal component in labor-force participation depends on unemployment and trends, there is a danger that using seasonally-adjusted data will simply recapture these features. Studying the raw data while allowing coefficients to vary among the months would essentially involve fitting regressions for each month and the loss of degrees of freedom as well as technical problems precluded this as a useful approach. Instead, the regressions were fitted using data adjusted to their estimated values as of the months of minimum labor-force participation and employment and as of the months when these quantities are largest. The data were based on the calculations of chapter four. All variables, except S/U_{-1}, were converted to a comparable basis.

It will be noted that the regressions use implicitly the ratio of employment to the labor force rather than the more usual variable which is the ratio of employment to population This was done mainly to try to avoid problems of spurious correlation. As Black and Russell (1969) point out, these rates might be interpreted as the probability that a member of the group who actively desires work will find it or that the male worker with whom a member of a secondary group is associated will be unemployed.

The results of the regressions based on the data adjusted to correspond to the months of minimum participation and employment are summarized in Table XXI. Four types of regression are presented: those using only the trends and lagged variables, those with the smallest standard errors of estimate obtained by selective inclusion of the variables, those using all the variables considered with a lagged dependent variable and those using all variables with the Hildreth-Lu technique (indicated by H-L).

Several general features stand out in all the regressions. The bulk of the association found is accounted for by the lagged dependent variable and the trend terms. The Hildreth-Lu procedure is less successful except in a couple of instances where it is only marginally better on the full regression. Even this occasional superiority does not carry over when some insignificant variables are removed. As a result, we concentrate on the regressions using the lagged dependent variable. These are probably preferable on a priori grounds in any case because partial adjustment might well be expected in participation rates. Only in the case of males 14-19 were all the variables considered significant at the 0.10 level.

Turning to the more substantive effects, the main general peculiarity of the regression results is the prevalence of lagged average unemployment rates with signs opposite to the more current values of the corresponding variable. Although the lagged average terms were originally included to allow the inclusion of a lag mechanism additional to that based on the dependent variable, these results suggest that another interpretation may be appropriate. The difference between the two forms may be taken to indicate changes in unemployment from the recently experienced average values. The implications of treating the results in this way are indicated in Table XXII, where the coefficient of the lagged average term in Table XXI is taken to give the coefficient for the change in unemployment.

Taking the most successful regressions, the results for males 25-54 suggest a rather weak discouraged-worker effect and a somewhat stronger, positive effect for the change in unemployment. For males 35-44 this effect was best captured by their own unemployment rate; for the other groups it is captured by the unemployment rate for males 25-44.

The first thing to note about the results for other groups is that the regressions gave no significant results for unemployment for four groups and almost nothing for females 55-64. The four groups are males 20-24, males over 65, females 35-44 and females 45-54. The remaining groups show a discouraged-worker effect on the basis of the coefficients of the unemployment rate for their own group and the coefficient for the duration of unemployment variable, whenever these coefficients are significant. The results suggest an additional worker effect in the coefficients for the unemployment rate for males 25-44. It should be noted that in most cases this latter effect would swamp the opposite effect coming from their own unemployment rate. A rough indication of the magnitudes involved is given by the sums of coefficients shown in Table XXII, though it is not the case, as we shall see in the next section, that the various unemployment rates tend to move exactly together. The changes in unemployment rates that were marked for males 25-54 also show up in a few instances in the results for these other groups. This is especially the case for the coefficient for the unemployment rate of males 25-44.

The main peculiarity in the results is the positive coefficient found for the change in unemployment rates, especially in the regressions for males 25-54. Two hypotheses might explain this result. The first is that persons who lose their jobs are more likely to drop out of the labor force temporarily when unemployment is decreasing and jobs can subsequently be expected to become easier to find and to stay in the labor force when prospects are getting worse. The second hypothesis would be that the surveyors are more likely to accept a claim of job search when unemployment is increasing or when average duration for those who are unemployed is short (as would tend to occur with rapidly rising unemployment). There is no way that the data used here can separate these possibilities.

It will be noted that the duration variable, S/U_{-1}, shows up with a significant negative effect for five groups, males 14-19, males 55-64 and females 14-34.

The trend terms (taking both the linear and quadratic forms together) for the males, at 1970 values, are all negative and, except for males 14-19, are getting larger in absolute value. For the females, the trends are all positive except for women over 65 where the negative squared term has overtaken the positive coefficient for time itself. The trends are accelerating for the age groups between 14 and 44.

The results shown in Table XXI, which used data adjusted to the minimum months of employment and labor-force participation, are somewhat better in terms of goodness of fit and standard errors of estimate than those obtained using seasonally-adjusted data or data adjusted to the maximum months. The substantive results are little affected by the use of altered definitions. The results of the "best" regressions obtained with the other data are shown in Table XXIII. It is worth noting that the standard errors of estimate based on the difference between the seasonally-adjusted data and the "predicted" data obtained by blowing up the "predictions" in the sample period based on Table XXI by the calculated seasonal factors estimated in chapter four were smaller than those shown in Table XXIII. This suggests that the minimum-month labor force may well be the relevant notion for participation studies. It will be recalled that this can be taken as an estimate of participation with the seasonal participants removed.

Calculation of regression equations for regional participation rates turned out to be at least as frustrating and ambiguous a business as calculating them for the age-sex breakdown. The results are summarized in Table XXIV, again using data adjusted to represent the minimum months of employment and participation. In the case of the males, the full regressions are reported. The results on the unemployment rate for Quebec, Ontario and British Columbia are insignificant, though in the last two cases they also contradict the findings of the age-sex breakdown. The results for the Atlantic region show a strong positive response to unemployment and negative response to its average past value. The Prairies show positive responses to unemployment. To suggest that males are the additional workers seems implausible, unless this behavior reflects response towards economic activities not normally classified as employment in the Labour Force Survey which divert males when unemployment is high. The trends are qualitatively the same as those found for the males as a whole in the age-sex breakdown.

The females regionally show a rather mixed pattern. For them we report the regressions giving the lowest standard errors of estimate without regard to significance of individual coefficients. For the Atlantic region and British Columbia, the current male unemployment rate has a positive effect and the average value of this variable has a negative one. The national duration of unemployment variable has positive coefficients in the Atlantic region while the lagged average female unemployment rate has a negative coefficient. Quebec produces a pattern with a negative coefficient for their own unemployment rate and with a positive coefficient for the male unemployment rates. The other provinces give positive effects to the current male rate. They also give significance to the lagged male rate or the duration variable. These results might be interpreted as giving some support to both the discouraged-worker and the additional-worker hypotheses. The trends are positive.

Whether the regional results represent genuine traits of labor-force participation or are the result of aggregation over various groups is a moot question. That the question would require more investigation with more extensive data is obvious. Indeed, the results obtained by using either system of classification indicate that a very large area of ignorance exists in the behavior of participation rates over time. The overwhelmingly important aspects of the results were the trends and the lagged dependent variables. Both are undoubtedly very crude proxies for unspecified and unknown forces at work and this way of handling ignorance cannot be regarded as very satisfactory. Attempts to include other possible aspects or to represent suspected sources of the trends and auto-correlations are largely precluded by lack of data. Attempts to include influences discussed by Officer and Anderson (1969), except for S/U_{-1}, did nothing to improve the results.

One of the prime reasons for estimating participation-rate regressions is to use the results in calculating potential labor force and employment. The results obtained here are not strong enough to warrant placing great confidence in the results of such calculations. Since the rates do depend on the unemployment rates for the groups, calculation of these potential figures will be postponed until after we have examined employment rates and other quantities.

The Structure of Employment

One of the interesting aspects of the Labour Force Survey data is the way in which the employment in the various groups has been expanding substantially, largely in conformance with their increasing participation in the labor force. The different groups also appear to have somewhat different responses to unemployment or general economic conditions.

Presumably, insofar as there are differences among the groups in their characteristics as employees, the large changes in the structure of employment have been brought about through changes in relevant relative wages. Unfortunately, the age-sex classification of employment and the labor force does not conform directly to a classification based on distinct skills or aptitudes which would be relevant if these groups were to be treated as different factors of production. Instead, any such distinctions come from differences among the groups in the extent to which various characteristics are represented within them. Furthermore, comparable wage data are not available to investigate the process at work. Instead, then, of looking at the process of allocation, we examine the typical patterns which arise from this process in a descriptive or predictive sense, especially to see how employment among the different groups depends on the unemployment rates for males aged 25-44.

Two types of model were investigated. In the first, the employment rate for each group is related to its lagged value, a constant, a trend and its square, and to the current and past average unemployment rate for the males aged 25-44. Also included in the regressions were the rate of change of the labor force in each group and the past average value of this rate of change. These variables were introduced to investigate whether unemployment rates appear to be affected by the rate of increase in the group. This model presumed that the labor-force figures are relevant indications of the numbers available for employment and that the market works to achieve balance in the proportion of the labor force who find employment.

The second model considered the ratio of employment in each group to employment of males aged 25-44. It related this ratio to the unemployment rate of males aged 25-44, the past average value of this rate, a constant, a trend and its square, the ratio of the labor-force population in the group to males 25-44, and past average values of this ratio. Regressions corresponding to this specification were run in both linear and log-linear form.

The models were fitted to monthly data for July 1953 to November 1970. The three versions of the data - seasonally adjusted, adjusted to minimum months and adjusted to maximum months - were employed. As in the case of labor-force participation, the minimum month data gave somewhat better results, both on their own terms with regard to $\bar{R}^2$, and after reconversion in terms of the seasonally-adjusted data.

Of the two types of model, the one based on unemployment rates gave superior performance in accounting for employment. Furthermore, when the ratios of the group labor force to the male labor force aged 25-44 were included in the employment-ratios model, the results indicated that it was the trend and the unemployment variables which affected the relative ratio of employment to labor force and not the ratio of employment directly. In consequence, attention is concentrated on the unemployment models.

The results for the age-sex breakdown are shown in Table XXV. The average past change in the labor force was never significant and was omitted from the regressions presented. The main interest in the results lies in the effects of unemployment among males 25-44 on other groups. The results fall into three groups. For males 14-24, the response is significantly larger than for the standard group. This can be seen from the fact that the sum of the coefficients for the unemployment rates less the coefficient E/L_{-1} is smaller than minus unity.[3] The second group involves males 45-64 where the response is approximately the same as for males 25-44. In the other groups, the response is much less. This includes males over 65 and all the females. In the case of females over 65 the coefficient is positive. The rate of change of the labor force in most cases had a negative effect which was significant. It was, however, never very large, indicating that the size of association of the employment rate (or unemployment rate) with the changes in the labor force was far less than the changes in the labor force.

The trends were usually strongly significant and contain some interesting and disturbing features. For males 14-19 and for all the females except those over 65 the trends are negative and accelerating. Whether this indicates a genuine worsening of employment for these groups or a change in labor-force participation attitudes remains an open question. For males 20-24, the negative t^2 term has caught up with the positive t coefficient. The reverse is true for males over 54 and females over 64.

Regional employment functions for the males took the experience of males in Ontario as their benchmark. The results are shown in Table XXVI. With the exception of the Prairies, higher unemployment rates in Ontario have a long-term effect of worsening relative unemployment. The reverse is true in the Prairies, but not significantly so. The trends are negative except for the Atlantic region where a strong positive trend is exhibited in the t^2 term.

Regional employment functions for the females took the experience of males in the region as their benchmark. The results are largely in agreement with those found for the age-sex breakdown.

Duration of Unemployment

A quite different aspect of unemployment concerns its dura-

---

3 As a result, $-(a_1 + a_2)/(1-p) > 1$, where a_1 and a_2 are the coefficients of U_p and $\bar{U}_p$ and p is the coefficient of E/L_{-1}.

tion. The data available contain a five-way classification of the unemployed by duration. The classification[4] and an indication of typical breakdowns in it are found in Table XXVII. It will be noted that a substantial fraction of unemployment is represented by temporary lay-offs and by unemployment which has lasted for less than one month. Needless to say, the structure of unemployment in existence at any moment is influenced by the past patterns of employment changes. Unfortunately, there are reasons to doubt the accuracy of these data. On several occasions the four-to-six month unemployment has not been consistent with the one-to-three month unemployment which occurred three months previously and it is unlikely that this discrepancy arose simply from sampling variability.[5]

The structure of the duration of unemployment data makes it natural to attempt to estimate transition probabilities. The only way to get to the longer-period unemployment is to go through the shorter period, with those who find employment or who drop out of the labor force being the ones who appear in the shorter-period unemployment figures without being present later in the longer-period numbers. The models used assumed that the proportion who remained unemployed might exhibit a trend and depend on the unemployment rate and on changes in it. The last two variables were taken to represent the difficulty of finding jobs. Since the changes variable contributed nothing to the models, it was dropped from consideration.

The results of fitting equations to seasonally-adjusted duration may be considered somewhat suspect. With the wide seasonal swings in unemployment, it is doubtful if accurate and useful models for seasonally-adjusted data could be found since one might well expect that the probability of remaining unemployed varies with the time of year and seasonally

---

[4] Unfortunately, the classification and the question on which it is based are not unambiguous. We take it to mean, for example, not less than one month but less than four full calendar months for the one-to-three group. An interpretation making the division at 3.5 months would also have been reasonable but would not clear up some of our difficulties.

[5] This might make the alternative interpretation more plausible, though it would not really clear up the difficulty.

adjusting the data cannot be expected to amount to seasonally adjusting the probabilities. As a result, the models were also tried on seasonally-unadjusted data, with separate regressions being fitted for each month of the year.

The group which gave the most difficulty were those without work and seeking work for one-to-three months. One might presume that the probabilities of remaining unemployed for one month, for two months and for three months are different and are not to be obtained by multiplication of the one-month probability. Unconstrained models, however, tended to give implausible monthly variations in the probabilities or even nonsense results. In consequence, the model adopted was:

$$W_{2t} = (\alpha + \beta t + \gamma u_t)W_{1t-1} + (\alpha + \beta + \gamma u_t)[\alpha+\beta(t-1)+\gamma u_{t-1}]W_{1t-1}$$

$$+ (\alpha + \beta + \gamma u_t)[\alpha + \beta(t-1) + \gamma u_{t-1}][\alpha + \beta(t-2) + \gamma u_{t-2}]W_{1t-1} \qquad (4.1).$$

Here W_{2t} is the number without work and seeking work for one-to-three months, u_t is the average seasonally-adjusted unemployment rate in the current and preceding month, and W_{1t} is the sum of the temporarily laid-off and those without work and seeking work for less than one month. (Better results were obtained when those on temporary lay-off were included - casting doubt on the validity of the lay-off classification). The model for seasonally-unadjusted data is somewhat inconsistent since the parameters should presumably vary among the parentheses of equation (4.1), but with the parameters referring to a particular month in equations for different months being the same. It was, however, impossible to incorporate the more sensible constraint within the limitations of the non-linear regression programs available.

The results of fitting the equations for the period April 1953 to November 1970, are shown in Table XXVIII. The values of R^2 are generally high. The monthly coefficients show a fairly strong dependence on the seasonally-adjusted unemployment rate. This rate performed marginally better than that for prime-age males or the one based on the minimum month of employment and participation. Significant negative trends occurred in the early part of the year, with insignificant positive ones in most of the later months. The equation using seasonally-adjusted data shows no significant dependence on the trend or the unemployment rate.

The structure used for those without work and seeking work for four-to-six months was simpler and it produced what are the most satisfactory results among those obtained for the duration of unemployment. Here the equation fitted was:

$$W_{3t} = (\alpha + \beta t + \gamma t^2 + \delta \bar{u}_t)\, W_{2t-3} \qquad (4.2).$$

$\bar{u}_t$ is the average unemployment rate for the four months involved.

The results are shown in Table XXIX. Several things are worth noting. First, there is, indeed, a pronounced seasonal in the probability. Second, the unemployment rate shows up very strongly, increasing the probability of remaining unemployed. Third, the trends, while rarely significant for the individual months, are negative except for the summer months and December. The acceleration terms are positive, except for February and March. In most cases they are insignificant. For the seasonally-adjusted data this factor has overtaken the trend term so that the probability is now estimated to be becoming higher.

The structure for those unemployed for more than six months required that account be taken of the probability of remaining in the group. The model, as a result, was:

$$W_{4t} = (\alpha_1 + \beta_1 t + \gamma_1 \bar{u}_t^{-1})W_{3t-3} + (\alpha_2 + \beta_2 t + \gamma_2 \bar{u}^{-1})W_{4t-3} \qquad (4.3).$$

It was found in this model, though not in others, that the use of the reciprocal of the unemployment rate produced more satisfactory results in terms of goodness of fit. Nevertheless, the range of values of the unemployment rate for which plausible numbers were achieved in all months is rather limited. A pronounced feature of the results, shown in Table XXX, is the tendency for γ_1 and γ_2 to be of opposite signs. They indicate, though not significantly in the monthly data, that the probability of remaining unemployed for three more months when one has been unemployed for not more than six full months increases with the unemployment rate while the probability decreases for those who have already been unemployed for more than six months. To say that this seems implausible is to state the case mildly. One possible reason for this finding might be that there is a core of permanently unemployed persons (possibly due to misreporting) who have virtually no chance of leaving the ranks of the unemployed. When unemployment is low, these people account for an inordinate amount of unemployment in the group who are unemployed for more than six months and so tend to raise the probability of remaining unemployed. Unfortunately, degrees of freedom problems prevented an adequate exploration of this possibility. A model containing the essence of it is:

$$W_{4t} = (\alpha_1 + \beta_1 t + \gamma_1 \bar{u}_t)(W_{3,t-3} + W_{4,t-3}) + (\alpha_2 + \beta_2 t)L_t \quad (4.4),$$

where L_t is the seasonally-adjusted labor force. The results for this model fitted with different monthly values for α_1, β_1, and γ_1, with a common value for α_2 and β_2, and with the assumption of a common variance for the residuals did not produce satisfactory results. This was also true when the population replaced the labor force in (4.4).

The main weakness of these models is the rather implausibly large values for the seasonal variations in the parameters which they reveal, especially when it is remembered that for the longer duration unemployment the model involves three-month lags but is fitted for each month. This rather implausible pattern is largely a reflection of the seasonal in the data. The results of regressions accounting for the ratio of the raw figures to the seasonally-adjusted values by the use of constants, trends, and the seasonally-adjusted unemployment rate are shown in Table XXXI. As might be expected, the seasonal tends to be pronounced for the first group. It is also very prominent in the four-to-six month group.

A major feature of the seasonal patterns is that the seasonal in the longer-term unemployment does not appear to lag that in the shorter-term unemployment to any noticeable extent. Thus the months of August, September and October tend to be the ones with the smallest value for those without work and seeking work less than one month. Those in this group who fail to find work will show up in the one-to-three month group in November. Here the seasonal is still low, but far from its minimum. These people are also the ones who would reappear in the four-to-six month group in February where the seasonal is now well above average. While the movement out of unemployment is sufficiently large that most of the figures - except for some of the four-to-six group relative to the one-to-three - are internally consistent, one cannot help finding these features surprising.

Although one can place little reliance on these estimates, it is still worth working out their implications in the absence of better information on duration. In Table XXXII, we record for various values of the unemployment rate the expected duration of unemployment based on the various regressions. In calculating the figures, the original estimates are averaged by averaging the results based on the assumption that the probability of being unemployed four-to-six months applies to each of the pairs one-to-four, two-to-five, and three-to-six months further unemployment. Since the model in (4.3) does not produce sensible probabilities when the trend is allowed to go far beyond the sample period, the trend was dropped from this model. Furthermore, when unemployment rates between 2.5 and 8.5 per cent would produce negative probabilities, the unemployment term was also dropped. This applied to the months of January, July, August, October and November. The coefficients used were obtained by refitting equation (4.3) with these changes. The coefficients set at zero were never significant at the 0.05 level even when the trend had been removed. For the calculations, the trend term was set at its 1970 values and the calculations assume the same seasonally-adjusted unemployment rate to apply forever.

The three things that stand out most clearly from Table XXXII are first the rather low figures for calculated expected duration, second the strong seasonal pattern, and third the tendency for expected duration to rise with unemployment. Undoubtedly - if the figures are reliable - they are overestimates of expected duration since many people who are unemployed only a few days or weeks will not be reported in the Labour Force Survey. Comparing the results in Table XXXII with those in Table XXXI for the under-one-month group, it will be seen there is a strong tendency for expected duration to be large when the seasonal value is low and conversely. Thus those who become unemployed when becoming unemployed is at its seasonal low can expect to remain unemployed for a longer period than those becoming unemployed at other times of the year.

Gross Movements

The gross movements data record the status of people in terms of employment (E), unemployment (U), and not in the labor force (N) in each of two successive months.[6] They then might lend themselves to analysis in terms of the proportion in each group who are in each other group in the succeeding month. In principle, they thus might be used to build dynamic models for the course of unemployment and labor-force participation over time on the basis of other economic variables.[7] Unfortunately, three problems stand in the way of adopting this approach. First, the models which tend to emerge from "sensible" economic specifications turn out to involve rather horrendous sets of simultaneous, non-linear difference equations. While these equations could in principle be solved by numerical methods, especially for purposes of simulation, the basic data do not seem to warrant much investigation along these lines because of the second problem which concerns the agreement about the classification in different months. This is compounded by the third problem which is the comparative shortness of the run of data available as mentioned in chapter three.

The main consistency problem is that the numbers that are recorded as being in each major category in one month do not begin to agree with the number that recall having been in the categories in the subsequent month. This may be due in part to sampling errors, though the numbers in the survey and the fact that households remain in it for six months should make this source of discrepancy of minor importance. The major reason is likely to be that respondents' memories of their economic conditions are faulty or biased. There may also be some error in the enumeration procedures. It is worth noting that the number who report that they were unemployed in

---

[6] The not-in-the-labor-force category is more finely subdivided in the basic data.

[7] A start in this direction is reported in Denton (1972) and Dawson and Denton (1972). The model uses the current and lagged values of the unemployment rate along with seasonal dummy variables. Since the current rate is wholly determined by the model, it is a purely associative one. Some analysis of these data has also been made by Hutton and Polianski (1966).

the previous month who are still unemployed is less than the total who had been unemployed for one month or longer. Apparently, Statistics Canada has not had the resources to reconcile these differences.[8]

The extent of the problem is indicated in Table XXXIII. The first column of that table records the mean of the ratio of the recalled figures to the previously recorded ones. Reported also are the results of fitting regressions for these ratios, using seasonally-adjusted data, to a constant, a trend, the squares of the trend and the seasonally-adjusted unemployment rate for the period March 1961 to November 1970. Not only is there substantial variability in the ratios, but they have also shown trends and dependence as unemployment and the averages are not the same for the different series.

The implication of these results is that fitting models for the probability of transition from the recalled category to the recorded category is not the same as fitting a model for recorded to recorded. This is made particularly clear in Table XXXIV where we express the data in terms of the proportions who remain in the same category and who were formerly in the category, based on the averages of the raw data. It is very evident that the figures do not begin to correspond.

It is virtually impossible to reconcile these data adequately. Attempts may be made along various lines,[9] but will not be pursued here because the shortness of the period available makes it necessary to use seasonally-adjusted data in any case in later work, because of ambiguities in the data, and because it did not appear worthwhile to use the results for simulation models for which reconciliation would be more crucial.

Two types of descriptive models were fitted to the seasonally-adjusted data. The first employed the rate of change of employment and the reported unemployment rate along with trends.[10] The dependent variable is the proportion in each

---

[8] This is not surprising since the gross movements data are unpublished.

[9] One way is reported in Denton (1972).

[10] Though not identical, the specification is analogous to Denton's (1972) using data not adjusted for seasonality.

recalled category. The models are purely associative since the independent variables arise from the flows being investigated. The results are shown in Table XXXV for the figures for both sexes. For each recalled category the three dependent variables sum identically to unity. This constraint is automatically incorporated in the regression results with the constant terms summing to unity and the coefficients of other variables summing to zero. Nevertheless, though one equation is redundant, all are presented for ease of reading.

Given that the results of Table XXXV are purely associative, a number of interesting features emerge. First, higher rates of increase of employment are associated with more people staying in employment. The main offset is not that fewer employed people become unemployed, but instead is fewer employed people dropping out of the labor force. A higher unemployment rate is associated with fewer people staying in employment and more becoming unemployed. By contrast, a higher rate of increase of employment is associated with much higher transfers from unemployment to employment and much lower remaining in unemployment. The size of these effects as shown in Table XXXV is relative to the numbers who were unemployed. The number of people involved in these changes is typically much smaller than in the changes from the previously employed group. The main association for those unemployed last month with the unemployment rate is an increase in the proportion remaining in unemployment balanced by a decrease in the number finding employment.

The most interesting of the results in Table XXXV concern those who were not in the labor force in the previous month. A higher rate of increase of employment is associated with a marked increase in the number going into employment from not being in the labor force. The magnitude involved in the increased participation rates is similar to the increased numbers who remain in employment. Higher rates of increase of employment are also associated with higher inflows into unemployment from those who were not in the labor force. The magnitude is about one third of that for the flow into employment; but this figure, of course, represents a much larger fraction of total unemployment than of employment.

Higher unemployment rates are associated with higher flows from being not in the labor force into both employment and unemployment. This finding, together with the insignificant association found in the flow from unemployment out of the labor force would support the additional-worker hypothesis of labor-force participation. The association in the flow from employment out of the labor force would support the discouraged-worker hypothesis.

The regressions were also run for males and females using their own unemployment rates and rates of increase of employment. The results are shown in Table XXXVI. The main qualitative difference between the two occurs in the group who were unemployed in the previous month where the signs for the females are quite different from those for the males. They are also different from those obtained with the total figures. However, the regressions for the females show no signs of significance.

The second type of associative model follows the spirit of the models employed in sections two and three. The independent variables, in addition to the constant and the trend, were the seasonally-adjusted unemployment rate, U, the seasonally-adjusted unemployment rate for males aged 25-44, U_p, both lagged one month, the averages of these variables over the preceding six months, indicated by a bar, and the ratio of those unemployed for four or more months to total unemployment, lagged one month, S/U_{-1}. In reporting the regressions, the unemployment rates are expressed as proportions rather than percentages of the labor force.

The resulting regression equations are shown in Table XXXVII in their full forms and after elimination of some of the more insignificant variables. The most interesting feature of the results is that the estimates often suggest that it is the difference between the previous month's value and the average in the past half year that matters and that the two types of unemployment rates have opposite effects. In this, the results resemble those obtained in sections two and three. It is also a noticeable feature that there are some differences in which variables are significant for males and females.

The results in Table XXXVII largely speak for themselves. The most interesting concern those who were unemployed last month. The dominant effect for males is that high overall unemployment increases the chances of remaining unemployed. This is balanced by the smaller probabilities of either becoming employed or of leaving the labor force. The latter effect is true only for the lagged monthly value, which is small in the total figures. On the other hand, a higher unemployment rate for males 25-44 actually decreases the chances of remaining unemployed. For females, the predominant influence is that a change in unemployment tends to increase the chances of remaining unemployed and decreases those for becoming employed. The male rate works in the same way, but not significantly.

The patterns for those who were not in the labor force are quite pronounced and are qualitatively similar for males and females. The predominant effects are found in the lagged values averaged over six months. High overall unemployment increases the proportion who remain outside the labor force. High unemployment for males 25-44 decreases this proportion by a roughly similar magnitude. In each case, the offset primarily is entering employment rather than unemployment. The duration of unemployment variables appear to play almost no role here. By contrast with these results, the lagged overall unemployment rate tends to encourage those who are already in the labor force to remain in it in the total figures, though this is not given much support in the less aggregated figures where it does not appear to be the case for females. The rate for males 24-44, especially the immediately lagged value, tends to encourage leaving the labor force. These results are in line with those found when labor-force participation was examined in section two.

Effects of Composition and Trends on the Unemployment Rate

The experiences of the different groups in the population with respect to employment and labor-force participation have varied substantially. The weights these groups receive in calculating unemployment rates have also been changing because of shifts in the composition of the population and in the participation rates. In this section we investigate two questions. First, what sorts of effects have changes in population and labor-force participation had on the unemployment rates. Second, how have the various trends examined in earlier sections affected the unemployment rate.

Table XXXVIII shows the breakdown of the labor-force population, the labor force and unemployment into various age groups in 1953, 1964 and 1969. These figures show several interesting patterns. The main change in the population has been the increase in the groups 14-24 and the shrinking in the later age groups, particularly those 25-44. These patterns are not fully reflected in the labor force. Here the main feature is the growing contribution made by women and the considerably lower weight which they receive in the labor force than in the population. The upshot has been that the proportion of the labor force who are males 25-44 has dropped. In unemployment, the major feature is the very disproportionate role played by the younger workers and the much smaller part played by the female workers over 24 years of age. It is notable that the decline in unemployment contributed by this group has been even sharper than the decline in their contribution to the labor force.

It can be argued that these changes have altered the nature of the overall unemployment rates, because different groups typically experience different unemployment rates and they have very different labor-force participation rates. Thus, even if all groups had the same unemployment rates at one time as at another, the total rate would be different.

Table IXL indicates the magnitude of the effects which the changing weights given to unemployment rates in the different groups have produced. The calculations are based first on the assumption that the 1969 composition of the labor force occurred at all times with each group experiencing the unemployment rate it actually experienced. The second set of calculations assumed that the population composition of 1969 prevailed at all times, but with actual labor-force participation rates and unemployment rates. The calculations were done for the seasonally-adjusted unemployment rate, for the rate adjusted to the months of minimum employment and the labor-force and to the rate adjusted to the month of minimum unemployment.

While it is quite true that these adjustments alter the unemployment rates, the effects are not dramatic. Had the 1969 labor force prevailed in 1953, the seasonally-adjusted unemployment rate would have been about six per cent lower than it actually was or two tenths of a percentage point. Had the 1969 population prevailed, the seasonally-adjusted unemployment rate would have been only about one tenth of a percentage point higher. Since the unemployment rate varies through more than four percentage points, these small alterations do little to change the indications given by the unemployment rates.

A different way to look at this question is to ask what unemployment rate would have arisen if the unemployment rate for males 25-44 had remained constant. This was done by using the models of sections two to four of this chapter and the seasonal patterns calculated in the previous chapter. The population was taken to be the actual one and the simulation was begun by assuming equilibrium values in June 1952, but presuming that the trends before that time had not existed. The unemployment rate for males 25-44 was held constant first for the minimum month of employment and the labor force and the second for the seasonally-adjusted rate. The versions of the participation and unemployment models with insignificant coefficients removed were used for these simulations and the seasonally-adjusted version of the duration equations were used.

The results are shown in Table XL for various unemployment rates. These figures, as might be expected, show a progressive deterioration in the seasonally-adjusted figures if the minimum-month rate is held constant and conversely. Of more interest, due to the squared trend terms in the models and the trends both in the models and in the population, the figures show first an improvement and then a deterioration in the overall unemployment rate calculated on the same basis as the rate which was being held constant. These trends add about three tenths of a percentage point to the seasonally-adjusted unemployment rates over the decade of the 1960s for standardization based on a seasonally-adjusted rate for males 25-44 of three to four per cent. It will be noted that these simulations show a response to changes in the unemployment rate whose constancy is assumed in making the calculations which is less than the change in that rate and that the time at which the trend reverses tends to be later the higher is the value of the unemployment rate being held constant.

Table XLI shows for a selection of groups what the simulated unemployment rates were at 1970 values for the trends. Also shown are the rates of increase of the unemployment rate expressed as a percentage of the unemployment rate per annum. Except for males over 24 when standardization is based on the seasonally-adjusted rate, the trends are positive. While the changes for adult males outweigh the positive trend for the females in this group, overall the trends are positive. Thus, on the basis of a constant seasonally-adjusted unemployment rate of four per cent for males 25-44, in 1970, the associated overall unemployment rate is estimated to have been 4.62

per cent and this was increasing by 3.43 per cent or by 0.17 percentage points per annum. Finally, shown in Table XLI are the rates at which the trends are estimated to be accelerating expressed as the increase in the trend over one year. Needless to say, these figures could not safely be projected far into the future. Except for males over 25, where these terms are negative but very small, these terms are all positive. The same types of results are obtained for the unemployment rates based on the months of minimum employment and the labor force when the corresponding rate for males 25-44 are held constant.

One of the questions of interest in this area is the extent to which changes in the labor force accompanying unemployment changes tend to distort the indications given by the unemployment rate about the number of persons available for work. In the United States, work by Simler and Tella (1968) and Taylor (1970) has indicated that this is a serious problem and that a better reading of the tightness of the labor market for purposes of analysis of wage changes is obtained by adjusting on the basis of a constant-unemployment labor force to include "hidden" unemployment. Two problems arise in carrying out such calculations on the basis of our equations. First, the models for the participation rate were fairly weak and showed about as much evidence of increased as decreased participation with different levels of the unemployment rate. Second, because of the strong effect of the lagged dependent variables in the participation rate equations, those equations do not simulate the actual labor force very well because residuals in the equations tend to affect subsequent participation rates strongly. This could only be overcome by once more adding the actual residuals from the regressions to the lagged dependent variables for simulation purposes.

These problems are indicated by the first three columns for each of the groups shown in Table XLII. Here we record the actual unemployment rates; the rates based on the simulated employment and labor force using the actual values of the unemployment rate for males 25-44 and the actual population; and the rate calculated when actual employment is subtracted from the simulated labor force.

It will be noted that while the first set of simulated rates tracks the actual rate very closely, this is not the case for the second set of calculations. In calculating "hidden" unemployment, then, it was the rate based on this simulated labor force which was compared with the rate based on the simulated labor force that would occur with a constant unemployment rate for males 25-44. If this were not done, the calculated differences between the labor force, and so the estimated "hidden" unemployment, would reflect almost entirely the residuals in the participation-rate regressions and not systematic effects of unemployment. The resulting calculations are shown in the fourth column of each set in Table XLII. Here the calculations are based on a constant unemployment rate based on the months of minimum employment and the labor force of six per cent for males 25-44. Use of other rates scarcely affects the results, though a lower rate would produce more negative terms indicating the tendency for the labor force to increase with increasing unemployment.

The most notable feature of the calculations is how small the differences are. The second feature is the tendency for "hidden" unemployment to be positive when unemployment is decreasing and to be negative when it is increasing. This is the effect of the change terms noted in section two. These results indicate that there is not much to be gained from trying to include the "hidden" unemployed in various analyses, and sporadic attempts in later models confirmed this feeling.

Tables XLIII and XLIV repeat, in terms of the region-sex breakdown, the composition of the population, the labor force, and unemployment in selected years and the effect changes in them have had on the unemployment rate nationally. Largely as a result of the generally increased participation of women, using the 1969 labor-force composition would have had a small effect on the rates in earlier years. Population changes have had virtually no effect.

The upshot of these investigations is two-fold. First, while there have been many changes both in the composition of the population and in the patterns of labor-force participation, the only change which has a dramatic effect on the unemployment rate is the changing nature of the seasonal patterns. Second, however, there appears to be a modest deterioration in the position of other groups relative to that of males 25-44. Unless, then, the labor market for this group has been improving, there is a presumption that the overall unemployment rate has been deteriorating. Needless to say, these findings alone do not indicate that the tightness of labor markets at a given overall unemployment rate has been increasing. That would require examination of the other side of the market as well.

Relationships Among Hiring and Employment Series

The disparate nature, sources and coverage of the series available on activity in labor markets cause problems for the analysis and understanding of the processes at work in these markets. In this section we look at the extent of agreement among different series that might be taken to represent broadly the same phenomena. The investigations concern the connection between hirings and placements and the associations among various employment series.

The relationship of hirings to placements is of interest particularly because of the administrative nature of the placements data which are now the only source for gross hirings in the economy. It is quite possible that the coverage of the employment service has been changing and it may be necessary to take account of this when using the data. It has indeed been suggested by Vanderkamp (1970) and Penz (1969) that this relationship can be used to adjust the vacancies series also. It is, however, extremely doubtful that the two aspects of the employment service should bear the same relationship to total economy quantities.

The relationships between hirings and placements are summarized in Table XLV. That table reports the average values of the ratio of hirings to placements and the correlations between them for both the seasonally-adjusted data and for the data adjusted to estimated seasonal minima, as described in chapter four. The correlations are generally quite low. This is particularly the case for the seasonally-adjusted data. The correlation for the data adjusted to minimum months is considerably larger except in the case of agriculture.

The low correlations possibly come as no surprise. As the mean values for the ratio of hirings to placements indicate, for most divisions most of the hirings do not go through the government employment service from which the records on placements are derived. The exception of agriculture largely indicates the extent to which the small-firm nature of that sector means that it was not represented in the hirings series. Similarly, the narrower coverage of the hirings data is indicated by the difference in the mean ratio between the figures for the industrial composite and those for all placements achieved.

The extent to which the ratio of hirings to placements had a time trend and was sensitive to the unemployment rate is summarized in Table XLVI. Here regression results are presented based on a trend, its square, and either the overall unemployment rate (U) or the sectoral rate (US). The first part of the table records the regressions for the seasonally-adjusted data while the second part records the regressions using the data adjusted to the minimum-seasonal months. In the latter case the overall unemployment rate is based on the age-sex breakdown.

There are three things worth noting about the regressions shown in Table XLVI. First, the values of $\bar{R}^2$ are generally fairly low and the standard errors of estimate are quite large. As a result, using the results to provide blow-up factors to estimate hirings on the basis of placements would probably give a highly imprecise estimate of hirings. Second, there is great diversity among the divisions in the nature of the trends. In some cases they are positive, in others negative; and there is not complete agreement about the trends between the two types of data used. It is worth noting that the possible break in the placements series or its trends stemming from the adoption of more active manpower programs in the later 1960s would not appear in these regressions since the hirings series were discontinued at the same time. Third, the unemployment rate is sometimes significant in the regressions. Again, there is not complete agreement among the different types of data or among the divisions with regard to the sign involved. This effect is sometimes better represented by the overall rate and sometimes by the sectoral rate.

These results on the relationship of hirings to placements do indicate that any adjustments of the placements-vacancies data are likely to be of dubious validity. At the same time, they also indicate that these data cannot simply be regarded as straightforward measures of the quantities pertaining at the national level. Used in conjunction with the unemployment rate or of trends, especially at the division level, there is a danger that regression estimates for the latter variables may partly represent the shifting use of the government employment service. There is not much that can be done about this, unless one were to try to adjust the figures on the basis of the results in Table XLVI and compare the results with those that arise when no adjustment is made.

Three series on employment are used in this study. The three are average employment corresponding to hirings and separations series (EA), employees reported (ER), and employment as recorded in the Labour Force Survey (EL). These series are based on different sources and concepts. The extent to which they agree among each other is indicated in Table XLVII. The first panel gives the correlations for the seasonally-adjusted data and their partial correlations holding the trend and its square constant. The second panel gives the same quantities for the figures adjusted to the minimum-seasonal months. The simple correlations are usually quite high, the major exceptions being construction for the correlations with employees reported and transportation, communications, and other utilities (TCU) for the minimum-month correlations of average employment. However, a rather different picture emerges when allowance is made for the common trends. In several cases this greatly reduces, or even eliminates, the correlations.

Interest often focusses on changes in employment rather than on the levels. Here agreement among the series is much less. Table XLVIII records the correlations and the partial correlations produced. In only a few instances, involving the data adjusted to minimum months, can the correlations be regarded as high and in many cases the series are virtually unrelated. This is probably partly the effect of differences in the timing of the series as well as the result of measurement error and the use of different concepts. Table IL records the correlations for the quarterly rates of change for the averages over each quarter of the monthly figures. The correlations are now somewhat higher in most instances, though they are still far from perfect.

The investigations of this section reveal clearly that the various series that might be taken to represent the same thing are not very closely associated with each other. Placements are not the same as hirings and are not perfectly associated with them. Various employment series are different. To the extent that the differences arise from different coverage, it might still be possible to fit with confidence models to sets of comparable data. Unfortunately, however, it is necessary to draw on data from different sources and the resulting models can at best be taken only to be indicative of the sorts of relation that may be operating in the economy.

Unemployment and Vacancies

An interesting aspect of the nature of labor markets is the relationship between unemployment and vacancies. Although it cannot be taken to represent a structural relationship in the economy, the extent to which there has been an inverse relationship between unemployment and vacancies serves as a useful descriptive measure of one feature of the economy.

It is sometimes argued that equality of demand and supply in labor markets exists when vacancies equal unemployment. Although there are severe measurement problems in implementing this notion with Canada data, it has been used in studies in Vanderkamp (1970) and Penz (1970), based on adjustment using the ratio of hirings to placements, as a device to measure what unemployment rate corresponds to balance in labor markets and to produce an indicator of excess demand or supply. Attractive as the notion is, however, it has no sound basis in conception, for the equality of vacancies and unemployment is in no way an equilibrium condition. Nor is the historical relationship unaffected by other factors.

Table L records regression results for comparing the logarithms of the ratio of total vacancies available in a month to the labor force in the sector (vacancies notified plus unfilled vacancies left over from the previous month) (V/L) with a trend, its square and the logarithm of the unemployment proportion. Both the division unemployment rate (US) and the overall rate (U) were used, in separate regressions. The first panel records the results for the seasonally-adjusted data; the second for the minimum-month figures.

The overall unemployment rate tended to give a closer fit to the vacancy rates than did the divisional rate. Overall, the trends in the relationships were slightly negative, indicating an improving situation in the structural characteristics of the labor markets. This was not the case, however, of many of the important divisions such as mining and manufacturing. As might be expected, there is a strong negative relationship between the vacancy rate and the unemployment rate, with the elasticity usually being less than unity.

Table LI reports regression results using the log of the ratio of unfilled vacancies at the end of the month to the labor force (VU/L). No attempt was made to allow for the fact that the labor force and the unemployment rate pertain to the middle of the month rather than to the end of the month. There are two interesting differences from the results shown in Table L for total vacancies available. First, the trends tend to be larger. Overall and in many of the divisions they are positive, though in some instances the squared term is negative and would now have caught up with the trend itself. Secondly, as might be expected, the elasticities with respect to unemployment are considerably larger than they were in the regressions for vacancies available. Since as a measure of the extent of tightness in the labor market unfilled vacancies are probably the more relevant measure, these results indicate that the structural characteristics of the labor market may be worsening.

A still more likely measure of the degree of tightness prevailing in labor markets is the ratio of unfilled vacancies at the end of the month to vacancies available in the month (VU/V). This measure is not affected by changes in the proportion of business being done by the employment service, though its relationship to the corresponding quantities for the total economy could change if the service were becoming more or less efficient at filling vacancies or if employers gave it an increasing proportion of the vacancies which are hard to fill.

Regressions for the log of the ratio of unfilled vacancies to vacancies available can be derived by subtracting the results in Table L from those in Table LI. This is done explicitly in Table LII. It will be noted that the ratio of unfilled vacancies to vacancies available is strongly and negatively associated with the unemployment rate. The elasticity for the industrial composite is -0.53, using the seasonally-adjusted data and -0.69, using the minimum-month data. The trends are generally positive, but decelerating. While the nature of the data is not such that one can be sure that this represents more than a changing role for the government employment service, taken at face value these results indicate that the degree of tightness on the demand side associated with a particular unemployment rate, indicating tightness on the supply side, has been increasing. It is also interesting to note that this has come about through there being fewer vacancies available, relative to the labor force, but, nevertheless, to more vacancies going unfilled.

A Preliminary Look at Wage Changes

The variety of information available on wages, which we discussed in chapter three, raises two questions. First how much agreement is there among the various series, and, second, what patterns are evident in them. In this section we look at these questions using two techniques, correlation and a decomposition of the variance of the series.

Table LIII reports on the correlation coefficients for the various measures for the rates of change of wages in the period 1955-69. On an annual basis these correlations are fairly high in some sectors such as mining and trade, but are very low in construction and services. The overall rates (based on the widest coverage easily available) show quite high correlations.

It should be recognized that the various series being compared have quite different bases so that it is not surprising that the correlations are not perfect. For these calculations, Average Weekly Wages and Salaries[11] (AWWS) and Average Hourly Earnings (AHE), which are monthly series originally, were taken as averages over the year or quarter and the percentage rates of change of these figures used. The wage index (WI) refers to rates in force at the end of the third quarter of each year and the base rate series (BR) is calculated as the total annual average rates of increase negotiated in contracts signed in particular periods. What is surprising and interesting is how much variation there is among the sectors in the extent of agreement among the series.

Table LIV records the correlations among various sectors for each of the measures. Again there is substantial association in many instances, but certainly not in all. Correlation, of course, measures the extent of association of deviations from average, so the figures in Table LIV do not fully indicate the extent to which all wages have risen together over the period considered since in all cases the averages are positive. They do, however, indicate that there is substantial sectoral diversity in the deviations from trend. As a result, there is some presumption in studying wage-changes

---

[11] In public administration this was proxied by the ratio of payrolls to employment.

that the models for different sectors will not be identical.

The decomposition of the sum of squares of rates of change is used to indicate in more absolute fashion how variations in the various numbers arise. If we let z_{jt} be the rate of increase of the variable for the j^{th} category in the t^{th} observation, we may divide the sum of the squares values of the z_{jt} into four parts:

$$\sum_{j=1}^{J} \sum_{t=1}^{T} z_{jt}^2 = TJ\bar{z}^2 + J\sum^{T} z_{.t}^2 + T\sum^{J} z_{j.}^2 + \sum_{j=1}^{J} \sum_{t=1}^{T} \varepsilon_{jt}^2 \quad (8.1).$$

Here the first term, involving $\bar{z} = \sum_{j=1}^{J} \sum_{t=1}^{T} z_{jt}/TJ$, which is the overall average of the observations, indicates how much the overall movements have contributed. The second term involving the average deviation from this overall average, $z_{.t} = \sum_{j=1}^{J} (z_{jt}-\bar{z})/J$, indicates how much of the sum is due to variations in the average rate of growth over time. The third term, involving the average extent to which each category grew faster or more slowly than the overall average, $z_{j.} = \sum_{t=1}^{T} (z_{jt}-\bar{z})/T$, gives how much this feature is involved in the sum. The fourth term, involving $\varepsilon_{jt} = z_{jt}-z_{.t}-\bar{z}_{j.}-\bar{z}$, represents other changes that cannot be associated with these categories.

When used on quarterly rates of change, problems of seasonality arise. Seasonality occurs both in $z_{.t}$ and in the ε_{jt}. Both these terms may be decomposed further into a seasonal term and remainder.

A summary of results of the decomposition for the period starting in 1955 is shown in Table LV.

In the annual data, the major source of the sums of squares is the overall average, $\bar{z}$. The contribution made by the annual average deviations, $z_{.t}$, are a quite substantial fraction of the remaining sums of squares. By contrast, the persistent relative-wage movements among the sectors, given by $z_{j.}$, account for much smaller amounts of the sums of squares. Finally, relative-wage movements which are reversed over the period were not a particularly prominent feature of the annual series, though their contributions were roughly equivalent to those made by the annual average deviations, $z_{.t}$.

It is worth contrasting these results with those obtained by decomposing the major items of the Consumer Price Index - food, housing, clothing, transportation, health, recreation and reading, and tobacco and alcohol - over the same time period. The overall average rate of change for these items was 2.4 per cent. Since this figure is a good deal lower than the averages for the wage series, it is surprising that it contributes 63.5 per cent to the total sum of squares. $z_{.t}$, $z_{j.}$ and ε_{jt} contribute 17.5 per cent, 3.5 per cent and 15.5 per cent respectively. Thus it is a feature of both types of highly aggregated series that they exhibit - on an annual basis - much more overall movement and average variation between years than sectoral or random differences.[12]

The second part of Table LV records the values of $z_{.t}$. It will be noted that there is very extensive agreement among the series about when the changes are above and below trend. On the other hand, there is substantial disagreement over the magnitudes involved.

Panel C of Table LV records the values of $z_{j.}$. Again there is substantial agreement about the relative standing of groups. The main exception is between Average Hourly Earnings and the other series. The relative performance of the forestry group in Average Weekly Wages and Salaries is quite different from those in the wage index and the base rate series. This is probably due to geographic shifts which have occurred in the industry. The high values for public administration may reflect the different nature of the data being used.

The fourth panel of Table LV records the correlations of $z_{.t}$ with $\sum_j \varepsilon^2_{jt}$ and of z_j with $\sum_t \varepsilon^2_{jt}$. In each case, they are positive and, especially for the second set, quite large. Thus there appears to be an association between years of rapid increase in wages and the variability of raise among sectors. This is what one would expect if downward adjustments - or ones less than usual - meet with more resistance or sluggishness than do upward ones.

---

[12] Cf. Cragg and Young (1973) for further discussion of the decomposition applied to the CPI.

NOTES TO TABLES XXI,XXII,XXIII,XXIV

S.E.E. has been multiplied by 100.

Coefficients for t have been multiplied by 100.

Coefficients for t^2 have been multiplied by 10,000.

H-L designates a Hildreth-Lu regression.

ρ - coefficient of lagged dependent variable or the auto-correlation parameter in Hildreth-Lu regressions.

*   Significantly different from zero at the 0.10 level.

** Significantly different from zero at the 0.05 level.

*** Significantly different from zero at the 0.01 level.

ALL REGRESSIONS RUN FOR PERIOD JULY 1953 - NOVEMBER 1970 INCLUSIVE

U unemployment rate for group.

$\overline{U}$ average unemployment rate for group in past 6 months.

U_p unemployment rate males 25-34.

$\overline{U}_p$ average unemployment rate males 25-34.

U_m unemployment rate of males in region.

$\overline{U}_m$ average unemployment rate of males in region.

ALL UNEMPLOYMENT RATES ARE RATIO OF UNEMPLOYED TO LABOR FORCE.

TABLE XXI

PARTICIPATION RATE REGRESSIONS

AGE - SEX BREAKDOWN

(Using Data Adjusted to Minimum-Month Employment and Labor Force)

A. MALES

Group	Constant	t	t^2	U_{-1}	$\overline{U}_{-1}$	U_p	$\overline{U}_p$	S/U_{-1}	ρ	$\overline{R}^2$	S.E.E.
14-19	0.135***	-0.319***	2.154***						0.618***	0.957	0.927
	0.169***	-0.366***	2.782***	-0.262***	0.255**	0.741***	-0.533*	-0.060***	0.531***	0.963	0.864
H-L	0.358***	-0.789***	5.796***	-0.225***	0.093	0.683***	-0.056	-0.098***	0.545***	0.962	0.868
20-24	0.260***	-0.202***	-0.889***						0.699***	0.973	0.586
	0.265***	-0.200***	-0.857***	-0.002	0.023	0.048	-0.045	-0.008	0.692***	0.973	0.592
H-L	0.862***	-0.653***	-2.618***	0.016	-0.059	0.013	0.191	-0.026	0.699***	0.973	0.588
25-34	0.391***	-0.021***	-0.623***						0.597***	0.860	0.191
	0.409***	-0.022***	-0.700***			0.051*	-0.058**		0.580***	0.861	0.190
	0.409***	-0.022***	-0.702***			0.052*	-0.061*	0.000	0.580***	0.860	0.190
H-L	0.972***	-0.047	-1.587			0.035	-0.032	-0.004	0.586***	0.860	0.191
35-44	0.529***	0.010***	-0.449***						0.456***	0.630	0.165
	0.546***	0.011***	-0.505***	0.054**	-0.059**				0.438***	0.636	0.164
	0.546***	0.011***	-0.506***	0.055**	-0.060*			0.001	0.438***	0.634	0.164
H-L	0.972***	0.020***	-0.847***	-0.065	0.068*			-0.002	0.446***	0.634	0.164
45-54	0.319***	0.000	-0.383***						0.665***	0.674	0.234
	0.367***	0.000	-0.503***			0.111***	-0.113***		0.615***	0.687	0.229
	0.381***	0.000	-0.433***	-0.022	0.094	0.123**	-0.160*	-0.008	0.600***	0.688	0.229
H-L	0.953***	0.012	-1.146***	0.010	-0.046	0.075	0.019	-0.016**	0.610***	0.682	0.231
55-64	0.314***	-0.010*	-0.740***						0.627***	0.647	0.430
	0.385***	0.019*	-1.095***		-0.223**	-0.118*	0.343***	-0.018*	0.549***	0.664	0.419
	0.385***	0.020*	-1.089***	-0.033	-0.196*	-0.102	0.335***	-0.019*	0.549***	0.663	0.420
H-L	0.852***	0.031	-2.390***	0.005	-0.448**	-0.160*	0.559***	0.022*	0.563***	0.662	0.422
65+	0.044***	-0.115***	-0.006						0.837***	0.981	0.509
	0.055***	-0.122***	-0.124	0.041	-0.092	0.022	0.007	-0.010	0.813***	0.981	0.511
H-L	0.284***	-0.682***	-0.512	0.087	-0.247	0.020	0.012	0.004	0.836***	0.981	0.511

TABLE XXI (Continued)

B. FEMALES

Group	Constant	t	t^2	U_{-1}	$\bar{U}_{-1}$	U_p	$\bar{U}_p$	S/U_{-1}	ρ	$\bar{R}^2$	S.E.E.
14-19	0.095***	-0.106***	0.464***						0.663***	0.861	0.675
	0.114***	-0.080***	0.832***	-0.090**		0.204***		-0.027**	0.590***	0.870	0.652
	0.112***	-0.093***	0.727***	-0.099**	0.049	0.278***	-0.124	-0.024	0.596***	0.869	0.654
H-L	0.274	-0.192	1.798	-0.026	-0.220	0.337	0.108	-0.035	0.600***	0.866	0.659
20-24	0.086***	0.137***	0.939***						0.825***	0.978	0.642
	0.112***	0.174***	1.167***			-0.203**	0.250**	-0.034***	0.786***	0.979	0.628
	0.113***	0.180***	1.231***	-0.145	0.099	-0.159	0.230*	-0.037***	0.785***	0.979	0.628
H-L	0.512***	0.773***	5.363***	-0.043	-0.333	-0.126	0.154	-0.035*	0.790***	0.978	0.636
25-34	0.075***	0.212***	1.211***						0.731***	0.991	0.387
	0.085***	0.251***	1.490***			0.059**		-0.012*	0.689***	0.991	0.384
	0.084***	0.251***	1.523***	-0.077	0.077	0.051	0.019	-0.014*	0.690***	0.991	0.386
H-L	0.269***	0.781***	4.832***	-0.107*	0.084	0.064	0.072	-0.013	0.702***	0.991	0.385
35-44	0.127***	0.449***	0.121						0.575***	0.992	0.491
	0.130***	0.466***	0.197	-0.002	0.008	-0.017	0.063	-0.014	0.565***	0.992	0.495
H-L	0.299***	1.062***	0.560	-0.009	-0.019	0.036	0.047	-0.026*	0.590***	0.992	0.494
45-54	0.094***	0.358***	-1.181***						0.712***	0.994	0.495
	0.100***	0.377***	-1.309***	0.013	-0.054	0.054	-0.066	-0.001	0.669***	0.994	0.499
H-L	0.330***	0.012***	-3.831***	-0.012	-0.103	0.090	-0.137	-0.004	0.722***	0.993	0.505
55-64	0.058***	0.267***	-0.752***						0.747***	0.993	0.460
	0.060***	0.273***	-0.822***	-0.053*					0.743***	0.993	0.458
	0.058***	0.272***	-0.775***	-0.078*	0.017	0.032	-0.018	0.001	0.745***	0.993	0.462
H-L	0.229***	1.055***	-2.831***	-0.045	-0.035	0.082	-0.126	0.009	0.754***	0.993	0.464
65+	0.024***	0.033***	-0.925***						0.570***	0.854	0.260
	0.029***	0.038***	-1.042***		-0.046*	0.073*	-0.108***		0.543***	0.857	0.256
	0.028***	0.037***	-1.040***	-0.003	-0.044*	0.073*	-0.111**	0.001	0.547***	0.856	0.257
H-L	0.060***	0.083***	-2.168***	0.001	-0.049	0.083*	-0.119*	-0.002	0.553***	0.855	0.258

TABLE XXII

SUMMARY OF EFFECTS OF UNEMPLOYMENT ON PARTICIPATION

(Regression Coefficients Derived from Table XXI)

A. Using "Best" Regressions

Group	U_{-1}	ΔU	U_p	ΔU_p	$U_{-1} + U_p$	$\Delta U + \Delta U_p$	S/U_{-1}
Males							
14-19	-0.007	-0.255	0.208	0.533	0.201	0.178	-0.060
20-24	-	-	-	-	-	-	-
25-34	-	-	-0.007	0.058	-0.007	0.058	-
35-44	-0.005	0.059	-	-	-0.005	0.059	-
45-54	-	-	-0.002	0.113	-0.002	0.113	-
55-64	-0.223[a]	-	0.225	-0.343	0.002	-0.343	-0.018
65+	-	-	-	-	-	-	-
Females							
14-19	-0.090	-	0.204	-	0.114	-	-0.027
20-24	-	-	0.047	-0.250	0.047	-0.250	-0.034
25-34	-	-	0.059	-	0.059	-	-0.012
35-44	-	-	-	-	-	-	-
45-54	-	-	-	-	-	-	-
55-64	-0.053	-	-	-	-0.053	-	-
65+	-0.046[a]	-	-0.035	0.108	-0.035	0.108	-

TABLE XXII (Continued)

B. Using Full Regressions

Group	U_{-1}	ΔU	U_p	ΔU_p	$U_{-1} + U_p$	$\Delta U + \Delta U_p$	S/U_{-1}
Males							
14-19	-0.027	-0.255	0.208	0.533	0.201	0.178	-0.060
20-24	0.021	-0.023	0.003	-0.045	0.024	-0.068	-0.008
25-34	-	-	-0.009	0.061	-0.009	0.061	0.000
35-44	-0.005	0.060	-	-	-0.005	0.060	0.001
45-54	0.072	-0.094	-0.037	0.160	0.035	0.066	-0.008
55-64	-0.229	0.196	0.235	-0.335	-0.006	-0.139	-0.019
65+	-0.051	0.092	0.015	-0.007	-0.036	0.085	-0.010
Females							
14-19	-0.050	-0.049	0.154	0.124	0.150	0.075	-0.024
20-24	-0.046	-0.099	0.071	-0.230	0.025	-0.329	-0.037
25-34	0.000	-0.077	0.070	-0.019	0.070	-0.096	-0.014
35-44	0.006	-0.008	0.046	-0.063	0.052	-0.071	-0.014
45-54	-0.041	0.054	-0.012	0.066	-0.053	0.120	-0.001
55-64	-0.061	-0.017	0.014	0.018	-0.047	0.001	0.001
65+	-0.047	0.044	-0.038	0.111	-0.085	0.155	0.001

TABLE XXIII

PARTICIPATION RATE REGRESSIONS USING ALTERNATIVE DEFINITIONS OF SEASONAL ADJUSTMENT

AGE - SEX BREAKDOWN

A. MALES

Group	Constant	t	t^2	U_{-1}	$\overline{U}_{-1}$	U_p	$\overline{U}_p$	S/U_{-1}	ρ	$\overline{R}^2$	S.E.E.
14-19											
Max.	0.296***	-0.330***	3.889***	-0.356***	0.320	0.724**	-0.563	-0.070**	0.523***	0.903	1.440
S.A.	0.205***	-0.374***	3.120***	-0.294***	0.311**	0.876***	-0.704**	-0.067***	0.528***	0.950	1.005
20-24											
Max.	0.298***	-0.083***	-0.973***						0.690***	0.864	0.664
S.A.	0.272***	-0.165***	-0.954***						0.697***	0.958	0.612
25-34											
Max.	0.418***	-0.021***	-0.711***			0.011	-0.052		0.577***	0.844	0.194
S.A.	0.412***	-0.024***	-0.706***			0.059	-0.072*		0.579***	0.870	0.191
35-44											
Max.	0.554***	-0.009***	-0.511***	0.075**	-0.074**				0.437***	0.670	0.166
S.A.	0.547***	0.000	-0.505***	0.047*	-0.066**				0.442***	0.584	0.165
45-54											
Max.	0.373***	-0.017***	-0.509***			0.127***	-0.139***		0.615***	0.758	0.233
S.A.	0.371***	0.000***	-0.506***			0.127***	-0.139***		0.615***	0.707	0.232
55-64											
Max.	0.404***	0.000	-1.121***		-0.230**	-0.176**	0.408***	-0.020**	0.547***	0.693	0.435
S.A.	0.403***	-0.019**	-1.108***		-0.230**	-0.175*	0.429***	-0.019*	0.547***	0.723	0.431
65+											
Max.	0.169***	0.650***	-1.356***						0.701***	0.992	0.967
S.A.	0.047***	-0.118***	-0.019						0.837***	0.980	0.538

TABLE XXIII (Continued)

B. FEMALES

Group	Constant	t	t^2	U_{-1}	$\bar{U}_{-1}$	U_p	$\bar{U}_p$	S/U_{-1}	ρ	$\bar{R}^2$	S.E.E.
14-19											
Max.	0.188***	0.076***	1.151***	-0.179***		0.644***		-0.037**	0.595***	0.554	0.989
S.A.	0.108***	-0.053**	0.318	-0.026		-0.017		-0.014	0.627***	0.734	0.740
20-24											
Max.	0.117***	0.207***	1.246***			-0.246*	0.314*	-0.037***	0.788***	0.984	0.649
S.A.	0.181***	0.160**	1.777***			-0.081	0.136**	-0.034***	0.759***	0.982	0.628
25-34											
Max.	0.089***	0.278***	1.614***			0.080**		-0.012*	0.694***	0.993	0.402
S.A.	0.059***	0.282***	1.075***			-0.028**		0.000	0.701***	0.993	0.395
35-44											
Max.	0.123***	0.467***	0.159						0.602***	0.993	0.512
S.A.	0.125***	0.460***	0.137						0.590***	0.993	0.512
45-54											
Max.	0.082***	0.327***	-0.901***						0.757***	0.994	0.522
S.A.	0.092***	0.361***	-1.098***						0.721***	0.994	0.502
55-64											
Max.	0.061***	0.293***	-0.720***	-0.076*					0.747***	0.993	0.470
S.A.	0.062***	0.279***	-0.819***	-0.071*					0.744***	0.993	0.470
65+											
Max.	0.029***	0.064***	-1.053***		-0.055**	0.092*	-0.103*		0.561***	0.906	0.279
S.A.	0.030***	0.055***	-0.946***		-0.053**	0.030	-0.027		0.553***	0.889	0.269

TABLE XXIV

PARTICIPATION RATES - MINIMUM MONTHS - REGION-SEX BREAKDOWN

A. Males

Area	Constant	t	t^2	U_{-1}	$\overline{U}_{-1}$	S/U_{-1}	ρ	$\overline{R}^2$	S.E.E.
Atlantic	0.310***	-0.230***	-1.263***	0.137***	-0.103*	-0.011	0.550***	0.954	0.643
Quebec	0.123***	-0.089***	0.254*	-0.019	0.055	-0.018**	0.843***	0.985	0.375
Ontario	0.184***	-0.109***	0.042	0.048	-0.008	-0.010	0.772***	0.986	0.313
Prairies	0.374***	-0.109***	-0.279*	0.144***	0.073	-0.015*	0.501***	0.909	0.434
B. C.	0.245***	-0.031***	0.358**	0.028	-0.033	-0.006	0.678***	0.690	0.477

B. Females

Area	Constant	t	t^2	U_{-1}	$\overline{U}_{-1}$	U_m	$\overline{U}_m$	S/U_{-1}	ρ	$\overline{R}^2$	S.E.E.
Atlantic	0.064***	0.198***	-0.121		-0.091	0.052	-0.087*	0.017*	0.734	0.979	0.563
Quebec	0.043***	0.096***	0.436***		-0.149**	0.052*			0.842***	0.980	0.438
Ontario	0.087***	0.175***	0.082			0.023		-0.019***	0.735***	0.986	0.382
Prairies	0.096***	0.388***	-0.436**			0.187***	0.321***	-0.013	0.637***	0.990	0.542
B. C.	0.124***	0.356***	0.651***			0.074*	-0.136***		0.573***	0.984	0.555

TABLE XXV

STRUCTURE OF EMPLOYMENT REGRESSIONS - AGE-SEX BREAKDOWN

(Based on data adjusted for minimum month of Employment and Labor Force)

Group	K	t	t^2	U_p	$\overline{U}_p$	ΔL	E/L_{-1}	$\overline{R}^2$	S.E.E.
Males 14-19	0.750 (0.068)	-0.035 (0.014)	-0.171 (0.353)	-1.359 (0.176)	-0.242 (0.189)	-0.100 (0.025)	0.235 (0.069)	0.919	0.994
Males 20-24	0.467 (0.056)	0.036 (0.009)	-0.471 (0.202)	-1.202 (0.100)	0.359 (0.109)	-0.130 (0.049)	0.538 (0.055)	0.969	0.545
Males 45-54	0.603 (0.060)	0.027 (0.005)	0.305 (0.108)	-0.635 (0.053)	0.105 (0.060)	-0.060 (0.076)	0.392 (0.061)	0.966	0.296
Males 55-64	0.471 (0.058)	-0.051 (0.008)	0.380 (0.140)	-0.456 (0.062)	0.044 (0.076)	-0.101 (0.046)	0.527 (0.058)	0.941	0.372
Males 65+	0.619 (0.063)	-0.070 (0.012)	0.212 (0.236)	-0.231 (0.109)	-0.066 (0.120)	-0.047 (0.024)	0.361 (0.065)	0.632	0.662
Females 14-19	0.765 (0.067)	-0.288 (0.029)	-1.547 (0.375)	-0.291 (0.169)	-0.434 (0.180)	-0.143 (0.028)	0.246 (0.066)	0.809	1.015
Females 20-24	0.696 (0.066)	-0.064 (0.009)	-0.612 (0.175)	-0.347 (0.078)	0.018 (0.082)	-0.096 (0.024)	0.303 (0.066)	0.728	0.468
Females 25-34	0.934 (0.071)	-0.021 (0.006)	-0.843 (0.153)	-0.120 (0.065)	-0.190 (0.071)	0.009 (0.019	0.070 (0.071)	0.576	0.397
Females 35-44	0.802 (0.069)	-0.055 (0.007)	-0.447 (0.133)	-0.109 (0.059)	-0.133 (0.064)	0.001 (0.013)	0.197 (0.069)	0.643	0.363
Females 45-54	0.645 (0.065)	-0.026 (0.007)	-0.447 (0.165)	-0.019 (0.074)	-0.071 (0.079)	-0.001 (0.017)	0.348 (0.066)	0.292	0.452
Females 55-64	0.831 (0.071)	-0.065 (0.011)	-0.151 (0.254)	-0.351 (0.118)	0.012 (0.124)	-0.019 (0.021)	0.181 (0.070)	0.472	0.716
Females 65+	0.970 (0.067)	-0.040 (0.028)	0.317 (0.680)	0.842 (0.319)	-0.276 (0.328)	-0.055 (0.023)	-0.019 (0.070)	0.227	1.917

NOTES

U_p - unemployment rate males 25-44 - expressed as proportion.

$\overline{U}_p$ - average of U_p in preceding five months.

ΔL - percentage change in labor force - coefficients multiplied by 100.

Coefficients of t multiplied by 100.

Coefficients of t^2 multiplied by 10,000.

Standard errors in parentheses.

Standard error of estimate multiplied by 100.

Dependent variables - Ratio of employment to labor force (E/L).

TABLE XXVI

STRUCTURE OF EMPLOYMENT REGRESSIONS - REGION-SEX BREAKDOWN

Based on data adjusted for minimum month of employment and labor force

A. Males

Region	K	t	t^2	U_o	$\overline{U}_o$	ΔL	$(E/L)_{-1}$	$\overline{R}^2$	S.E.E.
Atlantic	0.289 (0.047)	-0.008 (0.017)	1.547 (0.463)	-0.491 (0.166)	-0.022 (0.187)	-0.198 (0.075)	0.686 (0.051)	0.899	1.115
Quebec	0.343 (0.052)	-0.035 (0.010)	-0.058 (0.196	-0.358 (0.086)	-0.142 (0.119)	-0.294 (0.080)	0.648 (0.054)	0.930	0.576
Prairies	0.296 (0.050)	-0.013 (0.008)	-0.059 (0.167)	-0.185 (0.073)	-0.037 (0.083)	-0.082 (0.052)	0.700 (0.051)	0.852	0.491
B. C.	0.273 (0.055)	-0.003 (0.011)	-0.213 (0.025)	-0.539 (0.115)	0.144 (0.124)	-0.125 (0.075)	0.725 (0.055)	0.914	0.728

B. Females

Region	K	t	t^2	U_o	$\overline{U}_o$	ΔL	$(E/L)_{-1}$	$\overline{R}^2$	S.E.E.
Atlantic	0.731 (0.067)	-0.058 (0.013)	-0.988 (0.344)	-0.060 (0.053)	-0.069 (0.058)	-0.014 (0.019)	0.265 (0.068)	0.316	0.800
Quebec	0.694 (0.066)	-0.023 (0.007)	-1.195 (0.193)	-0.197 (0.048)	-0.114 (0.056)	0.008 (0.019)	0.312 (0.066)	0.775	0.469
Ontario	0.607 (0.065)	-0.046 (0.006)	-0.220 (0.095)	-0.166 (0.041)	-0.068 (0.047)	-0.034 (0.015)	0.390 (0.065)	0.804	0.274
Prairies	0.853 (0.069)	0.003 (0.006)	-1.023 (0.166)	-0.032 (0.060)	-0.295 (0.074)	0.001 (0.013)	0.148 (0.069)	0.486	0.431
B. C.	0.695 (0.066)	-0.094 (0.014)	0.763 (0.257)	0.004 (0.066)	-0.170 (0.070)	-0.047 (0.023)	0.283 (0.068)	0.531	0.736

NOTES -- U_o - unemployment rate of males in Ontario - expressed as a ratio.

U_m - unemployment rate of males in the region - expressed as a ratio.

TABLE XXVII

DURATION OF UNEMPLOYMENT

AVERAGE PROPORTIONS OF TOTAL UNEMPLOYMENT IN VARIOUS YEARS

	1961	1964	1969
Temporary Lay-Off	0.058	0.057	0.066
Without Work and Seeking Work Less Than 1 Month	0.227	0.307	0.278
Without Work and Seeking Work 1-3 Months	0.338	0.337	0.349
Without Work and Seeking Work 4-6 Months	0.198	0.156	0.153
Without Work and Seeking Work More Than 6 Months	0.179	0.143	0.154

Source: DBS The Labour Force

TABLE XXVIII

RESULTS FOR THOSE WITHOUT WORK AND SEEKING WORK 1-3 MONTHS
(Estimates of Equation 4.1)

Month	α	β	γ	R^2
Seasonally Adjusted	0.3209*	-0.00044	-0.733	0.806
January	0.6849*	-0.00574*	0.943*	0.961
February	0.6691*	-0.00625*	0.614	0.947
March	0.5838*	-0.00455*	1.146*	0.958
April	0.5049*	-0.00302*	1.021*	0.959
May	0.4081*	0.00140	1.449*	0.884
June	0.3265*	0.00522*	2.650*	0.934
July	0.3439*	0.00587*	2.901*	0.958
August	0.3338*	0.00397	3.412*	0.946
September	0.3289*	0.00056	2.753*	0.871
October	0.3151*	0.00353	3.715*	0.929
November	0.4075*	0.00074	3.088*	0.899
December	0.4520*	-0.00131	3.323*	0.955

*Significant at 0.05 level.

TABLE XXIX

REGRESSION RESULTS FOR THOSE WITHOUT WORK AND SEEKING WORK 4-6 MONTHS

(Estimates of Equation 4.2)

(Standard Errors in Parentheses)

Month	α	β	γ	δ	$\bar{R}^2$	S.E.E.
All months (seasonally adjusted)	0.1761 (0.0206)	-0.00313 (0.00092)	0.00095 (0.00018)	5.680 (0.329	0.923	6.68
January	0.2124 (0.1236)	-0.00488 (0.00572)	0.00299 (0.00157)	8.716 (1.889)	0.965	4.86
February	0.6258 (0.1504)	-0.01471 (0.00704)	-0.00039 (0.00197)	5.345 (2.245)	0.952	8.15
March	0.9439 (0.1510)	-0.01985 (0.00732)	-0.00097 (0.00206)	1.072 (2.223)	0.936	11.99
April	0.3638 (0.0750)	-0.00355 (0.00375)	0.00086 (0.00108)	4.889 (1.112)	0.954	10.06
May	0.0705 (0.0574)	0.00113 (0.00271)	0.00086 (0.00079)	4.973 (0.863)	0.937	8.24
June	0.0514 (0.0350)	0.00316 (0.00152)	0.00087 (0.00045)	3.026 (0.534)	0.942	3.89
July	0.0076 (0.0508)	0.00776 (0.00198)	0.00155 (0.00058)	3.949 (0.799)	0.895	3.74
August	0.0068 (0.0622)	0.00308 (0.00230	0.00121 (0.00066)	5.597 (0.999)	0.924	2.97
September	0.1506 (0.0611)	-0.00294 (0.00231	0.00035 (0.00058)	4.458 (0.992)	0.961	2.29
October	0.0226 (0.1116)	-0.00748 (0.00448)	0.00061 (0.00102)	6.291 (1.849)	0.844	4.91
November	0.1015 (0.0637)	-0.00553 (0.00268)	0.00090 (0.00061)	5.014 (1.034)	0.952	2.92
December	0.1181 (0.1252)	0.00112 (0.00497)	0.00156 (0.00126)	7.172 (1.981)	0.909	4.92

TABLE XXX

REGRESSION RESULTS FOR THOSE WITHOUT WORK AND SEEKING WORK MORE THAN 6 MONTHS
(Estimates of Equation 4.3)

	α_1	α_2	β_1	β_2	γ_1	γ_2	$\bar{R}^2$	S.E.E.
Seasonally Adjusted	0.364*	0.665*	-0.020*	0.046*	-0.001	-0.009	0.964	3.772
January	1.414*	0.028	-0.044	0.037	-0.045	0.036	0.965	3.405
February	0.862	0.630	-0.004	0.004	-0.007	0.001	0.981	2.795
March	0.218	1.440	-0.153	0.188	0.019	-0.035	0.926	5.927
April	0.382*	1.050*	-0.049*	0.087*	0.010	-0.024	0.992	2.251
May	0.408*	0.656	-0.025	0.080*	0.001	-0.016	0.974	3.959
June	0.292	0.624	-0.008	0.053	-0.001	0.021	0.938	5.458
July	0.346	0.181	-0.014	0.063	-0.008	0.006	0.930	4.990
August	0.271	0.371	-0.044*	0.074*	-0.009	0.010	0.961	3.354
September	0.006	0.778	-0.007	0.018	0.013	-0.016	0.924	4.235
October	1.554	-0.258	-0.055	0.050	-0.069	0.046	0.936	3.728
November	1.660	-0.242	-0.043	0.038	-0.062	0.039	0.940	3.501
December	0.859	0.482	-0.032	0.041	-0.005	-0.006	0.984	1.800

*Significant at 0.05 level.

TABLE XXXI

DURATION OF UNEMPLOYMENT -- SEASONAL PATTERNS -- REGRESSION RESULTS

	Without Work & Seeking Work Less Than 1 Month plus Temporary Lay-Offs	Without Work and Seeking Work 1-3 Months	Without Work and Seeking Work 4-6 Months	Without Work and Seeking Work More Than 6 Months
Constant				
January	2.139	1.669	0.871	0.936
February	1.783	1.850	1.456	1.075
March	2.451	1.485	2.157	1.193
April	1.565	1.159	2.292	1.303
May	0.983	0.811	1.226	1.288
June	0.748	0.621	0.721	1.057
July	0.432	0.811	0.543	1.041
August	0.130	0.736	0.488	0.942
September	-0.100	0.567	0.507	0.778
October	-0.054	0.585	0.585	0.807
November	0.407	0.745	0.560	0.793
December	0.579	0.635	0.489	0.540
Unemployment rate				
January	-0.126*	0.004	0.015*	-0.001
February	-0.133*	-0.004	0.012	-0.004
March	-0.245*	0.001	0.003	-0.003
April	-0.122*	-0.016	-0.015	0.007
May	-0.034	-0.014	-0.018*	0.005
June	0.048	-0.005	-0.005	0.013
July	0.095*	-0.023	-0.005	-0.004
August	0.139*	-0.004	-0.004	-0.003
September	0.189*	0.007	-0.009	0.000
October	0.188*	0.146	-0.015	-0.006
November	0.140*	0.147	-0.003	-0.003
December	0.117*	0.077*	0.025*	0.036*
Trend				
January	-0.026*	-0.032*	0.002	0.001
February	-0.018*	-0.030*	-0.009*	-0.004
March	-0.048*	-0.021*	-0.032*	-0.009*
April	-0.006	-0.013*	-0.034*	-0.014*
May	0.020*	0.005	-0.012*	-0.004
June	0.035*	0.019*	0.005*	-0.004
July	0.016*	0.034	0.010*	0.006*
August	0.005	0.023	0.011*	0.001
September	-0.003	0.008*	0.013*	0.010*
October	0.008	0.005	0.017*	0.007*
November	0.007	0.003	0.017*	0.002
December	0.004	0.020*	0.025*	0.022*
$\bar{R}^2$	0.751	0.971	0.995	0.947

TABLE XXXII

EXPECTED DURATION OF UNEMPLOYMENT IN MONTHS

CALCULATED FROM ESTIMATES OF (4.1), (4.2) and (4.3)

Month in Which Unemployment is First Reported	Unemployment Rate					
	3%	4%	5%	6%	7%	8%
January	2.2	2.3	2.5	2.6	2.8	2.9
February	2.0	2.1	2.3	2.5	2.7	2.9
March	2.0	2.3	2.7	3.1	3.5	4.0
April	2.5	2.8	3.2	3.6	4.1	4.6
May	1.8	2.5	3.1	3.9	4.7	5.7
June	2.3	3.0	3.8	4.7	5.7	6.9
July	3.3	3.7	4.3	5.0	5.7	6.6
August	2.7	3.5	4.3	5.2	6.2	7.4
September	3.4	4.4	5.3	6.4	7.5	8.8
October	3.0	3.7	4.3	5.0	5.7	6.5
November	2.9	3.3	3.7	4.1	4.5	4.9
December	3.1	3.3	3.6	3.8	4.1	4.4

TABLE XXXIII

CONSISTENCY OF RECALLED AND REPORTED DATA

RATIO OF RECALLED TO REPORTED -- REGRESSION RESULTS

	Mean of Raw Data	K	t	t^2	U	S.E.E.	$\overline{R}^2$
			A. Both Sexes				
Employed	1.0001	1.001	0.0007	-0.0001		0.0044	0.086
		0.998	0.0012	-0.0002	0.036	0.0044	0.079
Unemployed	0.9559	0.988	-0.0226*	0.0025*		0.0298	0.265
		0.883	-0.0046	0.0005	1.602*	0.0293	0.287
Not in Labor Force	0.9757	0.949	0.0161*	-0.0016*		0.0309	0.153
		1.015	0.0048	-0.0004	-1.002	0.0308	0.157

TABLE XXXIII (Continued)

	Mean of Raw Data	K	t	t^2	U	S.E.E.	$\bar{R}^2$
			B. Males				
Employed	0.9987	0.999	0.0002	0.0000		0.0038	-0.007
		0.998	0.0003	-0.0001	0.0106	0.0038	-0.016
Unemployed	0.9666	0.999	-0.0226*	0.0024*		0.0323	0.236
		0.920	-0.0085	0.0010	1.0474	0.0320	0.247
Not in Labor Force	0.9057	0.779	0.0673	-0.0061		0.3388	0.018
		-0.149	0.2306*	-0.0232*	12.155	0.3354	0.038
			C. Females				
Employed	1.0019	1.002	0.0012	-0.0002		0.0170	0.001
		1.022	-0.0012	0.0001	-0.530	0.0170	-0.001
Unemployed	0.9777	1.040	-0.0045	-0.0018		0.6002	-0.009
		0.261	0.0942	-0.0154	21.593	0.6001	-0.008
Not in Labor Force	1.0114	1.005	0.0041	-0.0004		0.0216	0.010
		1.006	0.0040	-0.0004	-0.031	0.0217	0.009

TABLE XXXIV

PROPORTION IN EACH CATEGORY WHO REMAIN IN CATEGORY & AVERAGE OF RAW DATA

		% of Recalled	% of Recorded
Employed	Total	96.17	95.94
	Males	97.28	96.79
	Females	94.08	94.07
Unemployed	Total	65.35	62.25
	Males	65.85	63.31
	Females	63.01	57.80
Not in Labor Force	Total	96.72	97.32
	Males	94.36	95.99
	Females	97.59	97.75

TABLE XXXV

GROSS MOVEMENTS - TOTAL

CURRENT MODELS

Regression Results Using Seasonally-Adjusted Data

This Month	Last Month	K	t	t^2	ΔE/E	U	$\bar{R}^2$
E	E	0.9625	0.0003	-0.00008			0.107
		0.9622	0.0002	-0.00007	0.135*		0.132
		0.9811	-0.0029*	0.00027*		-0.282*	0.202
		0.9804	-0.0029*	0.00027*	0.125*	-0.276*	0.222
U	E	0.0190	-0.0022*	0.00021*			0.682
		0.0191	-0.0021*	0.00021*	-0.027		0.681
		0.0043	0.0004	-0.00005		0.223*	0.812
		0.0045	0.0004	-0.00005	-0.019	0.222*	0.812
N	E	0.0185	0.0019*	-0.00013*			0.427
		0.0187	0.0019*	-0.00014*	-0.108		0.439
		0.0146	0.0026*	-0.00021*		0.059	0.425
		0.0152	0.0025*	-0.00021*	-0.106	0.054	0.436
E	U	0.2825	0.0318*	-0.00375*			0.643
		0.2799	0.0314*	-0.00368*	1.080*		0.661
		0.4255	0.0070	-0.00108		-2.168*	0.702
		0.420	0.0072	-0.00108	1.003*	-2.118*	0.718
U	U	0.6967	-0.0299*	0.00340*			0.556
		0.6990	-0.0295*	0.00332*	-0.961*		0.568
		0.5439	-0.0034	0.00054		2.316*	0.623
		0.5489	-0.0036	0.00054	-0.878*	2.272*	0.633
N	U	0.0209	-0.0019*	0.00045*			0.144
		0.0211	-0.0019*	0.00037*	-0.178		0.139
		0.0306	-0.0036	0.00054		-0.148	0.140
		0.0313	-0.0036	0.00054	-0.124	-0.154	0.136
E	N	0.0220	0.0024*	-0.00018*			0.761
		0.0216	0.0023*	-0.00016*	0.176*		0.787
		0.0187	0.0030*	-0.00018*		0.050	0.761
		0.0177	0.0030*	-0.00018*	0.178*	0.059	0.787
U	N	0.0027	0.0001	0.00003*			0.571
		0.0026	0.0001	0.00004*	0.056*		0.597
		-0.0030	0.0011*	-0.00007*		0.088*	0.620
		-0.0034	0.0011*	-0.00007*	0.059*	0.090*	0.650
N	N	0.9752	-0.0025*	0.00009*			0.790
		0.9758	-0.0024*	0.00007*	-0.232*		0.820
		0.9843	-0.0041*	0.00025*		-0.137	0.797
		0.9857	-0.0041*	0.00025*	0.237*	-0.149*	0.828

* Significant at the 0.05 level.

TABLE XXXVI

GROSS MOVEMENTS - BY SEX - CURRENT MODELS[a]

REGRESSION RESULTS

This Month	Last Month	K	t	t^2	ΔE/E	U	$\bar{R}^2$
A. Males							
E	E	0.9858	-0.00138	0.00009	0.1075	-0.2130*	0.330
U	E	0.0066	0.00029	-0.00004	-0.0232	0.2053*	0.778
N	E	0.0076	0.00109	-0.00005	-0.0843	0.0077	0.377
E	U	0.3919	0.01334*	-0.00174*	1.3283*	-1.5442*	0.685
U	U	0.5596	-0.00502	0.00077	-1.3931*	1.9390*	0.637
N	U	0.0485	-0.00833*	0.00097*	0.0649	-0.3950*	0.139
E	N	0.0453	0.00205	-0.00013	0.6652*	-0.0945	0.285
U	N	-0.00017	0.00146*	-0.00008	0.1693*	0.1106*	0.367
N	N	0.9564	-0.00351	0.00021	-0.8345*	-0.0161	0.326

TABLE XXXVI (Continued)

This Month	Last Month	K	t	t^2	$\Delta E/E$	U	$\bar{R}^2$
				B. Females			
E	E	0.9580	-0.00427*	0.00052*	0.1178*	-0.4022*	0.250
U	E	0.0026	-0.00002	-0.00002	-0.0015	0.2206*	0.585
N	E	0.0394	0.00429*	-0.00050*	-0.1163*	0.1817	0.340
E	U	0.3814	0.01462	-0.00224	-0.1273	-1.5520	0.088
U	U	0.6320	-0.01829	0.00286	0.3550	-0.2252	0.056
N	U	-0.0134	0.00367	-0.00062	-0.2277	1.7772	-0.021
E	N	0.0182	0.00159*	-0.00003	0.0426*	-0.0337	0.827
U	N	-0.0019	0.00052*	-0.00004*	0.0050	0.0931*	0.695
N	N	0.9837	-0.00211*	0.00006	-0.0476*	-0.0594	0.862

*Significant at the 0.05 level.

[a] $\Delta E/E$ and U are for the groups.

TABLE XXXVII

GROSS MOVEMENTS - LAGGED UNEMPLOYMENT MODELS - REGRESSION RESULTS

This Month	Last Month	K	t	t^2	U_{p-1}	$\overline{U}_{p-1}$	U_{-1}	$\overline{U}_{-1}$	S/U_{-1}	$\overline{R}^2$
				A. TOTAL						
E	E	0.976	-0.0020	0.00017	-0.524*	0.406	0.215	-0.210	-0.018	0.234
		0.975	-0.0023*	0.00017	-0.392*			-0.333*	-0.027	0.223
U	E	0.011	-0.0008	0.00007	0.074	-0.121	0.068	0.105	0.000	0.725
		0.012	-0.0008	0.00008	0.089*			0.017	-0.002	0.718
N	E	0.013	0.0028*	-0.00023*	0.450*	-0.284	-0.283	0.106	0.018	0.471
		0.012	0.0031*	-0.00026*	0.303*			-0.352*	0.028*	0.465
E	U	0.463	0.0070	-0.00096	2.370*	-1.335	-5.092*	2.869	-0.272*	0.732
		0.462	0.0080	-0.00104	1.786*		-4.129*	1.010	-0.242*	0.733
U	U	0.479	0.0005	0.00005	-3.274*	1.119	5.041*	-0.805	0.199	0.677
		0.477	-0.0002	0.00009	-2.767*		4.297*	0.637	0.186	0.680
N	U	0.058	-0.0075*	0.00091*	0.905*	0.216	0.051	-2.063*	0.073	0.257
		0.061	-0.0078*	0.00095*	0.981*		-0.168	-1.647*	0.056	0.256
E	N	0.026	0.0029*	-0.00014	0.123	0.360	-0.124	-0.345	-0.013	0.783
		0.033	0.0016*			0.555*		-0.704*		0.777
U	N	0.000	0.0006	-0.00002	-0.060	0.047	0.143*	-0.096	0.002	0.587
		0.001	0.0004*			-0.033		0.059		0.581
N	N	0.974	-0.0035*	0.00016	-0.063	-0.407	-0.018	0.441	0.011	0.802
		0.966	-0.0020*			-0.522*		0.644*		0.798

*Significant at the 0.05 level.

GROSS MOVEMENTS - LAGGED UNEMPLOYMENT MODELS - REGRESSION RESULTS

This Month	Last Month	K	t	t^2	U_{p-1}	$\overline{U}_{p-1}$	U_{-1}	$\overline{U}_{-1}$	S/U_{-1}	$\overline{R}^2$
U	U	0.607	-0.0047	0.00258	1.765	0.542	7.520*	-19.261*	0.827*	0.137
		0.514		0.00108*			8.040*	-12.519*	0.744*	0.132
N	U	0.031	-0.0082	0.00028	0.793	-2.075	0.069	3.542	-0.070	-0.042
		0.017		-0.00024			0.405	1.874	-0.137	-0.024
E	N	0.017	0.0031*	-0.00014*	0.073	0.157*	0.031	-0.432*	-0.002	0.832
		0.017	0.0030*	-0.00013*		0.215*		-0.406*		0.832
U	N	0.000	0.0003	-0.00001	0.012	-0.017	0.054	-0.027	0.003	0.650
		0.000	0.0002	0.00000		-0.010		0.050		0.647
N	N	0.983	-0.0035	0.00015*	-0.086	-0.140	-0.084	0.459*	-0.001	0.859
		0.982	-0.0033*	0.00013		-0.206*		0.355*		0.857

TABLE XXXVII (Continued)

GROSS MOVEMENTS - LAGGED UNEMPLOYMENT MODELS - REGRESSION RESULTS

This Month	Last Month	K	t	t^2	U_{p-1}	$\overline{U}_{p-1}$	U_{-1}	$\overline{U}_{-1}$	S/U_{-1}	$\overline{R}^2$
					B. MALES					
E	E	0.976	0.0003	-0.00007	-0.334*	0.309	0.048	0.121	0.001	0.307
		0.979	-0.0005*		-0.299*	0.163*	0.010			0.320
U	E	0.013	-0.0009	0.00008	0.023	0.015	0.135	-0.061	0.003	0.692
		0.009	-0.0001		0.011	0.014	0.144*			0.693
N	E	0.011	0.0006	-0.00001	0.311*	-0.324	-0.183	0.182	-0.003	0.402
		0.012	0.0006*		0.289*	-0.177*	-0.133			0.415
E	U	0.459	0.0104	-0.00134	1.917	1.727	-2.196*	-2.331	-0.179	0.698
		0.459	0.0090	-0.00125	2.295*		-2.698*	-0.540	-0.211*	0.698
U	U	0.477	0.0003	0.00017	-2.286*	-2.333	2.272*	3.865	0.129	0.655
		0.477	0.0021	0.00004	-2.796*		2.950*	1.446	0.173	0.653
N	U	0.064	-0.0107*	0.00117*	0.369	0.606	-0.076	-1.534*	0.049	0.176
		0.064	-0.0111*	0.00121*	0.501		-0.252	-0.906*	0.038	0.177
E	N	0.064	0.0002	0.00009	0.116	0.671	-0.256	-0.636	-0.018	0.191
		0.059	0.0010*			0.927		-1.027*		0.214
U	N	0.004	0.0007	0.00000	-0.182	0.275	0.193	-0.249	0.004	0.294
		0.004	0.0007			0.081		-0.032		0.300
N	N	0.932	-0.0009	-0.00009	0.066	-0.946	0.063	0.885	0.014	0.227
		0.937	0.0017*			-1.008		1.059		0.252
					C. FEMALES					
E	E	0.975	-0.0065*	0.00072*	-0.395*	0.331*	0.214	-0.426	0.052	0.245
		0.969	-0.0055	0.00064*				-0.491*	-0.019	0.214
U	E	0.005	-0.0040	0.00002	0.048	-0.056	0.036	0.167	-0.004	0.476
		0.006	-0.0004	0.00002				0.226*	-0.010*	0.475
N	E	0.020	0.0069*	-0.00074*	0.348*	-0.275	-0.250	0.259	0.057*	0.362
		0.025	0.0060*	-0.00067*				0.264	0.017	0.340
E	U	0.362	0.0129	-0.00286	-2.558	1.533	-7.589*	15.718*	-0.757*	0.157
		0.469		-0.00084*			-8.445*	10.644*	-0.607*	0.155

TABLE XXXVIII

AGE-SEX COMPOSITION OF POPULATION,

LABOR FORCE AND UNEMPLOYMENT

PERCENTAGES OF TOTAL

Group	Population			Labor Force			Unemployment		
	1953	1964	1969	1953	1964	1969	1953	1964	1969
Males									
14-19	6.3	8.2	8.5	6.2	5.7	5.8	14.6	15.1	14.6
20-24	5.0	4.9	6.0	8.8	7.9	9.0	14.9	13.7	14.5
25-34	10.6	8.9	8.9	19.4	16.3	15.3	21.4	14.5	13.8
35-44	9.6	9.3	8.5	17.7	16.9	15.0	15.2	13.3	11.6
45-54	7.5	7.7	7.4	13.4	13.6	12.7	12.4	12.1	10.0
55-64	5.4	5.4	5.5	8.9	8.6	8.4	7.7	9.8	8.7
65+	5.5	5.1	4.8	3.6	2.6	2.0	2.9	2.3	2.1

TABLE XXXVIII (Continued)

Group	Population			Labor Force			Unemployment		
	1953	1964	1969	1953	1964	1969	1953	1964	1969
Females									
14-19	6.3	7.9	8.1	3.9	4.4	4.5	3.5	6.8	8.4
20-24	5.3	4.9	5.2	4.8	4.8	6.2	2.0	3.6	5.6
25-34	11.2	9.1	9.0	5.1	5.2	6.1	2.5	2.6	3.9
35-44	9.6	9.6	8.5	4.0	5.9	6.0	1.1	2.4	2.7
45-54	7.0	7.7	7.6	2.7	5.1	5.4	1.2	2.0	2.7
55-64	5.2	5.4	5.6	1.3	2.5	3.0	0.1	1.4	1.3
65+	5.4	5.7	5.6	0.4	0.7	0.6	0.2	0.3	0.3

Source: Data from the Labour Force Survey.

TABLE IXL

EFFECTS OF CHANGING POPULATION AND LABOR FORCE
BASED ON AGE-SEX CLASSIFICATION
STANDARDIZED TO 1969 VALUES
ANNUAL AVERAGES

	Seasonally Adjusted			Minimum Month of Employment and Labor Force			Minimum Month of Unemployment		
	Original	Standardized Labor Force	Standardized Population	Original	Standardized Labor Force	Standardized Population	Original	Standardized Labor Force	Standardized Population
1953	3.0	2.8	3.1	5.4	5.0	5.6	1.2	1.1	1.2
1954	4.6	4.3	4.8	7.1	6.6	7.4	2.5	2.4	2.7
1955	4.4	4.2	4.6	6.9	6.4	7.1	2.4	2.3	2.5
1956	3.4	3.3	3.6	5.7	5.4	5.9	1.6	1.6	1.7
1957	4.6	4.4	4.8	7.0	6.7	7.3	2.7	2.6	2.8
1958	7.1	6.8	7.3	9.7	9.3	10.1	4.8	4.6	5.0
1959	6.0	5.8	6.2	8.5	8.1	8.7	3.9	3.7	4.0
1960	6.9	6.8	7.2	9.5	9.2	9.8	4.7	4.6	4.9
1961	7.1	7.0	7.4	9.7	9.5	9.9	4.9	4.8	5.1
1962	5.9	5.8	6.1	8.1	8.0	8.3	3.9	3.9	4.0
1963	5.5	5.5	5.7	7.6	7.5	7.8	3.6	3.6	3.7
1964	4.6	4.7	4.8	6.6	6.5	6.7	2.9	2.9	3.0
1965	3.9	3.9	4.0	5.7	5.6	5.7	2.3	2.3	2.3
1966	3.6	3.6	3.6	5.2	5.2	5.2	2.1	2.1	2.1
1967	4.1	4.1	4.1	5.8	5.7	5.8	2.5	2.5	2.5
1968	4.8	4.8	4.8	6.5	6.5	6.6	3.1	3.1	3.1
1969	4.7	4.7	4.7	6.3	6.3	6.3	3.1	3.1	3.1

TABLE XL

UNEMPLOYMENT RATES BASED ON CONSTANT UNEMPLOYMENT RATE FOR MALES 25-44

USING AGE-SEX BREAKDOWN OF THE LABOR FORCE

A. Based on Constant Unemployment in Months of Minimum Employment and the Labor Force

Rate to Which Standardized	4%		5%		6%		7%		8%	
Year	M.M.	S.A.	M.M.	S.A.	M.M.	S.A.	M.M.	S.A.	M.M.	S.A.
1953	3.99	1.71	4.95	2.52	5.91	3.34	6.87	4.17	7.83	5.00
1954	3.95	1.74	4.90	2.55	5.86	3.37	6.81	4.18	7.76	5.01
1955	3.93	1.79	4.87	2.59	5.82	3.40	6.76	4.21	7.71	5.02
1956	3.91	1.84	4.85	2.64	5.79	3.44	6.73	4.24	7.66	5.05
1957	3.91	1.91	4.84	2.70	5.78	3.50	6.71	4.30	7.64	5.10
1958	3.90	1.96	4.82	2.75	5.75	3.54	6.68	4.33	7.60	5.13
1959	3.89	2.03	4.81	2.81	5.74	3.60	6.66	4.39	7.58	5.18
1960	3.89	2.09	4.81	2.87	5.72	3.65	6.64	4.44	7.55	5.23
1961	3.90	2.17	4.81	2.95	5.72	3.72	6.63	4.50	7.54	5.29
1962	3.92	2.26	4.83	3.03	5.73	3.81	6.64	4.58	7.55	5.37
1963	3.95	2.36	4.85	3.13	5.76	3.90	6.66	4.67	7.57	5.45
1964	3.98	2.46	4.89	3.22	5.79	3.99	6.69	4.77	7.60	5.55
1965	4.02	2.56	4.92	3.32	5.82	4.09	6.73	4.86	7.63	5.64
1966	4.06	2.66	4.96	3.42	5.86	4.19	6.76	4.96	7.67	5.74
1967	4.10	2.76	5.00	3.52	5.90	4.29	6.80	5.06	7.70	5.83
1968	4.14	2.87	5.04	3.63	5.94	4.39	6.84	5.16	7.74	5.93
1969	4.19	2.98	5.08	3.74	5.98	4.50	6.88	5.27	7.78	6.04
1970	4.25	3.11	5.14	3.86	6.04	4.62	6.93	5.37	7.83	6.15

B. Based on Constant Seasonally-Adjusted Unemployment

Rate to Which Standardized	2%		3%		4%		5%		6%	
Year	M.M.	S.A.	M.M.	S.A.	M.M.	S.A.	M.M.	S.A.	M.M.	S.A.
1953	5.15	2.70	6.26	3.64	7.36	4.60	8.47	5.55	9.57	6.51
1954	5.02	2.65	6.12	3.59	7.22	4.53	8.31	5.48	9.40	6.43
1955	4.90	2.61	5.99	3.55	7.08	4.48	8.17	5.42	9.25	6.36
1956	4.79	2.59	5.88	3.51	6.96	4.44	8.04	5.38	9.11	6.31
1957	4.70	2.58	5.78	3.50	6.86	4.42	7.93	5.35	9.01	6.28
1958	4.60	2.55	5.67	3.47	6.74	4.39	7.81	5.31	8.87	6.23
1959	4.50	2.54	5.57	3.45	6.64	4.37	7.70	5.28	8.76	6.20
1960	4.41	2.53	5.47	3.44	6.53	4.35	7.59	5.26	8.64	6.17
1961	4.33	2.54	5.39	3.44	6.44	4.34	7.49	5.25	8.54	6.15
1962	4.26	2.55	5.32	3.45	6.37	4.35	7.41	5.25	8.46	6.15
1963	4.21	2.58	5.26	3.47	6.31	4.37	7.35	5.27	8.40	6.17
1964	4.16	2.60	5.21	3.50	6.26	4.39	7.30	5.29	8.34	6.19
1965	4.11	2.63	5.16	3.53	6.21	4.42	7.25	5.32	8.30	6.22
1966	4.07	2.67	5.12	3.56	6.17	4.45	7.21	5.35	8.26	6.25
1967	4.03	2.71	5.08	3.60	6.13	4.49	7.17	5.38	8.22	6.28
1968	4.00	2.75	5.05	3.63	6.09	4.52	7.14	5.42	8.18	6.31
1969	3.97	2.79	5.02	3.68	6.06	4.57	7.10	5.46	8.14	6.35
1970	3.95	2.86	5.00	3.74	6.04	4.62	7.08	5.51	8.12	6.40

TABLE XLI

STRUCTURE OF UNEMPLOYMENT BASED ON CONSTANT UNEMPLOYMENT RATE

FOR MALES 25-44

1970 VALUES

A. Standardized to Minimum Months of Employment and Labor Force

Rate to Which Standardized	4%	5%	6%	7%	8%
Group					
Males 14-24					
Minimum Month Unemployment	8.02	9.94	11.85	13.77	15.69
Seasonally-Adjusted Unemployment	5.98	7.48	8.99	10.53	12.07
Trend in S.A. (% p.a.)	11.99	9.51	7.85	6.66	5.77
Acceleration in S.A. (% p.a.)	8.43	6.75	5.62	4.81	4.20
Females 14-24					
Minimum Month Unemployment	4.84	5.50	6.17	6.84	7.50
Seasonally-Adjusted Unemployment	5.10	5.71	6.32	6.93	7.54
Trend in S.A. (% p.a.)	8.48	7.46	6.65	5.98	5.41
Acceleration in S.A. (% p.a.)	0.53	0.56	0.57	0.57	0.56
All 14-24					
Minimum Month Unemployment	6.64	8.02	9.39	10.77	12.15
Seasonally-Adjusted Unemployment	5.60	6.73	7.86	9.00	10.15
Trend in S.A. (% p.a.)	10.76	8.94	7.65	6.68	5.92
Acceleration in S.A. (% p.a.)	5.56	4.87	4.30	3.87	3.52
Males 25+					
Minimum Month Unemployment	4.03	4.96	5.89	6.83	7.76
Seasonally-Adjusted Unemployment	2.32	3.12	3.91	4.71	5.51
Trend in S.A. (% p.a.)	0.88	0.66	0.53	0.45	0.38
Acceleration in S.A. (% p.a.)	-0.01	-0.01	0.00	0.00	0.00
Females 25+					
Minimum Month Unemployment	2.03	2.28	2.53	2.77	3.02
Seasonally-Adjusted Unemployment	1.97	2.20	2.42	2.65	2.87
Trend in S.A. (% p.a.)	8.15	7.40	6.78	6.27	5.85
Acceleration in S.A. (% p.a.)	0.12	0.17	0.20	0.22	0.23
All 25+					
Minimum Month Unemployment	3.46	4.20	4.93	5.67	6.40
Seasonally-Adjusted Unemployment	2.22	2.85	3.48	4.11	4.74
Trend in S.A. (% p.a.)	2.59	1.91	1.48	1.18	0.96
Acceleration in S.A. (% p.a.)	0.20	0.18	0.16	0.14	0.13
Total					
Minimum Month Unemployment	4.25	5.14	6.04	6.93	7.83
Seasonally-Adjusted Unemployment	3.11	3.86	4.62	5.39	6.15
Trend in S.A. (% p.a.)	7.29	7.51	4.92	4.24	3.72
Acceleration in S.A. (% p.a.)	3.25	2.74	2.39	2.13	1.93

B. Standardized to Seasonally-Adjusted Unemployment Rate

Rate to Which Standardized	2%	3%	4%	5%	6%
Group					
Males 14-24					
Seasonally-Adjusted Unemployment	5.47	7.23	8.99	10.77	12.57
Trend in S.A. (% p.a.)	10.48	7.89	6.30	5.23	4.45
Acceleration in S.A. (% p.a.)	9.18	6.96	5.61	4.69	4.02
Females 14-24					
Seasonally-Adjusted Unemployment	4.90	5.61	6.32	7.03	7.74
Trend in S.A. (% p.a.)	7.66	6.58	5.74	5.08	4.54
Acceleration in S.A. (% p.a.)	0.70	0.69	0.67	0.64	0.62
All 14-24					
Seasonally-Adjusted Unemployment	5.23	6.54	7.86	9.19	10.53
Trend in S.A. (% p.a.)	9.46	7.57	6.31	5.41	4.74
Acceleration in S.A. (% p.a.)	6.08	5.04	4.33	3.83	3.44
Males 25+					
Seasonally-Adjusted Unemployment	2.06	2.98	3.91	4.86	5.76
Trend in S.A. (% p.a.)	-2.42	-1.64	-1.23	-0.97	-0.80
Acceleration in S.A. (% p.a.)	-0.12	-0.07	-0.04	-0.03	-0.02
Females 25+					
Seasonally-Adjusted Unemployment	1.90	2.16	2.43	2.69	2.95
Trend in S.A. (% p.a.)	7.29	6.52	5.92	5.43	5.04
Acceleration in S.A. (% p.a.)	0.24	0.26	0.28	0.28	0.28
All 25+					
Seasonally-Adjusted Unemployment	2.01	2.75	3.48	4.21	4.95
Trend in S.A. (% p.a.)	0.08	-0.04	-0.10	-0.15	-0.18
Acceleration in S.A. (% p.a.)	0.25	0.20	0.16	0.14	0.13
Total					
Seasonally-Adjusted Unemployment	2.86	3.74	4.62	5.51	6.40
Trend in S.A. (% p.a.)	5.43	4.19	3.43	2.91	2.53
Acceleration in S.A. (% p.a.)	3.55	2.84	2.40	2.10	1.88

TABLE XLII

SIMULATED SEASONALLY-ADJUSTED UNEMPLOYMENT RATE

	MALES				FEMALES			
Year	Actual Rate	Simulated Rate	Simulated with Actual Employment	"Hidden" Unemploy-ment	Actual Rate	Simulated Rate	Simulated with Actual Employment	"Hidden" Unemploy-ment
1953	3.4	3.3	3.4	0.0	1.6	1.9	0.7	0.2
1954	5.1	5.0	5.8	-0.1	2.6	2.5	3.7	-0.2
1955	4.9	4.8	5.3	0.1	2.6	2.4	4.9	0.1
1956	3.9	3.9	3.9	0.0	1.9	2.0	2.9	0.2
1957	5.4	5.3	5.1	0.0	2.3	2.4	2.8	-0.1
1958	8.1	8.0	8.2	-0.1	3.6	3.5	5.5	-0.5
1959	6.9	6.9	7.1	0.1	3.0	3.2	5.4	-0.2
1960	8.1	8.1	8.4	-0.1	3.6	3.5	4.7	-0.4

1961	8.4	8.5	9.0	0.0	3.7	3.9	4.6	-0.5
1962	6.8	6.7	7.6	0.1	3.3	3.3	5.0	0.1
1963	6.4	6.3	7.2	0.0	3.3	3.2	6.0	-0.1
1964	5.3	5.3	5.9	0.1	3.0	2.9	5.1	0.1
1965	4.4	4.5	4.8	0.0	2.7	2.8	4.6	0.2
1966	4.0	4.1	4.1	0.0	2.6	2.7	2.7	0.2
1967	4.6	4.9	4.8	-0.1	3.0	3.1	2.8	-0.1
1968	5.5	5.7	5.9	-0.1	3.4	3.6	4.1	-0.2
1969	5.2	5.3	5.5	0.0	3.6	3.7	4.1	0.0
1970	6.8	6.7	7.2	-0.1	4.5	4.3	6.7	-0.2

TABLE XLII (Continued)

	Ages 14-24				Ages 25+				Total			
Year	Actual Rate	Simulated Rate	Simulated with Actual Employment	"Hidden" Unemploy-ment	Actual Rate	Simulated Rate	Simulated with Actual Employment	"Hidden" Unemploy-ment	Actual Rate	Simulated Rate	Simulated with Actual Employment	"Hidden" Unemploy-ment
1953	4.6	5.0	6.1	0.0	2.5	2.4	1.8	-0.1	3.0	3.0	2.8	0.0
1954	6.9	7.1	8.8	-0.2	3.9	3.7	4.2	-0.1	4.6	4.5	5.3	-0.1
1955	6.6	6.7	8.5	0.1	3.7	3.5	4.2	0.0	4.4	4.2	5.2	0.1
1956	5.3	5.5	5.9	0.2	2.9	2.8	3.0	0.0	3.4	3.4	3.6	0.1
1957	7.3	7.3	8.5	-0.3	3.9	3.9	3.4	0.0	4.6	4.6	4.6	-0.2
1958	11.0	10.8	12.9	-0.5	5.9	5.8	6.0	-0.1	7.1	6.9	7.6	-0.3
1959	9.4	9.3	11.8	-0.1	5.0	5.0	5.2	0.0	6.0	5.9	6.7	0.0
1960	11.0	10.8	12.8	-0.6	5.8	5.8	5.8	0.0	6.9	6.9	7.4	-0.2
1961	10.8	11.5	13.4	-0.4	6.1	6.1	6.2	0.0	7.1	7.3	7.8	-0.1
1962	9.3	9.2	12.5	0.0	4.9	4.8	5.3	0.1	5.9	5.8	6.9	0.1
1963	9.2	8.7	12.7	0.0	4.5	4.4	5.1	0.0	5.5	5.4	6.8	0.0
1964	7.9	7.5	11.2	0.3	3.7	3.7	4.0	0.0	4.6	4.6	5.7	0.1
1965	6.5	6.6	8.9	0.3	3.1	3.2	3.4	0.0	3.9	4.0	4.7	0.1
1966	5.9	6.1	6.7	0.2	2.8	2.9	2.7	0.0	3.6	3.7	3.7	0.1
1967	6.9	7.2	7.6	-0.2	3.2	3.4	3.0	0.0	4.1	4.3	4.2	-0.1
1968	8.2	8.3	9.4	-0.3	3.7	3.9	3.9	0.0	4.8	5.1	5.3	-0.1
1969	7.9	8.0	9.3	0.1	3.6	3.7	3.6	0.0	4.7	4.8	5.1	0.0
1970	10.5	10.1	13.5	-0.3	4.5	4.5	4.7	-0.1	6.0	5.9	7.0	-0.1

TABLE XLIII

REGION-SEX COMPOSITION OF POPULATION

LABOR FORCE AND UNEMPLOYMENT

Group	Population			Labor Force			Unemployment		
	1953	1964	1969	1953	1964	1969	1953	1964	1969
Males									
Atlantic	10.5	9.8	9.3	9.7	8.8	8.1	18.5	16.1	14.1
Quebec	27.6	28.7	28.6	28.1	28.7	28.5	34.8	39.8	42.8
Ontario	34.4	35.0	35.6	35.4	35.9	36.5	25.8	23.8	23.3
Prairies	18.6	17.4	16.5	18.5	17.5	16.7	10.7	11.3	9.6
British Columbia	8.9	9.3	10.1	8.3	9.1	10.2	11.0	9.0	10.3

TABLE XLIII (Continued)

Group	Population			Labor Force			Unemployment		
	1953	1964	1969	1953	1964	1969	1953	1964	1969
<u>Females</u>									
Atlantic	10.7	9.8	9.3	8.1	7.7	7.7	7.9	7.0	9.0
Quebec	28.3	29.1	28.8	29.8	26.8	27.2	43.2	30.2	37.3
Ontario	35.0	35.3	35.9	38.7	39.4	38.4	27.5	34.0	29.9
Prairies	17.4	16.6	16.0	15.0	16.7	16.3	10.9	11.7	11.2
British Columbia	8.6	9.3	10.1	8.4	9.5	10.4	10.5	17.1	12.6

TABLE XLIV

EFFECTS OF CHANGING POPULATION AND LABOR FORCE
BASED ON REGION-SEX

EFFECTS OF CHANGING POPULATION AND LABOR FORCE
BASED ON REGION-SEX CLASSIFICATION
STANDARDIZED TO 1969 VALUES

	Seasonally Adjusted			Minimum Month of Employment and Labor Force			Minimum Month of Unemployment		
	Original	Standardized Labor Force	Standardized Population	Original	Standardized Labor Force	Standardized Population	Original	Standardized Labor Force	Standardized Population
1953	3.0	2.8	3.0	6.0	5.6	6.0	1.4	1.4	1.4
1954	4.6	4.3	4.6	7.7	7.2	7.7	2.8	2.8	2.9
1955	4.4	4.1	4.4	7.4	6.9	7.4	2.7	2.6	2.7
1956	3.4	3.2	3.4	6.2	5.8	6.2	1.8	1.8	1.8
1957	4.6	4.4	4.6	7.5	7.0	7.5	2.9	2.9	2.9
1958	7.1	6.7	7.0	10.2	9.6	10.2	5.2	5.0	5.2
1959	6.0	5.7	6.0	8.9	8.4	8.9	4.2	4.1	4.2
1960	6.9	6.7	7.0	9.9	9.5	9.9	5.2	5.1	5.2
1961	7.1	6.9	7.2	10.0	9.6	10.0	5.3	5.3	5.4
1962	5.9	5.7	5.9	8.5	8.2	8.5	4.2	4.2	4.2
1963	5.5	5.4	5.5	8.0	7.7	7.9	3.9	3.9	3.9
1964	4.6	4.6	4.7	6.9	6.7	6.8	3.2	3.2	3.2

TABLE XLIV (Continued)

EFFECTS OF CHANGING POPULATION AND LABOR FORCE
BASED ON REGION-SEX

EFFECTS OF CHANGING POPULATION AND LABOR FORCE
BASED ON REGION-SEX CLASSIFICATION
STANDARDIZED TO 1969 VALUES

	Seasonally Adjusted			Minimum Month of Employment and Labor Force			Minimum Month of Unemployment		
	Original	Standardized Labor Force	Standardized Population	Original	Standardized Labor Force	Standardized Population	Original	Standardized Labor Force	Standardized Population
1965	3.9	3.8	3.9	5.9	5.7	5.9	2.5	2.5	2.5
1966	3.6	3.5	3.6	5.4	5.3	5.4	2.2	2.2	2.2
1967	4.1	4.1	4.1	5.8	5.8	5.8	2.7	2.7	2.7
1968	4.8	4.8	4.8	6.6	6.6	6.6	3.4	3.4	3.4
1969	4.7	4.7	4.7	6.3	6.3	6.3	3.3	3.3	3.3

TABLE XLV

RELATIONSHIP BETWEEN HIRINGS AND PLACEMENTS

Average Ratio of Hirings to Placements
and correlations between them

August 1953 - August 1966

Sector	Seasonally-Adjusted Data		Data Adjusted to Minimum Month	
	Average	Correlation	Average	Correlation
Agriculture	0.13	0.38	0.59	0.19
Forestry	8.32	0.55	4.28	0.80
Mining	6.60	0.68	5.97	0.75
Manufacturing	4.01	0.85	4.24	0.86
Construction	3.64	0.59	3.29	0.78
TCU	4.99	0.45	5.81	0.77
Trade	3.63	0.69	3.53	0.82
FIR	5.26	0.86	5.00	0.91
Services	2.55	0.63	2.28	0.78
Ind. Comp.	3.88	0.71	3.61	0.87
All Covered	3.21	0.68	3.18	0.78

TABLE XLVI

REGRESSIONS FOR THE RATIO OF HIRINGS TO PLACEMENTS

AUGUST 1953 - AUGUST 1966

A. Seasonally-Adjusted Data

Sector	Constant	t	t^2	U	US	$\bar{R}^2$	S.E.E.
Agriculture	0.154**	0.0102**	-0.0004			0.602	0.036
	0.132**	0.0112**	-0.0001	0.359		0.602	0.036
	0.148**	0.0102**	-0.0003		0.302	0.600	0.036
Forestry	7.881**	-0.2380**	0.0004			0.121	2.335
	7.591**	-0.2256**	0.0041	4.745		0.116	2.343
	6.862**	-0.2012**	0.0147		3.776	0.122	2.334
Mining	6.745**	-0.0049	-0.0085			0.009	1.005
	8.155**	0.0650*	-0.0266**	-23.138		0.045	0.986
	7.499**	-0.0521	-0.0219**		-9.848**	0.044	0.987
Manufacturing	3.883**	-0.0562**	0.0016			0.259	0.392
	3.107**	-0.0231	0.0115**	12.732**		0.318	0.376
	3.119**	-0.0127	0.0116**		13.429**	0.367	0.362

Construction	3.781**	0.0253	-0.0055*			0.123	0.474
	2.588**	0.0762**	0.0098**	19.571**		0.240	0.441
	2.945**	0.0698**	0.0055		4.876**	0.204	0.451
TCU	5.143**	0.0382	-0.0048			0.035	0.989
	3.085**	0.1259**	0.0216**	33.763**		0.121	0.944
	4.094**	0.0819**	0.0079		17.730**	0.060	0.976
Trade	3.473**	0.0109	0.0102**			0.143	0.390
	3.369**	0.0153	0.0116**	1.696		0.139	0.391
	4.046**	0.0659**	0.0076**		-20.000**	0.476	0.305
FIR	5.204**	0.0820**	0.0119**			0.032	0.979
	4.643**	0.1060**	0.0191**	9.214		0.033	0.979
	4.713**	0.0917**	0.0174**		30.217	0.042	0.974
Services	2.574**	0.1373**	0.0130**			0.543	0.345
	2.976**	0.1202**	0.0079**	-6.588**		0.554	0.341
Ind. Comp.	3.805**	0.0072	0.0046*			0.029	0.393
	3.465	0.0273	0.0090**	5.741		0.039	0.391
All Covered	3.077**	-0.0134	0.0050**			0.168	0.336
	3.124**	-0.0163	0.0043	-0.802		0.163	0.337

TABLE XLVI (continued)

B. Data Adjusted to Minimum Months

Sector	Constant	t	t^2	U	US	$\bar{R}^2$	S.E.E.
Agriculture	0.664**	0.0909**	0.0052			0.268	0.455
	0.890**	0.0811**	0.0028	-2.672		0.266	0.455
	11.415***	3.0171	0.1983***		17.018***	0.349	0.429
Forestry	4.049**	-0.0236	0.0105			0.019	1.527
	4.645**	-0.0496	0.0041	-7.077		0.014	1.530
	3.610	-0.5058	-0.0193		-3.909***	0.068	1.488
Mining	6.269**	0.0331	-0.0138*			0.067	1.252
	7.422**	-0.0172	-0.0262**	-13.686		0.073	1.247
	-13.807*	-6.2507***	-0.4600***		-12.214***	0.122	1.214
Manufacturing	4.103**	-0.0719**	0.0806			0.190	0.549
	2.892**	-0.0190	0.131**	14.373**		0.246	0.530
	5.949*	0.8842	0.0805		6.445**	0.217	0.540
Construction	3.298**	0.0371	0.0033			0.007	0.728
	2.644**	0.0656**	0.0103	7.765		0.013	0.726
	16.732***	3.985***	0.2650***		4.590***	0.243	0.636

TCU	5.924**	-0.0209	-0.0088			-0.006	1.455
	3.001**	0.1067*	0.0226*	34.690**		0.050	1.414
	-63.078	-4.6459*	-0.3156*		60.036	0.005	1.447
Trade	3.327**	-0.0050	0.0110**			0.183	0.457
	3.282**	-0.0030	0.0115**	0.534		0.178	0.458
	-42.524	1.8712**	0.1396***		53.553	0.192	0.454
FIR	4.979**	0.0723**	0.0088			0.024	0.979
	4.320**	0.1012**	0.0159*	7.825		0.024	0.979
	5.688	0.1065	-0.0052		-0.012***	0.071	0.955
Services	2.296**	0.1264**	0.0124**			0.347	0.468
	2.970**	0.0970**	0.0052	-7.997**		0.364	0.462
Ind. Comp.	3.537**	0.0191	0.0060**			0.025	0.440
	3.381**	0.0281	0.0078*	1.899		0.021	0.441
All Covered	3.079**	0.0053	0.0056*			0.036	0.483
	3.028**	0.0082	0.0061	0.620		0.030	0.485

*Significant at 0.10 level.
**Significant at 0.05 level.
***Significant at 0.01 level.

U - Unemployment proportion.
US - Unemployment proportion in sector.

TABLE XLVII

AGREEMENT AMONG EMPLOYMENT SERIES

CORRELATION COEFFICIENTS USING MONTHLY DATA
1953-1966

A. Seasonally-Adjusted Data

Sector	Correlations			Partial Correlations holding t and t^2 constant		
	EA-EL	EA-ER	EL-ER	EA-EL	EA-ER	EL-ER
Agriculture	-0.812	NA	NA	0.084	NA	NA
Forestry	0.774	0.937	0.818	0.869	0.926	0.815
Mining	0.557	0.738	0.642	0.776	0.845	0.822
Manufacturing	0.935	0.984	0.932	0.834	0.944	0.755
Construction	0.912	0.266	0.032	0.903	0.538	0.435
TCU	0.583	0.938	0.765	-0.091	0.919	-0.022
Trade	0.972	0.941	0.939	-0.088	0.255	0.071
FIR	0.987	0.990	0.976	0.382	-0.021	-0.206
Services	0.993	0.996	0.188	0.813	0.792	0.874
Ind. Comp.	0.978	0.988	0.984	0.936	0.912	0.903
All Industries	0.978	0.988	0.973	0.921	0.912	0.901

B. Data Adjusted to Minimum Month

	EA-EL	EA-ER	EL-ER	EA-EL	EA-ER	EL-ER
Agriculture	-0.157	NA	NA	0.244	NA	NA
Forestry	0.828	0.956	0.795	0.874	0.969	0.838
Mining	0.544	0.708	0.597	0.704	0.856	0.740
Manufacturing	0.936	0.974	0.924	0.882	0.935	0.796
Construction	0.959	0.621	0.506	0.964	0.845	0.821
TCU	0.205	0.271	0.797	0.310	0.444	0.367
Trade	0.969	0.936	0.935	0.421	0.518	0.421
FIR	0.985	0.989	0.972	0.409	0.045	-0.188
Services	0.989	0.993	0.257	0.797	0.810	0.812
Ind. Comp.	0.978	0.992	0.979	0.872	0.959	0.931
All Industries	0.977	0.992	0.969	0.862	0.959	0.859

TABLE XLVIII

CORRELATIONS AMONG MONTHLY RATES OF CHANGE

OF EMPLOYMENT SERIES

1953-1966

A. Seasonally-Adjusted Data

Sector	Correlations			Partial Correlations		
	EA-EL	EA-ER	EL-ER	EA-EL	EA-ER	EL-ER
Agriculture	0.061	NA	NA	0.059	NA	NA
Forestry	0.314	0.541	0.168	0.312	0.538	0.165
Mining	0.091	0.058	0.042	0.070	0.039	0.032
Manufacturing	0.237	0.365	0.155	0.218	0.327	0.140
Construction	0.331	0.236	0.095	0.323	0.221	0.087
TCU	0.032	0.537	0.405	0.036	0.537	0.411
Trade	-0.070	0.039	-0.014	-0.071	0.028	-0.015
FIR	-0.047	0.049	0.111	-0.046	0.048	0.111
Services	0.070	0.188	0.062	0.011	0.174	0.096
Ind. Comp.	0.318	0.227	0.205	0.295	0.206	0.193
All Industries	0.341	0.227	0.169	0.319	0.207	0.157

B. Adjusted to Minimum Month

	EA-EL	EA-ER	EL-ER	EA-EL	EA-ER	EL-ER
Agriculture	0.214	NA	NA	0.217	NA	NA
Forestry	0.841	0.953	0.805	0.842	0.953	0.806
Mining	0.138	0.450	0.035	0.126	0.446	0.025
Manufacturing	0.683	0.610	0.409	0.678	0.602	0.401
Construction	0.925	0.899	0.858	0.925	0.899	0.858
TCU	0.279	0.238	0.499	0.280	0.238	0.502
Trade	0.528	0.612	0.310	0.529	0.612	0.309
FIR	0.132	0.051	0.056	0.131	0.051	0.057
Services	0.166	0.701	0.147	0.164	0.512	0.512
Ind. Comp.	0.862	0.770	0.698	0.875	0.769	0.769
All Industries	0.869	0.782	0.669	0.868	0.800	0.667

TABLE IL

CORRELATIONS AMONG QUARTERLY RATES OF CHANGE

OF EMPLOYMENT SERIES

1953-1966

A. Seasonally-Adjusted Data

Sector	Correlations			Partial Correlations		
	EA-EL	EA-ER	EL-ER	EA-EL	EA-ER	EL-ER
Agriculture	0.512	NA	NA	-0.525	NA	NA
Forestry	0.682	0.869	0.486	0.690	0.867	0.474
Mining	0.338	0.430	0.243	0.266	0.321	0.169
Manufacturing	0.593	0.860	0.554	0.574	0.837	0.533
Construction	0.607	0.363	0.174	0.582	0.295	0.125
TCU	-0.033	0.873	0.127	-0.019	0.876	0.132
Trade	0.009	0.010	0.272	0.002	-0.066	0.268
FIR	0.028	0.205	0.052	0.019	0.219	0.058
Services	0.094	0.370	0.147	0.191	0.278	0.333
Ind. Comp.	0.754	0.730	0.668	0.719	0.688	0.640
All Industries	0.221	0.373	0.070	0.192	0.348	0.041

B. Data Adjusted to Minimum Month

Sector	EA-EL	EA-ER	EL-ER	EA-EL	EA-ER	EL-ER
Agriculture	0.147	NA	NA	0.149	NA	NA
Forestry	0.899	0.984	0.858	0.904	0.985	0.863
Mining	0.336	0.826	0.294	0.312	0.821	0.260
Manufacturing	0.893	0.896	0.817	0.893	0.897	0.821
Construction	0.965	0.973	0.968	0.965	0.974	0.970
TCU	0.513	0.517	0.725	0.522	0.520	0.730
Trade	0.731	0.848	0.621	0.730	0.848	0.620
FIR	0.187	0.203	0.073	0.185	0.207	0.080
Services	0.150	0.837	0.111	0.142	0.836	0.102
Ind. Comp.	0.960	0.957	0.969	0.971	0.971	0.970
All Industries	0.544	0.338	0.706	0.537	0.328	0.698

TABLE L

VACANCIES AVAILABLE AND UNEMPLOYMENT

REGRESSION RESULTS FOR LOG V/L ON LOG U - USING MONTHLY DATA

AUGUST 1955 - NOVEMBER 1970

A. Seasonally-Adjusted Data

Sector	K	t	t^2	Log U	Log US	$\bar{R}^2$	S.E.E.
Agriculture	0.9632***	0.0233***	-0.0109***	-0.6594***		0.518	0.244
	2.6499***	0.0243***	-0.0089***		-0.0593**	0.355	0.282
Forestry	-0.3839	-0.0395	-0.0073***	1.4200***		0.671	0.271
	2.5342***	-0.0362***	-0.0080***		-0.8528***	0.495	0.336
Mining	1.3089***	0.0234***	-0.0020***	-0.6363***		0.612	0.145
	2.4777***	0.0202***	-0.0012**		-0.2469	0.401	0.180
Manufacturing	0.4759***	0.0109***	-0.0053***	-0.8730***		0.794	0.104
	0.8690***	0.0059***	-0.0034***		-0.7148***	0.801	0.103
Construction	0.9787***	-0.0300***	-0.0045***	-0.8456***		0.822	0.117
	2.1583***	-0.0392***	-0.0037***		-0.6776***	0.754	0.137
TCU	0.9616***	-0.0131***	-0.0054***	-0.5897***		0.333	0.238
	0.9961***	-0.0165***	-0.0057***		-0.5746***	0.329	0.239
Trade	1.0742***	-0.0043***	-0.0041***	-0.6647***		0.701	0.102
	1.1581***	-0.0005	-0.0033***		-0.5511***	0.586	0.120
FIR	1.1439***	-0.0153***	-0.0013***	-0.5480***		0.698	0.097
	2.4627***	-0.0153***	-0.0010**		-0.0644***	0.245	0.153
Services [a]	1.7704***	-0.1178**	0.0016	-0.5537***		0.918	0.075
	2.2666***	-0.0778	-0.0031		-0.3003***	0.903	0.081
Ind. Comp.	0.7171***	-0.0127***	-0.0045***	-0.8054***		0.822	0.089
	1.0230***	-0.0149***	-0.0042***		-0.7343***	0.825	0.088
All Industries	0.7526***	-0.0082***	-0.0053***	-0.7853***		0.813	0.089

[a] Estimated from April 1965.
* Significant at 0.10 level.
** Significant at 0.05 level.
*** Significant at 0.01 level.

B. Minimum-Month Data

Sector	K	t	t^2	Log U	Log US	$\bar{R}^2$	S.E.E.
Agriculture	-1.3287	-0.0008	-0.0071**	-0.6733*		0.013	0.100
	-6.8268***	0.1386***	-0.0205***		-2.0475***	0.538	0.636
Forestry	-2.2948***	-0.0468***	-0.0056***	-1.9630***		0.337	0.531
	1.5648***	-0.0337***	-0.0036**		-1.7422***	0.265	0.559
Mining	1.5283***	0.0112***	-0.0022***	-0.6114***		0.257	0.229
	3.0946***	0.0165***	-0.0003		0.0015	0.083	0.255
Manufacturing	-0.2636	0.0074**	-0.0048***	-1.0962***		0.490	0.219
	0.1359	0.0102***	-0.0030***		-0.8770***	0.660	0.179
Construction	0.5925*	-0.0241***	-0.0043***	-0.8782***		0.202	0.127
	1.3332***	-0.0398***	-0.0048***		-1.1504***	0.718	0.212
TCU	0.3895	-0.0449***	-0.0061***	-0.7854***			
	1.3739***	-0.0366***	-0.0050***		-0.3888***	0.384	0.325
Trade	0.8347***	-0.0175***	-0.0037***	-0.7254***		0.321	0.212
	0.8705***	-0.0075***	-0.0036***		-0.6038***	0.547	0.173
FIR	0.3099*	-0.0159***	-0.0011*	-0.8258***		0.438	0.176
	1.5810***	-0.0069**	0.0012*		-0.2064***	0.217	0.208
Services	3.6802***	-0.1817	0.0024	0.0430		0.648	0.179
	1.6055**	0.1822*	0.0068		-0.4439***	0.682	0.170
Ind. Comp.	0.2965	-0.0164***	-0.0039***	-0.9079***		0.399	0.204
	0.7083***	-0.0201***	-0.0036***		-0.8094***	0.653	0.155
All Industries	0.1778	-0.0105***	-0.0043***	-0.9135***		0.402	0.203

TABLE LI

UNFILLED VACANCIES AND EMPLOYMENT

REGRESSION RESULTS FOR LOG VU/L ON LOG U - USING MONTHLY DATA

AUGUST 1953 to NOVEMBER 1970

A. Seasonally-Adjusted Data

Sector	K	t	t^2	Log U	Log US	$\bar{R}^2$	S.E.E.
Agriculture	-2.668***	0.042***	-0.005***	-1.201***		0.696	0.220
	0.709***	0.041***	-0.001		-0.031	0.235	0.349
Forestry	-4.515***	-0.025***	-0.009***	-2.428***		0.588	0.472
	0.418**	-0.019**	-0.010***		-1.499***	0.395	0.571
Mining	-1.343***	0.062***	-0.002**	-1.153***		0.791	0.209
	0.665***	0.056***	-0.000		-0.487***	0.641	0.274
Manufacturing	-2.616***	0.045***	-0.003***	-1.420***		0.919	0.116
	-1.899***	0.037***	0.000		-1.137***	0.897	0.131
Construction	-3.046***	0.005**	-0.001**	-1.524***		0.796	0.181
	-0.906***	-0.011***	0.000		-1.214***	0.684	0.225

TCU	-2.280***	0.011***	0.001	-1.051***		0.498	0.267
	-2.219***	0.005	0.000		-1.025***	0.490	0.269
Trade	-1.249***	0.021***	-0.003***	-0.977***		0.856	0.099
	-1.206***	0.028***	-0.001***		-0.834***	0.765	0.127
FIR	-0.269***	-0.009***	0.001***	-0.696***		0.757	0.104
	1.436***	-0.009***	0.004***		-0.075***	0.234	0.184
Services[a]	0.444	0.131**	-0.018***	-0.430***		0.838	0.100
	0.293	0.158**	-0.020***		-0.361***	0.843	0.099
Ind. Comp.[b]	-2.3236***	0.0176***	-0.0022***	-1.3344***		0.889	0.113
	-1.768***	0.034***	0.001*		-1.2398***	0.899	0.143
All Industries	-2.3565***	0.0226***	-0.0025***	-1.3223***		0.898	0.110

[a]From 1965-1970.

[b]Excluding service.

TABLE LI (Continued)

B. Minimum-Month Data

Sector	K	t	t^2	Log U	Log US	$\bar{R}^2$	S.E.E.
Agriculture	-4.6850***	0.0250**	-0.0038	-1.4313***		0.125	0.809
	-7.0869***	0.1499***	-0.0125***		-1.7218***	0.553	0.578
Forestry	-6.8251***	-0.0186*	-0.0076***	-3.1591***		0.346	0.779
	-0.4385*	0.0031	-0.0038		-2.5452***	0.213	0.854
Mining	-2.1791***	0.0349***	-0.0015	-1.5932***		0.603	0.316
	0.7472***	0.0467***	0.0010		-0.4681	0.354	0.403
Manufacturing	-3.5238***	0.0303***	-0.0025***	-1.8229***		0.743	0.242
	-2.1958***	0.0369***	0.0008		-1.2175***	0.733	0.247
Construction	-4.4766***	0.0084	-0.0010	-2.0044***		0.451	0.443
	-1.4393***	-0.0067	0.0006		-1.6026***	0.663	0.347

TCU	-3.3969***	-0.0049	0.0008	-1.4291***		0.308	0.423
	-0.8165***	0.0091	0.0038**		-0.4103***	0.114	0.478
Trade	-1.9112***	0.0212***	-0.0020**	-1.1681***		0.514	0.258
	-1.3220***	0.0362***	-0.0013*		-0.7967***	0.596	0.236
FIR	-0.7356***	-0.0096***	0.0012**	-0.8941***		0.535	0.170
	0.7101***	-0.0001	0.0038***		-0.2069***	0.276	0.212
Services[a]	2.4820**	0.0683	-0.0175	0.2212		0.507	0.213
	-0.1882	0.0519	-0.0107		-0.4679***	0.543	0.206
Ind. Comp.[b]	-3.0093***	0.0154***	-0.0016**	-1.6007***		0.669	0.239
	-1.4614***	0.0154***	0.0000		-1.0815	0.641	0.249
All Industries	-3.1264***	0.0213***	-0.0018	-1.6055***		0.691	0.238

[a]From 1965-1970.

[b]Excluding services.

TABLE LII

VACANCY RATIO AND UNEMPLOYMENT

REGRESSION RESULTS FOR LOG VU/V ON LOG U-USING MONTHLY DATA

AUGUST 1953 - NOVEMBER 1970

A. Seasonally-Adjusted Data

Sector	K	t	t^2	Log U	Log US	$\bar{R}^2$	S.E.E.
Agriculture	-3.6307***	0.0184***	0.0054***	-0.5417***		0.372	0.300
	-1.9408***	0.0164***	0.0077***		0.0286	0.271	0.323
Forestry	-4.1312***	0.0142***	-0.0014	-1.0084***		0.340	0.334
	-2.1164***	0.0168***	-0.0022*		-0.6459***	0.250	0.356
Mining	-2.6518***	0.0385***	0.0005	-0.5169***		0.698	0.153
	-1.8129***	0.0355***	0.0009		-0.2404***	0.637	0.168
Manufacturing	-3.0914***	0.0339***	0.0024***	-0.5474***		0.909	0.075
	-2.7678***	0.0309***	0.0036***		-0.4226***	0.884	0.085
Construction	-4.0245***	0.0352***	0.0032***	-0.6788***		0.753	0.157
	-3.0640	0.0279***	0.0038***		-0.5368***	0.714	0.169
TCU	-3.2418***	0.0242***	0.0063***	-0.4618***		0.522	0.239
	-3.2155***	0.0216***	0.0061***		-0.4502***	0.520	0.2301
Trade	-2.3230***	0.0253***	0.0015***	-0.3120***		0.729	0.0018
	-2.3641***	0.0278***	0.0018***		-0.2827***	0.727	0.099
FIR	-1.4131***	0.0067***	0.0025***	-0.1478***		0.505	0.086
	-1.0264***	0.0066***	0.0031***		-0.0102	0.432	0.092
Services	-1.3267***	0.2484***	-0.0199***	0.1236		0.217	0.092
	-1.9732***	0.2358***	-0.0174***		0.0611	0.211	0.092
Ind. Comp.	-3.0348***	0.0304***	0.0024***	-0.5290***		0.861	0.085
	-2.8050***	0.0229***	0.0026***		-0.4658	0.844	0.090
All Industries	-3.1091***	0.0307***	0.0027***	-0.5370***		0.849	0.092

B. Minimum-Month Data

Sector	K	t	t^2	Log U	Log US	$\bar{R}^2$	S.E.E.
Agriculture	-3.3563***	0.0258***	0.0033*	-0.7580***		0.154	0.580
	-0.2600	0.0112	0.0080***		0.3257**	0.141	0.584
Forestry	-4.5303***	0.0282***	-0.0020	-1.1961***		0.323	0.421
	-2.0033***	0.0368***	-0.0002		-0.8030***	0.221	0.452
Mining	-3.7074***	0.0238***	0.0007	-0.9819***		0.622	0.203
	-2.3473***	0.0301***	0.0013**		-0.4665***	0.523	0.227
Manufacturing	-3.2602***	0.0229***	0.0023***	-0.7267***		0.817	0.109
	-2.3317***	0.0267***	0.0039***		-0.3404***	0.676	0.144
Construction	-5.0691***	0.0325***	0.0033***	-1.1262***		0.734	0.206
	-2.7725***	0.0332***	0.0054***		-0.4522	0.575	0.260
TCU	-3.7864***	0.0399***	0.0069***	-0.6437***		0.518	0.328
	-2.1904***	0.0457***	0.0088***		-0.0215	0.457	0.348
Trade	-2.7459***	0.0386***	0.0016***	-0.4427***		0.728	0.149
	-2.1926***	0.0437***	0.0023***		-0.1929***	0.689	0.160
FIR	-1.0455***	0.0063***	0.0023***	-0.0682*		0.323	0.103
	-0.8709***	0.0069***	0.0025***		-0.0002	0.313	0.103
Services	-1.1982**	0.2501***	-0.0200***	0.1782		0.144	0.114
	-1.7937***	0.2342***	-0.0175***		-0.0240	0.134	0.115
Ind. Comp.	-3.3058***	0.0319***	0.0024***	-0.6928***		0.833	0.111
	-2.1697***	0.0355***	0.0036***		-0.2721***	0.686	0.152
All Industries	-3.3043***	0.0318***	0.0024***	-0.6919***		0.828	0.113

TABLE LIII

CORRELATIONS AMONG DIFFERENT WAGE-CHANGE SERIES 1955-69

(Annual Below Diagonal, Quarterly Above)

(Correlations with Base Rates - 1955-68)

Forestry

	AWWS	WI	BR
AWWS	1.00	-	-
WI	0.75	1.00	-
BR	0.63	0.63	1.00

Mining

	AWWS	AHE	WI	BR
AWWS	1.00	0.76	-	-
AHE	0.96	1.00	-	-
WI	0.81	0.84	1.00	-
BR	0.69	0.70	0.72	1.00

Manufacturing

	AWWS	AHE	WI	BR
AWWS	1.00	0.60	-	0.21
AHE	0.97	1.00	-	0.40
WI	0.94	0.98	1.00	-
BR	0.82	0.90	0.89	1.00

Construction

	AWWS	AHE	WI
AWWS	1.00	-0.23	-
AHE	0.60	1.00	-
WI	0.40	0.24	1.00

Transportation, Communications and Utilities

	AWWS	WI	BR
AWWS	1.00	-	-
WI	0.67	1.00	-
BR	0.42	0.72	1.00

Trade

	AWWS	WI	BR
AWWS	1.00	-	-
WI	0.83	1.00	-
BR	0.73	0.77	1.00

Services

	AWWS	WI	BR
AWWS	1.00	-	-
WI	-0.03	1.00	-
BR	0.42	0.30	1.00

Public Administration

	ALI	BR
ALI	1.00	-
BR	0.44	1.00

Overall

	AWWS	WI	BR
AWWS	1.00	-	0.21
WI	0.95	1.00	-
BR	0.89	0.92	1.00

TABLE LIV

PERCENTAGE RATES OF CHANGE OF WAGE MEASURES

CORRELATIONS AMONG SECTORS - 1955-69

A. Average Weekly Wages and Salaries
(Annual Below Diagonal, Quarterly Above.)

	For.	Min.	Man.	Const.	TCU	Trade	FIR	Serv.	PA
Forestry	1.00	0.48	0.11	-0.30	0.24	-0.22	-0.27	0.28	-0.28
Mining	0.50	1.00	0.55	0.13	0.27	0.16	-0.13	0.53	-0.42
Manufacturing	0.53	0.89	1.00	0.32	0.09	0.63	0.44	0.48	-0.34
Construction	0.60	0.72	0.52	1.00	-0.05	0.74	0.21	-0.14	-0.25
TCU	0.41	0.45	0.66	-0.06	1.00	0.12	0.05	0.06	-0.00
Trade	0.43	0.61	0.86	0.16	0.82	1.00	0.60	0.08	-0.07
FIR	0.47	0.52	0.69	0.24	0.65	0.62	1.00	0.10	0.00
Services	0.21	0.68	0.54	0.75	-0.00	0.12	0.12	1.00	0.36
PA	0.66	0.74	0.69	0.63	0.43	0.51	0.45	0.61	1.00

B. Average Hourly Earnings
(Annual Below Diagonal., Quarterly Above.)

	Min.	Man.	Const.
Mining	1.00	0.60	0.16
Manufacturing	0.87	1.00	0.29
Construction	0.04	0.29	1.00

C. Wage Rate Index (Annual)

	For.	Min.	Man.	Const.	TCU	Trade	Serv.
Forestry	1.00						
Mining	0.60	1.00					
Manufacturing	0.60	0.82	1.00				
Construction	0.22	0.65	0.78	1.00			
TCU	0.58	0.67	0.77	0.53	1.00		
Trade	0.22	0.65	0.85	0.87	0.66	1.00	
Services	0.37	0.32	0.58	0.65	0.23	0.59	1.00

D. Base-Rate Changes (Annual)

	For.	Min.	Man.	TCU	Trade	Serv.	PA
Forestry	1.00						
Mining	0.41	1.00					
Manufacturing	0.71	0.69	1.00				
TCU	0.79	0.64	0.90	1.00			
Trade	0.63	0.46	0.62	0.71	1.00		
Services	0.32	0.48	0.67	0.64	0.57	1.00	
PA	0.56	0.68	0.74	0.74	0.75	0.82	1.00

TABLE LV

DISPERSION OF WAGE CHANGES AMONG SECTORS 1955-69

A. Summary of Decomposition

	AWWS* Annual 1955-68	AWWS* Quarterly 1955(1)-1969(3)	AHE Annual 1955-69	AHE Quarterly 1955(1)-1969(4)	WI Annual 1955-68	BR Annual 1955-68
$\bar{z}$ (% per period)	5.30	1.42	4.51	1.18	4.99	5.51
Due to overall average (%)	80.0	24.4	67.2	25.0	78.4	81.7
Due to row-averages (%)	8.0	5.7	15.4	24.2	11.0	10.1
Due to row seasonals (%)	-	5.8	-	1.6	-	-
Due to column averages (%)	3.2	1.4	0.8	0.2	1.7	1.0
Due to remainder (%)	8.8	22.1	16.6	39.0	8.9	7.2
Due to remainder-seasonal (%)	-	40.7	-	1.6	-	-

TABLE LV (Continued)

B. Deviations from Average by Year (%)

	AWWS	AHE	WI	BR
1955	-1.74	-2.33	-2.67	-1.85
1956	1.33	2.33	1.14	0.06
1957	1.69	-3.08	0.17	0.91
1958	-0.99	-0.69	-1.49	-1.11
1959	-1.70	01.61	-1.33	-1.47
1960	-0.96	-0.25	-0.77	-0.89
1961	-1.21	-2.11	-2.27	-1.27
1962	-1.99	-1.81	-1.70	-2.00
1963	-1.60	-1.49	-1.04	-1.86
1964	-0.67	-1.04	-0.95	-0.82
1965	0.57	0.15	0.21	0.42
1966	1.22	2.18	2.48	2.62
1967	3.10	3.51	3.06	4.27
1968	1.89	2.99	2.24	2.00
1969	-	3.17	2.91	-

C. Deviations from Average by Sector (%)
(Annual Decompositions)

	AWWS	AHE	WI	BR
Forestry	-0.04	-	1.30	0.94
Mining	-0.29	0.52	-0.95	-0.40
Manufacturing	-0.72	0.15	-0.37	-0.73
Construction	0.71	-0.67	0.87	-
TCU	-0.46	-	-0.10	0.00
Trade	-1.38	-	-0.31	0.86
FIR	-0.33	-	-	-
Services	-0.06	-	-0.44	-0.24
PA	2.58	-	-	0.43

D. Correlations of Averages with Standard Deviation

	AWWS	AHE	WI	BR
By Sector	0.38	0.41	0.15	0.66
By Year	0.52	0.58	0.69	0.87

*Including Public Administration proxy which did not extend to the last quarter of 1969 when the calculations were done.

chapter six

EMPLOYMENT CHANGES - INDUSTRIAL COMPOSITE

Introduction

Models incorporating the spirit of the theoretical considerations developed in chapters two and three were first investigated for the industrial-composite aggregates and much of the specification analysis was conducted with these data. At this level of aggregation, of course, relative differences in experience among industries cannot be incorporated into the analysis. This chapter is concerned with the results obtained at this level for hirings, separations, placements and employment changes.[1]

The investigation proceeds in three stages. First, quarterly versions of the models are considered. Then we proceed to monthly models. Finally, instrumental-variable estimates are considered. Because of the exploratory nature of the work the equations investigated involved a fairly large number of variables and this feature is intensified by the incorporation of distributed lags. It was felt that it was

---

[1] These investigations were conducted contemporaneously with some of the work on labor flows and wages reported in chapters eight and nine. Those investigations therefore do not reflect fully any suggestions gleaned in the analysis reported in this chapter.

better to run the risks of unintelligible results which such a procedure involves rather than to specify from the start very simple models. These dangers are unfortunately intensified by the weaknesses of the data used. Nevertheless, the models used, although they involve upwards of 20 coefficients to be estimated, are actually fairly limited and simple-minded.

Quarterly Models

The variables used in the quarterly models are listed in Table LVI. When the basic data were monthly, the quarterly figures were produced by averaging the figures. In the case of Real Domestic Product, however, the data for part of the period were available only quarterly and these data were used.

Distributed lags were introduced initially by including separately the value of the variable (when it was supposed to operate contemporaneously), say X_t; its value lagged one quarter, X_{t-1}; its average over the preceding four quarters,

$$\overline{X}_t = \sum_{k=1}^{4} X_{t-k}/4 \;;$$

and this average lagged one year, $\overline{X}_{t-4}$. For simplicity, we shall denote the functions used in the specification as

$$C(X_t) = \alpha_1 X_t + \alpha_2 X_{t-1} + \alpha_3 \overline{X}_t + \alpha_4 \overline{X}_{t-4} \qquad (2.1)$$

and

$$L(X_t) = \beta_1 X_{t-1} + \beta_2 \overline{X}_t + \beta_3 X_{t-4} \qquad (2.2).$$

When either of these forms is used, the various α's or β's are treated as separate parameters to be estimated.

Two forms of the dependent variable were used for hirings and placements. They were their ratios to employment in the previous period, H/E or P/ER, and their ratios to unemployment in the same period, H/U or P/U. As we noted earlier, the appropriate form for the hirings equation is in considerable doubt and the correct form is likely to be high complicated. At the same time, the nature of the data used probably precludes the imposition of sensible constraints on the function.

The H/U form might seem the more appealing one in that it might be taken to represent the flow from unemployment to employment. However, the two variables are not comparable and it is simply not the case that hirings have to be drawn from those who are reported to be unemployed. There is also the problem that unemployment is endogenous to the system, although its current value was not used in the equations. Using H/U would therefore introduce the danger that the results reflect the denominator rather than the numerator.[2]

The H/E form assumes that it is the gross rate of increase of employment that is to be explained. The form makes for comparability with equations for the rate of change of employment. However, the *a priori* notion that the amount of hiring should be studied relative to the amount of initial employment is not very appealing. On the other hand, the use of the level of hirings produces equations with extremely strong trends and, some partial explorations revealed, substantial heteroscedasticity. Logarithmic models for hirings and other variables were also given some very limited exploration and were dropped from further consideration when they appeared to be distinctly inferior to those reported here.[3]

Two basic types of specification for conditions prevailing in the labor market were investigated. The first, T_1 is given by

$$T_1^c = C(V/E) + L(VU/L) + L(VU/V) + L(1/U^2) \qquad (2.3).$$

The second, T_2, was

$$T_2^c = C(V/U) + L(VU/V) + L(1/U^2) \qquad (2.4).$$

The superscript c indicates that some current forms of the variables are used in the measure. When an L superscript is used, only lagged values are included.

In some early explorations, 1/U and U were tried instead of

---

[2] For this reason, the form H/V, though used in some explorations, is not reported, especially since V does enter the models strongly and contemporaneously.

[3] This is based on the calculation of posterior probabilities. It should be emphasized that the exploration was only partial.

$1/U^2$. They turned out to be either inferior to, or no more satisfactory than $1/U^2$ in terms of the goodness of fit that resulted and $1/U^2$ was then employed exclusively. The form $1/U^2$ is frequently used in Phillips curve specifications.[4]

The other variables try to represent various aspects of labor-market "tightness" related to vacancies. V/E might be taken to indicate the extent to which it is desired to increase employment or the relative need for more labor. It is replaced by V/ER when the dependent variables extended beyond 1966. VU/L could be taken to indicate the extent of unsuccessful attempts to hire relative to the total group from which vacancies might be filled. VU/V indicates the extent to which employers find the market tight by indicating the proportion of vacancies they are unable to fill. Of the variables using vacancies, this is the only one where numerator and denominator are comparable. V/U indicates the relative standing of jobs available to those who are looking for work. It was presumed that this could represent the type of influences represented by the variables V/E and VU/L.

Two specifications for hirings were used. They were

$$H/E = \beta_1 + \beta_2 t + \beta_3 t^2 + T^c + C(DW) + L(DP) \qquad (H.1)$$

and

$$H/E = \beta_1 + \beta_2 t + \beta_3 t^2 + L(Z^1) + T^c + C(DW) + L(DP) + \beta_4 (H/E)_{-1} \qquad (H.2).$$

These forms were also used for H/U, with $(H/U)_{-1}$ replacing $(H/E)_{-1}$ in (H.2). They were also used for placements, with $(P/ER)_{-1}$ or $(P/U)_{-1}$ replacing $(H/E)_{-1}$ or $(H/U)_{-1}$ and with Z^2 replacing Z^1.

Specification (H.1) involves the assumption that only "tightness" in the labor market and the rates of change of wages and prices matter. (H.2) tries to capture, in conjunction with the trend, the demand for labor based on output through the ratio of RDP to employment. It can thus be considered another "tightness" variable. Equation (H.2) also contains the lagged value of the hirings variable, introduced primarily

---

[4] Cf. eg. Bodkin, Bond, Reuber and Robinson (1967).

to reflect the firings considerations mentioned in chapter two. It may equally well represent another dimension of the perceived ease of finding jobs. This specification includes virtually every variable discussed in chapter two in some form with the exception of profits, which was a very minor variable there and for which adequate data were not available, given that some variables may be considered to have been "eliminated" by solving the systems and subsequent substitution. These specifications contain current values of the variables in the system through T^c and through wage changes. The trend may arise either from a trend in the hirings function, trends in representativeness of the vacancies data, or in productivity, captured in Z.

The specification for separations was similar to (H.2), but involved T^L. It was

$$S/E = \beta_1 + \beta_2 t + \beta_3 t^2 + L(Z^1) + T^L + C(DW) + L(DP) + \beta_4 (H/E)_{-1} \quad \text{(S.1)}.$$

Here only wages enter on a current basis. (S.1) may be combined with (H.2) to produce

$$(H\text{-}S)/E = \beta_1 + \beta_2 t + \beta_3 t^2 + C(Z^1) + T^c + C(DW) + L(DP) + \beta_4 (H/E) \quad \text{(E.1)}.$$

The coefficients of (E.1) are, of course, not equal to those obtained by substracting (S.1) from (H.2). The form (E.1), with placements replacing hirings, with Z^2 replacing Z^1, and with V/ER substituted for V/E was used for $\Delta ER/ER$ and for $\Delta ELF/ELF$.

Six variants of each of the models were investigated, based on different treatments of unemployment and of wage and price changes. These various forms are referred to as specification variants. These variants may be listed:

Specification Variant	Form Used
1	$1/U^2$ with DW and DP
2	$1/UP^2$ with DW and DP
3	$1/U^2$ with W and DP
4	$1/U^2$ with DWR and DPR

5	$1/UP^2$ with W and DP
6	$1/UP^2$ with DWR and DPR.

When DWR and DPR were used, only DWR_t, DWR_{t-1} and DPR_{t-1} were included when the standard specification called for C(DW) and L(DP).

The questions being investigated with these specification variants were whether the overall unemployment rate or that for males 25-44 is more relevant as a measure of conditions in labor markets and whether the level of wages (relative to trend), their rate of change, or the rate of change relative to historical average is the appropriate wage quantity. The form of DWR may be considered to embody directly "accelerationist" assumptions about the role of wage changes.

The models were fitted to the seasonally-adjusted data and to the data adjusted to the months of seasonal minima as described in chapter four. The figures for the industrial composite were calculated by aggregating the minimum-month data by industrial division. The minimum-month unemployment rate was calculated on the basis of age-sex breakdown of employment and the labor force. In the case of wages, maximum-month adjustments were made in most cases, as discussed in section five of chapter four. For convenience, however, they will be referred to also as minimum-month data.

The minimum-month regressions used all the independent variables adjusted to the minimum months. The seasonally-adjusted regressions used seasonally-adjusted independent variables - referred to as data variant 1 - and these data with the wage variable changed to the minimum-month figures - referred to as data variant 2. Other combinations of seasonally-adjusted dependent variables with minimum-month data turned out not to be worth pursuing.

The relative performances of the various models and variants are summarized in Table LVII. The summary is in terms of the posterior probabilities discussed in chapter three. Each version was given equal prior probability and aggregation is performed over data variants, and, in the case of hirings and placements, over alternative forms, to produce the table.

A number of findings emerge from perusal of Table LVII:

(i) The forms H/E and P/ER are clearly superior to those involving division by unemployment.

(ii) The two specifications (H.1) and (H.2) receive some support; the simpler form (H.1) for hirings and the more complicated form (H.2) for placements in the minimum month equations.

(iii) Each form of the "tightness" specification, T_1 and T_2, receives support in some models. In most cases, one or the other is strongly suggested, but the same form is not suggested in each case. (The already severe collinearity problems made it unfeasible to sensibly combine the specifications).

(iv) No general and clear-cut preference for $1/U_2^2$ (specification variants 1, 3 and 4) or $1/UP^2$ (specification variants 2, 5 and 6) could be discerned. This was not because the posterior probabilities were equal; rather they support one form in some cases and the other in others.

(v) Similarly no general and universal preference for wage forms emerged. In the twelve sets of comparisons in Table LVII, DW was clearly best once, W was best four times and DWR, the "accelerationist" form, was best seven times.

(vi) The evidence in favor of using either seasonally-adjusted or minimum month wage data in the seasonally-adjusted equations was mixed. Usually the seasonally-adjusted version has some edge, but this was particularly not the case for (H-S)/E.

(vii) The exact form which had the highest posterior probabilities in the seasonally-adjusted versions was different from the one with the highest posterior probability in the minimum-month regressions.

It is clear from these findings that the various trials did not suggest a particular form as being the appropriate one for the various aspects of labor markets being investigated. This is quite possibly a genuine feature of markets where different persons make different decisions and where the relevant expectations variable may be different, though it may also be the result of shortcomings in the specification or data.

One of the remarkable features of Table LVII is how clear-cut the posterior probabilities are in pointing to particular versions of the specifications considered for particular variables. This is partly a reflection of the fact that the models fit extremely well and that, as a result, there is substantial scope for small variations in specification to have substantial relative effects on the standard errors of estimate. The equations with the highest posterior probability are reported in Table LIX. The values of $\bar{R}^2$ are very high and are all very highly significantly different from zero. The weakest of the equations are for ΔER/ER in the seasonally-adjusted version and ΔELF/ELF in both versions.

It might be expected that the rather extreme multicollinearity introduced into the equations through the simultaneous use of similar variables, especially in T_1 or T_2, and the use of observations on particular variables at different, but adjacent, points of time would render most coefficients insignificant and prevent the achievement of much precision in the estimation of the parameters. To a certain extent this was the case; but, despite the problems, a good deal of information about particular effects is contained in the estimated equations.

We may look first at the evidence that each type of variable used, in all its various timing guises, plays a role in the various equations. For this purpose we concentrate on the equations having the highest posterior probabilities in Table LVII.

A summary in terms of the conventional F-test statistic of the hypothesis that the coefficients applying to each variable are all zero[5] is shown in Table LVIII. Except in the case of P/ER seasonally adjusted, it is not the case that every group was significant in a particular equation. It is, however, the case that in most equations most of the groups are. The main exceptions are the seasonally-adjusted version for S/E and the equations for the rate of change of employment variables, ΔER/ER and ΔELF/ELF, for which the goodness of fit was comparatively weak. Thus there is here no reason to suppose that the models could be simplified by removing one or

---

[5] That is, that all the α's in (2.1) or β's in (2.2) are zero.

more of the variables.

The finding that every one of the variables used appears to enter the models somewhere also applies, though not as strongly, to the particular forms of the variables which were used. This can be seen by scanning across the columns of Table LIX, observing where the asterisks, which indicate significance at conventional levels, occur. It is reinforced by observing what happens when an attempt is made to eliminate insignificant variables from the equations.

The elimination of variables proceeded in two steps. First, variables whose overall F-statistics were not significant at the 0.10 level were dropped starting with the least significant and proceeding until all the F-statistics in the resulting equations were significant. This was not done for the trend, which was retained throughout this part of the exercise. Then individual coefficients were set equal to zero on the basis of their t-statistics until all were significant at 0.10 level. The exception here was that the annual value $\overline{X}$, of a variable was not dropped until its value lagged a year, $\overline{X}_{-4}$, had been eliminated.

It is unlikely that such a shameless "fishing" expedition will result in anything like the correct model, but it is revealing of the nature and strength of the relationships found in the full regressions. The results of the exercise are shown in Table LX. In the seasonally-adjusted equation only the variable (V/U), which was used only with ΔER/ER, and the annual wage term lagged a year did not survive somewhere. V/U and V/U_{-1}, used only with S/E and ΔELF/ELF, did not remain in at least one of the minimum-month regressions.

The values of the individual coefficients and sets of coefficients in Tables LIX and LX suggest several interesting things, which appear generally to be sensible. The variable whose effect was most clearly predicted by the development of chapter two was wages. Its contemporary value was supposed to have a positive effect on hirings and, possibly, employment changes and a negative effect on separations. This is the case in the seasonally-adjusted equations, except in the case of P/ER. It is also true in the case of the significant coefficients for the minimum-month regressions. However, several of the contemporaneous values are not significant there. The wage terms, furthermore, were among the ones eliminated in the seasonally-adjusted equation for hirings, separations and the rate of change of employees reported and in the minimum-month equation for placements. In a number of cases, the lagged values of the wage term were of importance relatively commensurate with the current term. In the case of equations using DWR, this effect generally reinforced the current values with the exception being cases where the values were not significant in the full regressions. When DW was used, with the minimum-month equation, the coefficients were negative for both the annual average and its value lagged one year. The value in the previous quarter had a positive coefficient. Its value allows the interpretation that the change in the rate of change in the contemporary quarter exercises an additional effect or that the previous quarter's change does not receive full weight in forming the annual average. The equations using W, except the seasonally-adjusted one for placements, suggest that it is the change of wages in some form which matters, with, possibly, there being an additional effect coming from the deviation of wages from their trend.[6]

Taking the set of estimates relating to wages (or strictly earnings) together, the results suggest, though not strongly, that contemporaneous wage changes do have the expected effect, that lagged values of wage changes, however, may have a reinforcing effect, and that in some cases an "accelerationist" interpretation is possible. The exceptions concern placements, whose validity as a representative measure is open to question, or coefficients which are not significant.

The rate of change of the Consumer Price Index had signs which, in general, were the opposite of those suggested for the change of wages. The main exception was the seasonally-adjusted placements regression, which we noted earlier was

---

[6] The change interpretation arises from noticing that coefficients of opposite signs occur and noting that $\alpha(X_1 - X_2)$ can be written as $\alpha X_1 - \alpha X_2$. The deviation from trend argument arises since trends are included among the independent variables and, as a result, the coefficients for other variables are identical to those that would have been obtained if a least-squares trend had first been subtracted from the variables used. This does not apply to the minimum-month version for H/E shown in Table LX since the trends were eliminated from that equation, but there the change interpretation is quite clearly the right one.

characterized by negative signs on the wage terms. The values of the estimates were such that in most cases the results could be interpreted as indicating that the rate of change in wages in excess of the rate of change (or acceleration) of prices is what is relevant. Whether this is because real wages matter or because the rate of change of prices indicates the expected rate of change of wages is an open question. One feature of the estimates is worth noting in this connection: in two cases in Table LX the price-change variable remains in the equation with a negative coefficient when the wage change variable has been eliminated.

The easiest to interpret of the group of variables taken to represent labor-market tightness was $1/U^2$ or $1/UP^2$. The results contain little of surprise. For hirings and employment changes the estimates suggest that the effect of unemployment is positive. For separations the effect is negative. The surprising feature is that it is the annual average and its value lagged one year which are often of most importance, suggesting that expectations, rather than the prevailing initial conditions in the market are important. In some cases, including the version for minimum-month hirings with insignificant coefficients eliminated, the lagged quarterly value has a coefficient of opposite sign to but smaller magnitude than the annual value. This can be interpreted as the change having an effect or as the most recent quarter being given less weight in forming perceptions of the state of the market than values in earlier times.

The coefficients for the variables which involve vacancies cause a number of problems for interpretation. This is hardly surprising given the clearly proxy-variable nature of these variables and the fact that T_1^c involves 10 coefficients in addition to those for the unemployment rate while T_2^c involves seven. There are some variations in the signs and relative magnitudes of the coefficients of these variables among the various equations and between the seasonally-adjusted and the minimum-month regressions.

A feature of the seasonally-adjusted equations using T_1^c is that the annual version of the variables has the predominant effect, the only exception, and then only a partial one, being for placements. The annual values lagged a year, especially when significant, tend to reinforce this effect. The pattern of the quarterly values is less clear, and can be taken as suggesting that recent change has an opposite effect from the annual average. The pattern of signs for the annual averages is negative for vacancies divided by employment, positive for the ratio of unfilled vacancies to the labor force and negative for the ratio of unfilled vacancies to vacancies available. These signs, together with the ones for the unemployment rate, make it clear that perceived tightness in the market is not a simple thing. They mean that an increase in vacancies available, *ceteris paribus*, or of unfilled vacancies, can have different effects depending on the values of the other variables. Such values of V/E and VU/V occur in the sample that either sign for the derivative with respect to vacancies (V) is possible and the same is true for $\overline{VU/V}$ and $\overline{VU/L}$.

One interpretation for these sorts of results is that VU/V represents labor-market tightness which does tend to decrease hiring. This effect is reinforced by having a fairly broad market, as represented by V/E. On the other hand, a large proportion of unfilled vacancies to the labor-force tends to promote hiring because it indicates that it may not be as easy to obtain suitable jobs as the vacancy rate would suggest or because it represents, indirectly, extra efforts being made by employers who have been having trouble filling vacancies. This is, of course, only one possible interpretation.

Before placing much confidence in such results, however, it should be noted that they are not supported by the minimum-month regressions which used T_1^c. There the quarterly values of V/E tended to be strong and the overall effect, both quarterly and annual, tended to be positive. VU/L was negative on a quarterly basis, positive on an annual basis except for the P/ER regression. VU/V was positive on a quarterly basis and of mixed signs and insignificant on an annual basis. With the different timing and different type of data used in the minimum-month regressions, it is quite possible that there is nothing really at variance between these results and those using the seasonally-adjusted data. What is clear, however, is that the results are not suggesting the same things. The minimum-month data suggest that the current and recent state of the vacancy aspects of the labor market matter strongly, that tightness in the sense of there being many vacancies available promotes change while, at least on an immediate basis but not on an annual one, a high rate of unfilled vacancies to labor force impedes hirings.

Very little in the way of concrete conclusions emerged when the alternative forms T_2^c or T_2^L were used. In two cases, S/E seasonally-adjusted and $\Delta ELF/ELF$ minimum month, the coefficient for both types of vacancy variable are wholly insignificant. In the other cases, only V/U has significance and has negative coefficients when significant.

The productivity variable, Z, also showed rather mixed patterns, allowing for no clear or strong generalizations. The main feature of the lagged hirings or placements variable is the large magnitude of its coefficients.

Needless to say, the lag scheme used has been arbitrary. Instead of the various averages, Almon distributed lags were tried using a third-degree polynomial distributed over the preceding eight quarters when L(X) was used and over these quarters and the current one when C(X) was employed. The polynomial was constrained to be zero at t-9. The specifications used were those producing the highest posterior probabilities in Table LVII; that is, those reported in Table LIX. However, four specifications were tried for the wage terms. These were:

1) a nine-quarter (including the current one) Almon distributed lag of DW;

2) a nine-quarter (including the current one) Almon distributed lag of W;

3) DWR and DWR_{-1};

4) a five-quarter distributed lag (including the current one) of DWR.

The results are summarized in Table LXI where the natural logarithm of the odds in favor of the Almon specification over the specification in Table LIX are listed. In four of the seasonally-adjusted versions and in three of the minimum-month ones at least one of the Almon specifications had a higher posterior probability. The wage-specification producing the most probable version varied among the equations. W was best three times with the seasonally-adjusted equation and twice with the minimum-month forms, DWR without an Almon lag was best twice with the seasonally-adjusted data, and with an Almon lag was best once with the minimum-month figures. DW accounted for the remaining four equations. These findings hardly constitute an overwhelming case for or against one form of distributed lag model over the other.

The results of the "Almon" equations with the highest posterior probabilities are summarized in Table LXII. (The full equations, with up to 61 coefficients, did not seem worth reporting in detail.) There we present the sum of the coefficients associated with the variables, the F-values for the hypothesis that the coefficients are zero and an indication of the pattern of signs in the distributed lag. Two signs are presented when the lag does not include the current period, the first indicating the signs of the coefficients for the more recent period and the second the signs of coefficients for earlier parts of the distributed lag. A sign in parentheses indicates that an individual coefficient, usually insignificant, was of different sign. Three signs are presented when the contemporaneous value of a variable was included in the distributed lag, the first being the sign of that coefficient and the next two corresponding to the ones presented for other variables.

In terms of the sums of the coefficients, wages or their changes had a positive effect in all hirings, placements, and employment-change equations, except for ΔELF/ELF minimum month where they were not significant. Wages did have a negative effect on separations. This pattern of signs of effects was also true for the contemporaneous values of the wage variables except in the case of P/ER and ΔELF/ELF seasonally adjusted. No pronounced patterns for the lags were apparent, as can be seen from Table LXII. In some cases a switch in sign occurred, in others it did not. The rate of change of prices showed mixed lag patterns which were not clearly related to the patterns on wages.

The labor-market "tightness" variables again were remarkable for the variety of forms entering the equations significantly and the variety of ways in which these variables expressed their influences. For the seasonally-adjusted equations, two major differences from the earlier results were apparent. First, in the case of hirings, the predominant signs of the three vacancy variables were reversed. Second, in the case of separations, $1/U^2$ had negative signs, but VU/V had positive and significant ones. With the exception of a few minor variations in signs among insignificant coefficients, the results for these variables in the minimum-month equations were the same as those found when the "average" method of introducing lags was adopted. The same generalization is true in the case of the productivity variable Z. As in the earlier specification, H/E_{-1} or P/ER_{-1} showed surprising strength.

One of the features of the regressions we have been examining, using either the average or the Almon lag specification, is the presence of fairly pronounced negative auto-correlation of the residuals according to some of the Durbin-Watson statistics. This feature is particularly disturbing since some of the equations contain in $(H/E)_{-1}$ or $(P/ER)_{-1}$ the lagged dependent variable or a quantity which is related closely to that variable. Allowance for this feature may be made by estimating maximum likelihood equations allowing for first-order auto-correlation of residuals, via the Hildreth-Lu procedure.[7] The results of applying it to the equations of Tables LIX and LXII are shown in Tables LXIII and LXIV. The effects of this change on the qualitative nature of the results are minor, and are usually confined to insignificant coefficients. The only differences worth mentioning in the "average" specifications are:

a) For H/E seasonally adjusted the quarterly values of VU/L and VU/V became more important while the annual values lost importance; and

b) for P/ER seasonally adjusted the annual average of wages switched from being significantly negative to significantly positive.

In the Almon specification, the important changes were:

a) For H/E both seasonally adjusted and minimum month, the pattern of signs for V/E changed somewhat and this changed the sign of the (insignificant) sum in the case of the minimum month;

b) $1/U^2$ changed from having a negative effect on S/E seasonally adjusted to having a

---

[7] The standard errors used do not allow for the fact that the auto-correlation coefficient had to be estimated as standard errors for this estimate available.

positive effect; and

c) the current value of DW switched from having an insignificant negative coefficient to having an insignificant positive one for S/E minimum month.

Taken all together, then, these results indicate that the conclusions suggested by the original equations are not the result of failure to take auto-correlation of the residuals into account.

The results of the quarterly models thus suggest that the basic formulation goes a long way towards accounting for the various dependent variables. The results, however, are not without their peculiarities. The extent to which these can be resolved by using a shorter period over which successive observations are recorded is examined in the next section using monthly models.

Monthly Models

The specifications used in the monthly models were basically the same as those for the quarterly models. The main change was to use monthly values, current and lagged, in the average specification and a fourth-degree polynomial lag distributed over the previous 24 months when the Almon specification was adopted. Thus letting X_t be the monthly value, the forms included in the average monthly specification for $C_M(X)$ were

$$X_t,\ X_{t-1},\ X^Q = \sum_{k=1}^{3} X_{t-k}/3,\ X^A = \sum_{k=1}^{12} X_{t-k}/12 \quad \text{and} \quad X^A_{-12}\ .$$

$L_M(X)$ differed only by dropping X_t. Coefficients were estimated for each of these separate forms. The specifications were otherwise the same as those used in the quarterly models with (M.1), indicating the monthly equivalent of the specification using T_1 and (M.2) indicating the monthly equivalent of the specification using T_2. (AM.1) and (AM.2) indicate the equivalent Almon distributed-lag formulation. The same six specification variants were used as in the quarterly models. DWR and DPR now involve the ratio of the rate of change of Average Weekly Wages and Salaries to their average rate of change in the past 24 months. The seasonally-adjusted values of the variable were used in the seasonally-adjusted equations. DWR without an Almon lag was used in specification variants 4 and 6 when Almon lags were being employed. When monthly observations on RDP were not available, linear interpolations of the quarterly values were employed.

The results of fitting these equations are summarized in Table LXV in terms of the posterior probabilities for the various possibilities considered. Specification (M.1) was best in five instances: H/E and the minimum-month versions of P/ER, (H-S)/E and ΔER/ER. (M.2) was also the best for five: S/E, ΔELF/ELF and the seasonally-adjusted version of ΔER/ER. (AM.1) was the best in the remaining two; namely, P/ER and (H-S)/E seasonally-adjusted. As in the case of the quarterly models, then, the data do not point to the superiority of any one form.

The position with respect to the appropriate unemployment rate was also unclear. $1/U^2$ was superior for three of the six seasonally-adjusted variables and for four of the minimum-month ones. DWR was superior in all the minimum-month cases and in four of the seasonally-adjusted ones. The exceptions involved cases where the Almon specification was superior. This result, however, may be the effect of the low importance being given to wages in the models, since the forms used involve only two DWR variables instead of the five used with the other specifications.

There was again some evidence of auto-correlation of the residuals which was taken into account in the later investigations of the models. These concentrated on the average forms and the Almon forms with the highest posterior probabilities. An exception was made for the minimum-month form for H/E where specification variant 3 was pursued. This was done because this form had a lower standard error than did specification variant 4, with which it was almost tied in terms of posterior probabilities, and when allowance was made for serial correlation of the residuals this edge improved and the posterior probability would favor variant 3.

A summary of the significance of the groups of coefficients for each type of variable is given by Table LXVI where values of the F-statistic are presented. The full, estimated equations are presented in Table LXVII. The values of F were not calculated for ΔELF/ELF where the equation as a whole was not significant. The $\bar{R}^2$ for the seasonally-adjusted versions of

ΔER/ER was also rather low. With these exceptions, the goodness of fit is remarkably high.

Each type of variable was significant in some equation. It is notable, however, that the wage variable was not significant in any of the seasonally-adjusted equations and that the price variables were significant only in the equations for separations. By contrast, there are several equations where each of the types of variable using vacancies is significant. Not surprisingly, this does not carry over to all the coefficients, as shown in Table LXVII, but even so the number which are significant is often high and the number of variables which "drop out" of the study entirely by omitting insignificant coefficients is fairly small. The results of this exercise appear in Table LXVIII.

The main features of these coefficients may be summarized:

(1) In the seasonally-adjusted equations wages were insignificant and "dropped out" of the equations. For minimum-month forms they were highly significant, except in the ΔELF/ELF equation. The contemporaneous value had the predicted sign and this was reinforced by the lagged term in the equations using DWR. When W was used in the equation for H/E, the overall effect was positive, although the current value had a small coefficient and the coefficient for the immediately lagged month was negative. This could well be interpreted as indicating that the most recent month is given no special role since that month's value is also included in W^Q and W^A.

(2) When significant, the unemployment rate variable tends to have the signs found in the quarterly models overall. Thus it is apt to have negative coefficients for hirings or employment change and positive ones for separations. The major exceptions before the elimination of variables is the minimum-month form of ΔER/ER where the two

annual values have positive coefficients. This does not remain the predominant effect with the elimination of coefficients, but now (H-S)/E and S/E show mixed signs with the "opposite" one being larger. This is not surprising in view of the point estimates of Table LXVII.

(3) The coefficients for the vacancy variables continued to present a baffling array of signs and magnitudes, though possibly less so than was the case in the quarterly results. The minimum-month figures are less clearly in disagreement with the seasonally-adjusted ones, and are generally in line with the sort of patterns suggested by the quarterly, seasonally-adjusted results. The annual values in many cases played the strongest role, though it was sometimes overshadowed by the monthly values or the monthly and quarterly ones. In most cases, the signs were different for the most recent and the annual values. The major exception, which tended to carry over to the equation with insignificant coefficients eliminated, occurred with H/E minimum month. In that equation, the predominant effects again were different from those for the seasonally-adjusted equations. By and large, then, the coefficients do suggest that labor market tightness matters, that it is a complicated business, that long perception lags may be involved and that the immediate state may have a different effect from the past average one either because change has a different effect from the annual level, or because the most recent experience is weighted lightly in forming perceptions of the market.

(4) This impression is reinforced by the productivity variable, Z, which may also be regarded as a demand-for-labor variable.

(5) Finally, it is worth noting that $(H/E)_{-1}$ or $(P/ER)_{-1}$ played a much smaller role in the monthly models. It is also the case that auto-correlation of the residuals was a much less serious problem and, indeed, in many instances the auto-correlation coefficient was not significantly different from zero.

The results of using the Almon specification for the lags is summarized in Table LXIX. Perhaps the most interesting of the findings is the significance of wages in the seasonally-adjusted equations. This is balanced, however, by the fact that overall S/E and (H-S)/E show the "wrong signs" for the wage variable and this is true of the contemporaneous value in the S/E equation. The lag patterns show a rather rich mixture of signs and effects and again all types of variable are significant somewhere in the model.

It is then clear from the results of this section that monthly models are possible and revealing, that by the usual practices of statistical inference simple models are ruled out, at least within the specifications considered, and that the workings of the labor market appear to be highly complicated.

Instrumental-Variable Models

There is, of course, no doubt that the variables used are neither accurately measured nor do the concepts on which they are based correspond to those which are probably appropriate theoretically. Part of the reason for the complicated and, at times, puzzling results which we have obtaining may simply be weaknesses in the data being used.

It is well known that if the accuracy of the data are at the root of the problem there is little that can be done about it. One possibility is to use instrumental variables, though the conditions which are required for its implementation are stringent and may well not be met in our data.

The extent to which various variables that might, broadly speaking, be taken to represent similar relevant conditions all entered the regressions significantly and with opposite signs might be taken to indicate that this problem is a serious one for the interpretation and meaning of coefficients, even though the generally very high values of $\bar{R}^2$ suggest that these problems do not prevent one's obtaining highly interesting results. They suggest that, indeed, the models are somehow capturing very important aspects of the operation of labor markets even if their interpretation is not clear. It therefore seemed worthwhile to attempt the use of instrumental variables, using some of those investigated as instruments for others. In addition, since the wage variable used, Average Weekly Wages and Salaries, clearly is not the relevant one, Average Hourly Earnings in Mining, Manufacturing, and Construction was used as an instrument for them. This variable suffers from the same sorts of inadequacies as Average Weekly Wages and Salaries, unfortunately.

The specification was simplified to include only one "demand for labor" variable, namely V/E or V/ER, the instrument being used for it being Z^1 or Z^2, and one "tightness" variable, $1/U^2$ or $1/UP^2$, with VU/V being taken to be the instrument. The CPI and the lagged hirings and placements variables served as their own instruments. Using the current (V/E) form, Z as used up to now does not provide enough instruments. As a result, Z_{-1} was used as the instrument for V/E and Z_{-2} was the instrument for V/E_{-1}.

For the purposes of comparison, ordinary regressions were also run for this specification. In addition, regressions were run using all the variables and all the instruments. These are termed, respectively, the "comparable regression" and the "full regression".

Six variants were explored. These involved the use of $1/U^2$ and $1/UP^2$ with DW and RW using the "average" specification for distributed lags and these two unemployment variables with Almon lags, including a lag on DW.

The results for the quarterly models are summarized in Table LXX in terms of the estimates of the standard deviations of the structural residuals. For comparison purposes, division was made in calculating the Instrumental Variable estimates of the variance of the residuals in the equations by the same "degrees of freedom" factor as used in the regression model. One problem that can arise is that the estimate is negative. This is indicated in Table LXX by a dash, and the resulting models were not pursued since programs to force a sensible constraint were not available.

The results shown in Table LXX indicate that in terms of the estimated standard errors the results are very strong, especially for the seasonally-adjusted versions of the models. In other respects, however, the models are not as satisfactory. This can be seen from Table LXXI where the estimates corresponding to the lowest positive standard error in the "average" specifications are presented.

The problem can be seen by comparing the values of $\bar{R}^2$ with the R^2's calculated from the residuals. $\bar{R}^2$ is defined here as unity minus the estimated variance of the disturbances, adjusted "for degrees of freedom", divided by the variance of the dependent variable. R^2 from the residuals is defined by taking the variance of the difference between the dependent variable Y_t and the variable

$$\sum_{k=1}^{K} X_{tk} \hat{\beta}_k$$

where X_{tk} are the values of the independent variables and $\hat{\beta}_k$ are the corresponding instrumental-variable estimates of the coefficients. This residual conceptually includes the errors of measurement which induces the use of instrumental variables. The frequency with which these are negative indicates a rather unsatisfactory model.

It is, of course, possible for the value of R^2 to be negative when defined in this way even though the model is correct and the instrumental variables regression has produced a satisfactory fit, though it is unlikely in that case that very strong results would be obtained by regression. It is worth, therefore, examining the results even though the models do have some unsatisfactory aspects.

The models as estimated can hardly be considered to be entirely satisfactory, and this is particularly true when an attempt is made to eliminate "insignificant" variables. Given the dubious aspects of this procedure, especially in the context of the use of instrumental-variable regression whose finite-sample properties in the best of circumstances are unknown, the results of this "fishing" expectation may largely be discounted and are not presented. They are characterized by elimination of several coefficients that appear to be highly significant in Table LXXI and changes of sign of other significant coefficients.

Features which stand out in Table LXXI are:

(a) the almost complete lack of precision or statistical significance in the case of S/E;

(b) the differences in the patterns of signs among different regressions, particularly for hirings and placements seasonally-adjusted;

(c) the very prevalent tendency for the point estimates, and the significant ones, to show reversals of sign within the labor-market variables V/ER and $1/U^2$ which suggest that change is important. In a great many instances, if V/ER and $1/U^2$ are considered complementary labor-market tightness variables, it appears that they pull in opposite directions;

(d) when significant, the wage-variables have the expected sign, except for placements seasonally adjusted. There are several other instances, however, where the point estimates are at variance with the expected results.

The results of the Almon lag models were, if anything, even less satisfactory. None of the sums of coefficients is significant. The values of $\bar{R}^2$ again were high but the sums of squares of residuals as defined above were usually negative. Since the results are not revealing, we do not present them in more detail.

Monthly versions of the instrumental-variables regressions are summarized in Tables LXXII and LXXIII. Again the performances in terms of the standard errors of the equations appear strong. For these equations, furthermore, negative estimates did occur. However, the more successful models were again characterized by negative values of the $\bar{R}^2$ calculated from the residuals, the only exception being the minimum month version for hirings.

The results of estimation in the average specification, shown in Table LXXIII, may be compared with those for the quarterly specification:

(a) the equations for separations now do yield highly significant coefficients;

(b) differences between the hirings and the placements series remain, but are not as pronounced a feature of the results;

(c) reversals of sign within the V/E and $1/U^2$ groups remain an important feature;

(d) the wage variables in three instances pull in the wrong direction, with significant coefficients. The instances are H/E seasonally adjusted and the two equations for ER/ER; and

(e) the lagged H/E or P/ER terms have significant coefficients of implausibly large magnitude.

An odd feature of these results is that the ΔELF/ELF equation is totally without significance seasonally adjusted. Every coefficient is significant in the minimum-month version.

The Almon specifications used with monthly data also gave little encouragement. Wages, particularly, continued to display "wrong" patterns. The lag-patterns were complicated and varied among equations.

It is perhaps hardly surprising that the use of instrumental variables in this fashion did not produce satisfactory results in this application. Overall, these equations did little to improve the situation over that found from the regression equations. The results did not yield a clear, consistent, and simple view of the operation of the labor markets. It, therefore, did not seem worthwhile to pursue this approach further.

Summary and Conclusions

This chapter has been concerned with investigating models based on the theoretical considerations developed earlier for the industrial-composite aggregates. It has largely been concerned with questions of specification. The specifications investigated were necessarily somewhat arbitrary and this problem is compounded by the rather dubious nature of some of the data available. These considerations may have colored the nature of the final results, but it is certainly possible, and there is no evidence at all to dispute this, that the models are revealing very genuine features of labor-markets.

The major hope in conducting specification investigations is that clear-cut and simple patterns will emerge and that of various possibilities considered, some will emerge as clearly the relevant ones. It cannot be said that this occurred. In particular, every form of variable investigated appeared to be highly significant in some model. In addition, most particular instances appeared important somewhere. Thus simple models, in terms of the number of parameters, did not seem to be possible.

A strong and important corollary to this finding should also be stressed. The results clearly indicate that the workings of the labor markets are related to the sorts of variables investigated. The values of $\bar{R}^2$ achieved are little short of amazing, particularly for monthly models. Also, while there are some major exceptions, the models give apparently sensible results on the way in which labor markets work.

The success of the monthly models was characterized by coefficients for some monthly values of the variables being significant and distinct from quarterly ones. This reinforces the desirability of using monthly variables and, except for wage changes, monthly models are used in the rest of this study.

In terms of discriminating among alternative possibilities the investigations were less successful. In some instances, the overall unemployment rate appeared to be the relevant one, in others the rate for males 25-44 gave superior results. Wages appeared sometimes in the form of their levels, sometimes as rates of change and sometimes in the form of the rates of change divided by past average rates of change. The estimates could, however, usually be interpreted as indicating that some form of rate of change variable was appropriate. The two different ways of treating vacancies each showed strength in some instances, and in some cases the one form and in others the other form was indicated as being the appropriate one. Finally, no clear-cut superiority of either the Almon or the "average" specification of distributed lags emerged.

To some extent, one might think that the results indicate that still more complicated results are needed, combining the various variables which we have treated as alternatives, should be considered. Unfortunately, collinearity problems become very severe when this is attempted and any attempt to then extend the models to industrial divisions would have been rendered impossible. The limitations involve degrees of freedom, if the quarterly models were considered, and limitations of the computational facilities where monthly models are under examination.

The effects of the various variables have already been summarized in earlier sections. It is worth noting that the models did not always or clearly support the expected results with respect to wages, though this may partly be the result of data problems. They suggest that the "labor market tightness" variables work in complicated ways. One possible reason for this is aggregation problems and the next chapter is concerned with investigating the insights to be gained from working at the industrial-division level of aggregation.

Some of the weakest results were obtained for the rate of change of employment variables, particularly those for employment as recorded in the Labour Force Survey. This may partly be the result of the fact that these figures are for the whole economy, not the industrial composite. As a result, their comparability with the other variables is less. At the same time, the labor-force constraint on possible employment is presumably most binding on these figures and the form may be seriously deficient. The comparability problem is to some extent investigated in the next chapter. The use of a different form in chapter eight to some extent considers the other issue.

TABLE LVI

VARIABLES USED IN QUARTERLY INVESTIGATIONS

a)	DP	-	the quarterly rate of change of the Consumer Price Index.
b)	DPR	-	$DP_t / \sum_{j=1}^{8} DP_{t-j}$
c)	DW	-	the quarterly rate of change of average weekly wages and salaries
d)	DWR	-	$DW_t / \sum_{j=1}^{8} DW_{t-j}$ - the rate of change of average weekly wages and salaries divided by the average of this variable in the past two years
e)	DWS	-	the average (annual) rate of change of base rates in settlements made in the quarter
f)	DWSR	-	$DWS_t / \sum_{j=1}^{8} DWS_{t-j}$
g)	H/E	-	the ratio of hirings to average employment in the previous quarter
h)	H/U	-	the ratio of hirings to unemployment
i)	H/V	-	the ratio of hirings to vacancies available
j)	K	-	a constant
k)	P/ER	-	the ratio of placements to employees reported in the previous quarter
l)	P/U	-	the ratio of placements to unemployment
m)	P/V	-	the ratio of placements to vacancies available
n)	S/E	-	The ratio of separations to average employment in the previous quarter

TABLE LVI (Continued)

o)	t and t^2	-	a trend and its square, valued zero in the last quarter of 1970 and increasing by 0.25 per quarter
p)	$1/U^2$	-	the square of the reciprocal of the unemployment rate
q)	$1/UP^2$	-	the square of the reciprocal of the unemployment rate for males 25-44
r)	V/E	-	the ratio of vacancies available to average employment in the previous quarter
s)	V/ER	-	the ratio of vacancies available to employees reported in the previous quarter
t)	V/U	-	the ratio of vacancies available to unemployment
u)	VU/L	-	the ratio of vacancies unfilled (at the end of each month) to the labor force
v)	VU/V	-	the ratio of unfilled vacancies to vacancies available
w)	W	-	average weekly wages and salaries
x)	Z^1	-	the ratio of real domestic product to average employment with employment expressed in hundreds of thousands and real domestic product in index form
y)	Z^2	-	the same as Z^1 but with employees reported replacing average employment
z)	$\Delta ER/ER$	-	the change in employees reported in the industrial composite divided by employees reported in the previous quarter

TABLE LVI (Continued)

A) $\Delta ELF/ELF$- the change in total employment recorded in the Labour Force Survey divided by employment in the previous quarter. The minimum-month figures are calculated from aggregation of the age-sex breakdown

TABLE LVII

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE POSTERIOR

PROBABILITIES FOR VARIOUS SPECIFICATIONS

A. Hirings

	Seasonally Adjusted				Minimum Month			
	(H.1)		(H.2)		(H.1)		(H.2)	
	T_1^c	T_2^c	T_1^c	T_2^c	T_1^c	T_2^c	T_1^c	T_2^c
Total	0.50	0.39	0.09	0.02	0.64	0.00	0.12	0.24
H/E Total	0.50	0.39	0.09	0.02	0.64	0.00	0.12	0.24
H/U Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Specification								
Variant 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Variant 2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.21
Variant 3	0.00	0.00	0.00	0.00	0.54	0.00	0.08	0.00
Variant 4	0.03	0.30	0.02	0.01	0.00	0.00	0.00	0.00
Variant 5	0.00	0.01	0.01	0.00	0.09	0.00	0.03	0.00
Variant 6	0.46*	0.08	0.06	0.01	0.01	0.00	0.00	0.00
Data Variant 1	0.20	0.16	0.03	0.01	-	-	-	-
Data Variant 2	0.29	0.23	0.06	0.01	-	-	-	-

B. Placements

	Seasonally Adjusted				Minimum Month			
	(H.1)		(H.2)		(H.1)		(H.2)	
	T^c_1	T^c_2	T^c_1	T^c_2	T^c_1	T^c_2	T^c_1	T^c_2
Total	0.62	0.00	0.38	0.00	0.00	0.00	1.00	0.00
P/ER Total	0.62	0.00	0.38	0.00	0.00	0.00	1.00	0.00
P/U Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Specification								
Variant 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Variant 2	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Variant 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Variant 4	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.00
Variant 5	0.57	0.00	0.37	0.00	0.00	0.00	0.00	0.00
Variant 6	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00
Data Variant 1	0.61	0.00	0.37	0.00	-	-	-	-
Data Variant 2	0.01	0.00	0.01	0.00	-	-	-	-

TABLE LVII (Continued)

C. Separations

	Seasonally Adjusted		Minimum Month	
	T^c_1	T^c_2	T^c_1	T^c_2
Total	0.05	0.95	0.01	0.99
Specification				
Variant 1	0.00	0.00	0.00	0.01
Variant 2	0.00	0.00	0.01	0.98
Variant 3	0.00	0.00	0.00	0.00
Variant 4	0.01	0.75	0.00	0.00
Variant 5	0.00	0.00	0.00	0.00
Variant 6	0.04	0.20	0.00	0.00
Data Variant 1	0.02	0.59	-	-
Data Variant 2	0.03	0.37	-	-

D. (H-S)E

	Seasonally Adjusted		Minimum Month	
	T^c_1	T^c_2	T^c_1	T^c_2
Total	1.00	0.00	1.00	0.00
Specification				
Variant 1	0.00	0.00	0.00	0.00
Variant 2	0.00	0.00	0.00	0.00
Variant 3	0.00	0.00	0.00	0.00
Variant 4	1.00	0.00	0.18	0.00
Variant 5	0.00	0.00	0.00	0.00
Variant 6	0.00	0.00	0.82	0.00
Data Variant 1	0.00	0.00	-	-
Data Variant 2	1.00	0.00	-	-

E. $\Delta ER/ER$

	Seasonally Adjusted		Minimum Month	
	T_1^c	T_2^c	T_1^c	T_2^c
Total	0.14	0.86	1.00	0.00
Specification				
Variant 1	0.00	0.00	0.00	0.00
Variant 2	0.00	0.00	0.00	0.00
Variant 3	0.00	0.00	0.00	0.00
Variant 4	0.01	0.41	0.12	0.00
Variant 5	0.00	0.00	0.00	0.00
Variant 6	0.13	0.45	0.88	0.00
Data Variant 1	0.01	0.49	-	-
Data Variant 2	0.13	0.37	-	-

F. $\Delta ELF/ELF$

	Seasonally Adjusted		Minimum Month	
	T_1^c	T_2^c	T_1^c	T_2^c
Total	0.56	0.44	0.00	1.00
Specification				
Variant 1	0.00	0.00	0.00	0.00
Variant 2	0.07	0.00	0.00	0.00
Variant 3	0.00	0.00	0.00	0.32
Variant 4	0.00	0.25	0.00	0.19
Variant 5	0.49	0.00	0.00	0.21
Variant 6	0.00	0.19	0.00	0.28
Data Variant 1	0.46	0.41	-	-
Data Variant 2	0.10	0.03	-	-

TABLE LVIII

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE

VALUES OF F FOR VARIOUS VARIABLE GROUPS IN "BEST" EQUATIONS

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	2.90	7.95***	1.96	7.77***	0.48	1.23
Z^1 or Z^2	-	-	1.13	0.82	1.09	1.86
V/E or V/U	6.68***	46.86***	1.20	8.75***	2.11	1.60
VU/L	8.39***	11.08***	-	10.76***	-	1.37
VU/V	6.36***	5.30***	1.05	7.03***	0.66	2.19
$1/U^2$ or $1/UP^2$	11.03***	6.11***	1.46	10.32***	0.28	1.95
DW, W, or DWR	3.53**	5.14***	1.65	2.05	1.67	1.48
DP or DPR	12.87***	8.79***	0.23	11.72***	0.09	5.46***
H/E_{-1} or P/ER_{-1}	-	-	0.22	9.87***	0.80	3.83*

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	2.55	4.45**	6.96**	3.71**	0.07	0.48
Z	-	5.82**	2.81*	8.45***	3.46**	0.24
V/E or V/U	9.32***	32.35***	2.92*	5.39***	5.11***	0.76
VU/L	11.84**	14.94**	-	6.94***	23.69***	-
VU/V	0.80	3.65**	0.34	2.07	1.87	0.00
1/U or $1/UP^2$	2.85*	1.07	8.70***	0.55	6.34***	0.87
DW,W, or SWR	11.27***	1.46	28.19***	4.28**	3.29**	2.82*
DP or DPR	5.13***	18.97***	2.09	20.82***	5.39**	1.11
H/E_{-1} or P/ER_{-1}	-	0.29	39.57***	9.96***	1.92	0.01

* Significant at 0.10 level.
** Significant at 0.05 level.
*** Significant at 0.01 level.

TABLE LIX

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE

"BEST" REGRESSIONS -- ESTIMATES OF COEFFICIENTS

	A. Seasonally Adjusted					
Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.150***	-0.025	-0.355	0.115	-0.393	1.574*
t	0.474^{f}	-0.187^{f}	-0.017	0.007	-0.007	0.039
t^2	0.026^{f}	-0.992^{f}	-0.047**^{f}	0.085***^{f}	0.004^{f}	0.065^{f}
Z_{-1}	-	-	-1.647	-0.043	6.494	3.424
$\overline{Z}$	-	-	6.983	6.595	-3.587	-10.732
$\overline{Z}_{-4}$	-	-	4.028	0.310	4.408	-12.810**
V/E or V/U	0.342***	0.426***	-	0.957***	-1.635**	-0.396
V/E_{-1} or V/U_{-1}	-0.084	0.503***	0.024	1.157	-1.108	1.311
$\overline{V/E}$ or $\overline{V/U}$	-1.926***	-0.902***	-0.094	-6.613***	1.730	-6.216***
$\overline{V/E}_{-4}$ or $\overline{V/U}_{-4}$	0.042	-0.825***	-0.032	-1.749**	1.337	-0.085
VU/L_{-1}	4.384	-2.860***	-	-10.775**	-	11.323
$\overline{VU/L}$	16.719**	7.449***	-	67.709***	-	36.188
$\overline{VU/L}_{-4}$	-1.340	8.103***	-	25.338***	-	16.940
VU/V_{-1}	-0.046	0.041**	0.027	0.148	0.170	-0.207
$\overline{VU/V}$	-0.295**	-0.118***	-0.006	-1.162***	-0.019	-0.946**
VU/V_{-4}	-0.038	-0.133***	-0.023	-0.462***	-0.078	-0.374
$1/U^2_{-1}$	-0.035^{a}	-0.009^{a}	-0.025	-0.017	0.036	-0.066^{a}
$\overline{1/U^2}$	-0.216**	-0.068***	0.598*	-1.224***	-0.201	-0.121
$\overline{1/U^2}_{-4}$	0.090	-0.085***	0.261	-0.728	-0.019	-0.627**

TABLE LIX (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DW	0.031[c]	-0.090***[ef]	-0.125[c]	0.067[c]	0.541[c]	0.586*[ef]
DW_{-1}	0.030	-0.043	-0.053	-0.009	0.675	0.510
$\overline{DW}$	-	-0.118***	-	-	-	-0.286
$\overline{DW}_{-4}$	-	0.096	-	-	-	-1.068
DP_{-1}	-0.145***	-0.045*	0.024[c]	-0.205***[c]	-0.083[c]	-0.385
$\overline{DP}$	-	0.073	-	-	-	0.355
$\overline{DP}_{-4}$	-	-0.314***	-	-	-	-2.801***
H/E_{-1} or P/ER_{-1}	-	-	0.221	-0.931***	1.355	-3.355*
$\bar{R}^2$	0.976	0.980	0.955	0.895	0.506	0.411
D.W.	2.85	2.10	2.64	2.66	2.20	2.54

[a] $1/UP^2$ used.

[c] DWR or DPR used.

[e] W used.

[f] Multiplied by 100.

*Significant at 0.10 level.
**Significant at 0.05 level.
***Significant at 0.01 level.

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.131	0.104***	-0.288	0.633**	-0.839*	0.517
t	0.017	0.116***[a]	-0.020***	0.019**	0.003	0.018
t^2	0.046**[a]	0.003[a]	-0.075***[a]	0.001[a]	0.010[a]	0.046[a]
Z_{-1}	-	0.004	-1.311*	3.801***	-7.256***	1.403
$\overline{Z}$	-	-1.050***	4.040	-14.203***	8.703	0.379
$\overline{Z}_{-4}$	-	0.085**	2.780	-8.837**	-0.741	-0.059
V/E or V/U	0.718***	0.310***	-	0.272*	1.924***	4.364
V/E_{-1} or V/U_{-1}	0.275***	0.091	0.000	0.330	0.364	1.575
$\overline{V/E}$ or $\overline{V/U}$	0.341	-0.127*	-0.101	1.411**	3.636**	-21.258
$\overline{V/E}_{-4}$ or $\overline{V/U}_{-4}$	0.133	0.070	-0.095**	-0.295	-2.080**	-2.333
VU/L_{-1}	-0.479***	-5.877***	-	-0.338***	-2.180***	-
$\overline{VU/L}$	0.431	1.530	-	0.534***	1.221**	-
$\overline{VU/L}_{-4}$	0.620**	-10.832	-	0.319*	2.652***	-
VU/V_{-1}	0.042	0.008	0.011	0.069*	0.151	0.004
$\overline{VU/V}$	-0.134	-0.013	-0.046	0.013	0.065	-0.014
$\overline{VU/V}_{-4}$	-0.055	0.027***	0.005	-0.043	-0.147	-0.000
$1/U^2_{-1}$	0.032*[c]	0.040	0.016[b]	-0.020[b]	0.336[b]	-0.114
$\overline{1/U^2}$	-1.13*	0.040	1.67**	-0.018	-0.842	-0.967
$\overline{1/U^2}_{-4}$	-1.28**	0.043	0.127**	-0.006	-3.874***	0.127
DW	-0.152[ae]	-0.010[d]	-0.182**	0.278**[d]	-0.435[d]	0.410*[ae]
DW_{-1}	0.328**	0.023	0.156**	0.193	0.407	0.642**
$\overline{DW}$	0.720*	-	-1.079***	-	-	-1.455**
$\overline{DW}_{-4}$	-1.198***	-	-1.074***	-	-	0.038

TABLE LIX (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DP_{-1}	-0.250**	-0.076***	0.230**	-0.412***	-0.729**[d]	-0.429
$\overline{DP}$	0.244	-	-0.216	-	-	0.840
$\overline{DP}_{-4}$	-0.662*	-	0.225	-	-	-0.502
H/E_{-1} or P/ER_{-1}	-	0.067	0.597***	-0.495***	3.691	-0.083
$\bar{R}^2$	0.983	0.983	0.975	0.982	0.959	0.230
D.W.	3.08	1.91	2.61	2.64	2.31	2.05

[a] Coefficient multiplied by 100.

[b] $1/UP^2$ used.

[d] DWR or DPR used.

[e] W used.

*Significant at 0.10 level.
**Significant at 0.05 level.
***Significant at 0.01 level.

TABLE LX

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE

"BEST" REGRESSIONS FOLLOWING ELIMINATION OF INSIGNIFICANT VARIABLES

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.154 ***	-0.022 ***	0.050 ***	0.615 ***	0.719 ***	-0.608 ***
t	0.007 ***	-0.149 ***a	-0.074 ***a	0.015 ***	-	-0.025 ***
t^2	0.038 ***a	-	-	-	-	-0.057 **a
Z_{-1}	-	-	-	2.890 ***	-	4.467 ***
$\overline{Z}$	-	-	-	-12.546 ***	-	-
$\overline{Z}_{-4}$	-	-	-	-7.515 ***	-	-
V/E or V/U	0.373 ***	0.431 ***	-	0.054 ***	-	-
V/E_{-1} or V/U_{-1}	-	0.504 ***	-	-0.027 ***	-1.809 ***	2.055 ***
$\overline{V/E}$ or $\overline{V/U}$	-2.049 ***	-0.692 ***	-	0.168 ***	-1.321*	-1.503 ***
$\overline{V/E}_{-4}$ or $\overline{V/U}_{-4}$	-	-0.456 ***	-	0.023 ***	-4.173 ***	1.028 ***
VU/L_{-1}	1.964 ***	-3.140 ***	-	-	-	-
$\overline{VU/L}$	19.746 ***	5.307 ***	-	-	-	-
$\overline{VU/L}_{-4}$	-0.666 ***	4.814 ***	-	-	-	-
VU/V_{-1}	-	0.051 ***	-	-	-	0.179 ***
$\overline{VU/V}$	-0.354 ***	-0.102 ***	-	0.110 ***	-	-0.233 ***
$\overline{VU/V}_{-4}$	-	-0.073 ***	-	-	-	-

TABLE LX (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
$1/U^2_{-1}$	-	-	0.109 ***	-	-	-
$\overline{1/U^2}$	-0.293 ***bc	-0.055 ***bc	0.062 ***	-1.214 ***	-	-
$\overline{1/U^2}_{-4}$	-	-0.053 ***	-0.039 ***	-	-	-
DW	-	-0.063 ***a	-	0.092 **d	-	0.351 ***ae
DW_{-1}	-	-	-	0.085 **	-	-
$\overline{DW}$	-	0.115 ***a	-	-	-	-
$\overline{DW}_{-4}$	-	-	-	-	-	-
DP_{-1}	-0.124 ***d	-0.053 **	-	-0.229 ***	-	-0.440 *
$\overline{DP}$	-	0.045	-	-	-	-0.479
$\overline{DP}_{-4}$	-	-0.320 ***	-	-	-	-2.117 ***
$\overline{H/E}_{-1}$ or $\overline{P/ER}_{-1}$	-	-	-	-4.480 ***	-	-2.585 **
$\bar{R}^2$	0.973	0.979	0.954	0.891	0.375	0.406
D.W.	2.48	2.23	2.25	2.72	1.36	2.69

[a] Multiplied by 100

[b] $1UP^2$ used

[d] DPR used

[e] W used

*Significant at 0.10 level.
**Significant at 0.05 level.
***Significant at 0.01 level.

Notes refer to coefficient below which they occur.

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	-0.204***	0.085***	0.008	0.953***	-0.511**	0.144***
t	-	0.062[c]***	-0.011***	0.024***	0.010***	0.010***
t^2	-	-	-0.058***c	-	-	0.038***a
Z_{-1}	-	-	-0.756**	4.699***	-9.111***	-
$\overline{Z}$	-	-0.972***	-	-18.228***	-	-
$\overline{Z}_{-4}$	-	0.048**	-	-11.100***	-	-
V/E or V/U	0.929***	0.326***	-	0.203*	1.939***	-
V/E_{-1} or V/U_{-1}	0.181**	0.134***	-	-	1.943***	-
$\overline{V/E}$ or $\overline{V/U}$	-	-	-0.075***	1.636***	2.114*	-
$\overline{V/E}_{-4}$ or $\overline{V/U}_{-4}$	-	-	-0.076***	-	-2.138***	-
VU/L_{-1}	-0.307***	-6.515**	-	-0.370***	-1.879***	-
$\overline{VU/L}$	0.574***	1.098	-	0.467***	1.496***	-
$\overline{VU/L}_{-4}$	0.299***	-7.652***	-	0.154**	2.481***	-
VU/V_{-1}	-	-	-	0.079***	-	-
$\overline{VU/V}$	-	0.004	-	-	-	-
$\overline{VU/V}_{-4}$	-	0.040***	-	-	-	-
$1/U^2_{-1}$	0.034***a	-	-	-	-	-
$\overline{1/U^2}$	-0.140***	-	0.161***	-	0.001 e	-
$\overline{1/U^2}_{-4}$	-0.0637***	-	0.108**	-	-4.672***	-

TABLE LX (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DW	-	-	-0.203 ***	0.352 d***	-	-
DW_{-1}	0.448 b***	-	0.117 **	0.355 ***	0.966 d**	-
$\overline{DW}$	-0.053	-	-0.956 **	-	-	-0.524 ab***
$\overline{DW}_{-4}$	-0.419 ***	-	-1.012 ***	-	-	0.439 ***
DP_{-1}	-0.278 ***	-0.085 ***d	0.190 **	-0.453 ***	-0.652 **	-
$\overline{DP}$	0.451	-	-	-	-	-
$\overline{DP}_{-4}$	-0.617 **	-	-	-	-	-
$\overline{H/E}_{-1}$ or $\overline{P/ER}_{-1}$	-	-	0.599 ***	-0.216 ***	-	-
$\bar{R}^2$	0.983	0.982	0.978	0.983	0.058	0.214
D.W.	2.31	1.73	2.28	2.40	2.02	1.87

[a]Multiplied by 10,000

[b]W used

[c]Multiplied by 100

[d]DPR or DWR used

[e]$1/UP^2$ used

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level

TABLE LXI

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE; LOGARITHMS OF POSTERIOR ODDS IN FAVOR OF ALMON SPECIFICATIONS OVER BEST AVERAGE SPECIFICATIONS

A. Seasonally Adjusted

Specification	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
1	-3.39	7.31	-8.63	-6.14	1.01	-10.04
2	2.15	21.84	-4.52	-6.30	-1.24	-9.14
3	-4.09	8.77	-6.15	-4.26	0.00	-5.26
4	-1.96	6.88	-6.84	-7.21	0.44	-8.31

TABLE LXI (Continued)

B. Minimum Month

Specification	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
1	4.46	-10.84	-3.59	1.44	-11.64	3.52
2	-7.90	-4.03	-20.69	-0.35	-7.73	3.02
3	-27.65	-4.42	-11.26	-6.17	-10.37	2.68
4	-21.27	-9.98	-8.14	-3.04	-9.08	4.83

TABLE LXII

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE

SUMMARY OF BEST ALMON SPECIFICATIONS

A. Seasonally Adjusted

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	F	3.70**	26.53***	1.76	4.90**	0.69	0.37
Z	Sum	-	-	6.34	-16.38	-0.003	0.585
	F	-	-	0.16	2.40	1.36	0.20
	Pattern	-	-	+ -	- +	(+) - +	- +
V/E or V/U	Sum	3.193	-0.898***	0.136	-4.12	45.037	-5.187
	F	6.47***	128.85***	0.65	3.51**	2.50	0.70
	Pattern	- + -	+ + -	+ +	+ - -	- + -	+ - -
VU/L	Sum	-9.541	14.343***	-	77.04**	-	0.056
	F	3.67**	28.24***	-	1.92	-	0.72
	Pattern	+ -	- +	-	÷ +	-	+ +
VU/V	Sum	0.386	-0.244***	0.165**	-1.025*	0.186	-1.015
	F	1.79	21.07***	1.92	2.24	1.13	0.77
	Pattern	- +	- -	+ +	- -	+ (-) +	- -
$1/U^2$	Sum	-0.647*	-0.175***	-1.160	-2.617***	-0.517*	-0.745[c]
	F	10.64***	22.87***	2.50*	8.17***	1.18	0.90
	Pattern	- -	- -	- -	- -	+ -	- -

TABLE LXII (Continued)

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DW	Sum	0.852***[a]	0.113***[a]	-0.469**[a]	0.069[d]	0.397*	0.431[d]
	F	2.53*	17.38***	1.15	0.50	4.30	1.30
	Pattern	+ + +	- + +	- - -	+ +	+ + -	- +
DP	Sum	1.746***	-0.278***	-0.854	0.428	3.477	28.900*
	F	4.92	17.36***	1.47	2.00	2.29	1.85
	Pattern	- +	+ -	- +	+ -	+ -	+ -
H/E_{-1} or P/ER_{-1}	Coefficient	-	-	0.334*	-0.814***	1.428	-0.674
$\bar{R}^2$		0.972	0.990	0.951	0.870	0.562	0.267
D.W.		2.94	2.79	2.93	2.97	2.48	2.53

[a] W used. [b] DWR almon used. [c] $1/UP^2$ used. [d] DWR non-almon used.

e Multiplied by 100.

* Significant at 0.10 level. ** Significant at 0.05 level. *** Significant at 0.01 level

B. Minimum Month

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	F	3.97**	1.90	7.31**	7.96***	0.60	0.36
Z	Sum	-	-0.966	24.03***	-32.935*	0.044	-0.004
	F	-	4.87***	3.28*	5.17**	1.88	0.29
	Pattern	-	+ -	+ +	- -	+ - (+)	(+) - +
V/E or V/U	Sum	0.016	0.423***	-0.290**	2.495***	0.428	-150.875
	F	23.46**	58.09***	6.72***	9.85***	9.32	0.08
	Pattern	+ - +	+ (+) - +	- -	+ + +	+ - (+)	- - -
VU/L	Sum	0.840***	-0.156**	-	1.101*	0.403	-
	F	15.88***	2.97**	-	3.53**	4.21	-
	Pattern	+ -	- (+) -	-	- + (-)	- +	-
VU/V	Sum	-0.167**	0.007	-0.001	-0.139	-0.098	0.225
	F	13.91***	2.97**	0.28	3.68**	0.63	0.62
	Pattern	- +	(+) - +	+ -	- +	(+) - +	+ (-) +
$1/U^2$	Sum	-0.346***	-0.011	-0.292	-0.463	-3.102*[c]	-0.416
	F	3.74**	0.05	4.27**	6.46***	1.64	0.18
	Pattern	- -	(-) + -	+ +	- -	+ -	- +
DW	Sum	3.196***	-0.036[a]	-0.142	3.863**	3.196[a]	-0.049[b]
	F	30.72***	5.13***	18.17***	3.35**	2.82	2.12
	Pattern	+ + -	+ + -	- + -	+ + +	+ + -	+ - +

TABLE LXII (Continued)

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DP	Sum	-1.112	0.221	-2.103	0.561	-34.839*	0.313
	F	13.52***	9.56***	1.97	6.93***	0.27	0.39
	Pattern	+ -	(-) + -	- -	+ -	- -	(-) + -
H/E_{-1} or P/ER_{-1}	Coefficient	-	-0.082	0.350***	-0.412***	-1.007	0.634
$\bar{R}^2$		0.986	0.982	0.970	0.985	0.951	0.243
D.W.		2.72	2.52	2.53	2.75	2.31	2.53

TABLE LXIII

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE

"BEST" REGRESSIONS -- ESTIMATES OF COEFFICIENTS

ALLOWING FOR AUTO-CORRELATED DISTURBANCES

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.112 **	-0.010	0.337	0.876	-0.254	0.553
t	0.082 a	-0.122 a	-0.016 **	0.005	-0.007	0.005
t^2	0.006 a	0.003 a	-0.041 **	0.067 a***	-0.003 a	-0.015 a
Z_{-1}	-	-	-1.675	-0.596	6.309	4.599 *
$\bar{Z}$	-	-	6.592 *	6.602	-4.133	-7.950
$\bar{Z}_{-4}$	-	-	4.076	0.553	4.313	-8.178
V/E or V/U	0.446 ***	0.427 ***	-	1.076 ***	-1.703 **	0.079
V/E_{-1} or V/U	-0.609 **	0.577	0.022	0.580	-1.138	2.010
$\overline{V/E}$ or V/U	-1.200 *	-1.002 ***	-0.084 *	-5.797 ***	1.239	-3.672

TABLE LXIII (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
$\overline{V/E}_{-4}$ or V/U	-0.047	-0.768 ***	-0.033	-1.805 ***	0.694	0.625
VU/L_{-1}	8.039 ***	-3.255 ***	-	-6.704	-	2.805
$\overline{VU/L}$	1.000 *	7.853 ***	-	60.467 ***	-	17.436
$\overline{VU/L}_{-4}$	-1.290	7.830 ***	-	24.446 ***	-	9.439
VU/V_{-1}	-0.102 **	0.047 ***	0.018	0.075	0.147	0.060
$\overline{VU/V}$	-0.154	-0.133 ***	0.003	-1.013 ***	0.004	-0.664 *
$\overline{VU/V}_{-4}$	-0.414	-0.132 ***	-0.021	-0.456 ***	-0.025	-0.197
$1/U^2_{-1}$	-0.026 *	-0.010	-0.017	-0.032	-0.066	-0.005
$\overline{1/U^2}$	-0.204 ***	-0.067 ***	0.517 *	-1.175 ***	-0.251	-0.030
$\overline{1/U^2}_{-4}$	0.150 *	-0.086 ***	0.261	-0.623 ***	-0.042	-0.374

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DW	0.018	-0.074 ***a	-0.132 *	0.049	0.562	0.639 **ac
DW_{-1}	0.041 **	-0.043	-0.069	-0.010	0.879 *	0.371
$\overline{DW}$	-	0.134 ***	-	-	-	-0.183
$\overline{DW}_{-4}$	-	-0.043	-	-	-	-0.731
DP_{-1}	-0.188 ***	-0.044 *	0.011	-0.209 ***	-0.259	-0.608 **
$\overline{DP}$	-	0.079	-	-	-	0.113
$\overline{DP}_{-4}$	-	-0.369 ***	-	-	-	-2.591 ***
$(H/E)_{-1}$ or $(P/ER)_{-1}$	-	-	0.236	-0.776	1.393	-3.633 **
ρ	-0.688	-0.244	-0.381	-0.545	-0.142	-0.540
$\bar{R}^2$	0.997	0.987	0.983	0.954	0.578	0.675

[a] Multiplied by 100 [b] Multiplied by 10,000 [c] W used

$\bar{R}^2$ calculated for lag-transformed equation

* Significant at 0.10 level ** Significant at 0.05 level *** Significant at 0.01 level

TABLE LXIII (Continued)

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.551 **	0.105 ***	-0.342	0.786 ***	-0.837 **	0.412
t	0.288 ***	0.122 ***a	-1.614 ***a	0.023 ***	0.180 a	0.013
t^2	0.061 ***a	0.003 a	-0.045 **a	0.006 a	0.010 a	0.032 a
Z_{-1}	-	0.025	-0.036	3.292 ***	-7.478 ***	1.260
$\overline{Z}$	-	-1.091 ***	3.728	-16.355 ***	9.575 *	0.321
$\overline{Z}_{-4}$	-	0.089 ***	3.540	-9.841 ***	-0.661	-0.036
V/E or V/U	0.531 **	0.313 ***	-	0.224	1.885 ***	3.631
V/E_{-1}	0.426 ***	0.108 *	-0.037 *	0.417 *	-0.122	1.609
$\overline{V/E}$	0.009	-0.135 *	-0.089	1.662 ***	3.578 ***	-17.073
$\overline{V/E}_{-4}$	0.144	0.073	-0.077 **	-0.343	-2.018 **	-6.059

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
VU/L_{-1}	-0.583 ***	-0.059 ***	-	-0.377 ***	-2.051 ***	-
$\overline{VU/L}$	0.374 ***	0.014	-	0.625 ***	1.167 ***	-
$\overline{VU/L}_{-4}$	0.574 ***	-0.107 ***	-	0.028 **	2.469 ***	-
VU/V_{-1}	0.091 ***	0.008	-0.005	0.069 *	0.153	0.041
$\overline{VU/V}$	-0.226 ***	-0.013	-0.050 *	0.034	0.075	-0.037
$\overline{VU/V}_{-4}$	-0.092 **	0.027 ***	0.002	-0.029	-0.142	0.016
$1/U^2_{-1}$	0.394 ***	0.035	0.098	-0.095	0.466	0.149
$\overline{1/U}^2$	-0.856 **	0.046	1.488 ***	-0.443	-0.980	-1.108
$\overline{1/U}^2_{-4}$	-1.146 ***	0.039	0.888 *	-0.012	-3.515 ***	0.184
DW	-0.079	-0.013	-0.024	0.313 **	0.339	0.420 *ac
DW_{-1}	0.198 *	0.019	0.058	0.283 *	0.826	0.503

TABLE LXIII (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
$\overline{DW}$	0.957 ***	-	-0.632 *	-	-	-1.313 ***
$\overline{DW}_{-4}$	-1.683 ***	-	-0.803 ***	-	-	0.118
DP_{-1}	-0.280 ***	-0.074 ***	0.310 ***	-0.503 ***	-1.047 ***	-0.455
$\overline{DP}$	0.284	-	-0.325	-	-	0.725
$\overline{DP}_{-4}$	-0.703 ***	-	0.075	-	-	-0.493
$(H/E)_{-1}$ or $(P/ER)_{-1}$	-	0.026	0.867 ***	-0.506 ***	4.780	0.008
ρ	0.912	0.097	-0.900	-0.498	-0.317	-0.160
$\overline{R}^2$	0.998	0.983	0.996	0.988	0.966	0.298

TABLE LXIV

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE

SUMMARY OF BEST ALMON SPECIFICATIONS

ALLOWING FOR SERIALLY CORRELATED RESIDUALS

A. Seasonally Adjusted

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	F	7.49***	1.50	5.27**	3.56**	1.65	0.61
Z	Sum	-	-	2.201***	-0.029	-0.650	2.039
	F	-	-	3.61**	0.92	1.82	0.38
	Pattern	-	-	+ +	- +	(+) - +	(+) - +
V/E or V/U	Sum	4.112***	-0.766***	-0.017**	-3.845	-139.954	-3.868
	F	11.56***	83.83***	2.48*	11.23***	3.78**	0.91
	Pattern	+ + +	+ + -	- -	+ -	- (-) + -	+ + -
VU/L	Sum	-1.808	13.096***	-	59.389*	-	43.554
	F	4.43**	27.45***	-	2.60*	-	0.75
	Pattern	+ -	- +	-	- +	-	+ +
VU/V	Sum	0.593**	-0.228***	0.028	-7.385	0.272	-0.771
	F	2.73*	13.77***	1.00	3.83**	1.35	1.49
	Pattern	- +	- +	+ -	+ -	+ (-) +	+ -
$1/U^2$ [a]	Sum	-0.554*	-0.163***	-0.093*	-1.921***	-0.573***	-0.620
	F	17.54***	4.91***	5.83***	13.59***	3.62**	0.84
	Pattern	- -	+ +	+ +	- -	+ -	- -

TABLE LXIV (Continued)

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DW	Sum	0.901***	0.105[bc]***	-0.189	0.016	3.97[c]	0.138[d]
	F	5.28***	7.15***	0.50	0.07	4.08**	1.73
	Pattern	+ + +	- - +	- + -	+ +	+ + -	- +
DP	Sum	1.879***	-0.307***	-0.899***	0.252***	3.53**	29.263**
	F	9.40***	8.20***	7.23***	7.33***	1.83	2.43*
	Pattern	- + (-)	(-) + -	- +	+ -	+ -	+ -
H/E_{-1} or P/E_{-1}	Coefficient	-	-	0.532***	-0.942	1.678*	-0.685
ρ		-0.636	-0.478	-0.499	-0.792	-0.322	-0.336
$\bar{R}^2$		0.995	0.996	0.995	0.963	0.707	0.458

[a] Multiplied by 10,000. [b] W used. [c] RW almon used. [d] RW non-almon used.
[e] Multiplied by 100. $\bar{R}^2$ Calculated for lag-p transformed equation

* Significant at 0.10 level. ** Significant at 0.05 level. *** Significant at 0.01 level

B. Minimum Month

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	F	5.81	4.29**	10.05***	19.44***	1.00	0.51
Z	Sum	-	-1.004*	14.09	-28.62	0.078	-0.002
	F	-	3.87**	3.75**	7.61***	2.71*	0.55
	Pattern	-	(+) - (+)	+ +	- -	+ -	(+) - +
V/E or V/U	Sum	-0.045	0.321***	0.233***	0.266***	-6.468	-22.543
	F	28.92***	17.33***	14.33***	16.72***	8.74***	0.74
	Pattern	+ + -	+ (+) - +	- -	+ + +	+ - (+)	- + -
VU/L	Sum	0.917***	-15.920**	-	0.798	0.955	-
	F	20.09***	3.59**	-	2.61*	0.90	-
	Pattern	+ -	- (+) -	-	+ +	- +	-
VU/V	Sum	-0.173***	-0.005	-0.053	-0.533	-0.122	0.339
	F	17.07***	1.36	2.15	7.31***	1.01	2.74*
	Pattern	- +	- +	(-) + -	- +	- +	+ (-) +
$1/U^2$ [a]	Sum	-0.363***	-0.030	0.341***	-0.531***	-2.959**	0.018
	F	5.31***	1.59	9.04***	11.37***	0.47	1.15
	Pattern	- -	(-) + -	+ +	- -	- -	(+) - +
DW	Sum	3.283***	-0.069[bc]	-0.012	4.487***	1.001	0.236[b]
	F	36.92***	1.13	2.98*	5.46***	4.21**	2.00
	Pattern	+ + -	+ + -	+ - -	+ + +	+ + -	+ - +

TABLE LXIV (Continued)

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DP	Sum	-1.287	0.235	-1.080	1.365	-42.295**	0.083
	F	17.35***	1.40	3.06*	12.32***	1.30	2.47*
	Pattern	+ -	(-) + -	- +	+ -	- -	(-) + -
H/E_{-1} or P/E_{-1}	Coefficient	-	-0.012	0.746***	-0.729**	0.492	1.057
ρ		-0.396	-0.411	-0.900	-0.912	-0.354	-0.395
$\bar{R}^2$		0.991	0.990	0.995	0.994	0.959	0.488

TABLE LXV

MONTHLY MODELS FOR THE INDUSTRIAL COMPOSITE
POSTERIOR PROBABILITIES

A. Hirings

	Seasonally Adjusted					Minimum Month				
	M.1	M.2	AM.1	AM.2	Total	M.1	M.2	AM.1	AM.2	Total
Total	0.44	0.07	0.39	0.00	1.00	0.79	0.00	0.23	0.00	1.00
Specification										
Variant 1	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.09	0.00	0.09
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.14
3	0.00	0.00	0.05	0.00	0.05	0.23	0.00	0.00	0.00	0.23
4	0.44	0.00	0.24	0.00	0.68	0.28	0.00	0.00	0.00	0.28
5	0.00	0.00	0.19	0.00	0.19	0.13	0.00	0.00	0.00	0.13
6	0.00	0.07	0.00	0.00	0.07	0.15	0.00	0.00	0.00	0.15

B. Placements

	Seasonally Adjusted					Minimum Month				
	M.1	M.2	AM.1	AM.2	Total	M.1	M.2	AM.1	AM.2	Total
Total	0.07	0.00	0.92	0.00	1.00	1.00	0.00	0.00	0.00	1.00
Specification										
Variant 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.15	0.00	0.15	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.03	0.00	0.03	0.01	0.00	0.00	0.00	0.01
4	0.03	0.00	0.00	0.00	0.03	0.69	0.00	0.00	0.00	0.69
5	0.00	0.00	0.72	0.00	0.72	0.01	0.00	0.00	0.00	0.01
6	0.04	0.00	0.02	0.00	0.06	0.29	0.00	0.00	0.00	0.29

C. Separations

	Seasonally Adjusted					Minimum Month				
	M.1	M.2	AM.1	AM.2	Total	M.1	M.2	AM.1	AM.2	Total
Total	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00
Specification										
Variant 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.11	0.00	0.00	0.11	0.00	0.36	0.00	0.00	0.36
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.89	0.00	0.00	0.89	0.00	0.64	0.00	0.00	0.64

TABLE LXV (Continued)

D. (H-S)/E

	Seasonally Adjusted					Minimum Month				
	M.1	M.2	AM.1	AM.2	Total	M.1	M.2	AM.1	AM.2	Total
Total	0.00	0.00	0.69	0.30	1.00	0.98	0.00	0.02	0.00	1.00
Specification										
Variant 1	0.00	0.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.09	0.26	0.35	0.00	0.00	0.01	0.00	0.01
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.02	0.00	0.02	0.86	0.00	0.00	0.00	0.86
5	0.00	0.00	0.07	0.04	0.11	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.01	0.00	0.01	0.12	0.00	0.01	0.00	0.13

E. ΔER/ER

	Seasonally Adjusted					Minimum Month				
	M.1	M.2	AM.1	AM.2	Total	M.1	M.2	AM.1	AM.2	Total
Total	0.01	0.99	0.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00
Specification										
Variant 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01
4	0.00	0.46	0.00	0.00	0.46	0.72	0.00	0.00	0.00	0.72
5	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.02
6	0.01	0.51	0.00	0.00	0.52	0.26	0.00	0.00	0.00	0.26

F. ΔELF/ELF

	Seasonally Adjusted					Minimum Month				
	M.1	M.2	AM.1	AM.2	Total	M.1	M.2	AM.1	AM.2	Total
Total	0.00	0.98	0.00	0.02	1.00	0.00	1.00	0.00	0.00	1.00
Specification										
Variant 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.53	0.00	0.01	0.54	0.00	0.49	0.00	0.00	0.49
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.45	0.00	0.01	0.46	0.00	0.51	0.00	0.00	0.51

TABLE LXVI

MONTHLY MODELS FOR THE INDUSTRIAL COMPOSITE

VALUES OF F FOR VARIOUS VARIABLES -- "BEST" AVERAGE EQUATION

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	6.13***	2.42*	4.13**	0.11	2.07	-
Z_1	1.26	2.28*	1.70	1.63	15.03***	-
V/E or V/E	13.58***	36.70***	1.85	4.20***	1.30	-
VU/L	7.02***	4.62***	-	-	-	-
VU/V	6.64***	4.27***	4.32***	3.09**	0.62	-
$1/U^2$ or $1/UP^2$	5.93***	1.54	1.98	2.04**	0.99	-
DW, W, or DWR	0.86	1.09	0.48	0.07	0.69	-
DP or DPR	0.49	0.24	3.40*	1.93	2.14	-
H/E_{-1}	0.81	4.14**	0.46	0.11	1.07	-

TABLE LXVI (Continued)

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
t, t^2	3.60**	2.72*	0.50	0.58	4.33**	-
Z_1	4.99***	1.45	21.58***	16.26***	12.31***	-
V/E or V/U	39.88***	125.56***	2.47**	9.11***	14.45***	-
VU/L	3.43**	7.95***	-	3.48**	6.23***	-
VU/V	4.40***	5.30***	1.99	5.22***	8.29***	-
$1/U^2$ or $1/UP^2$	1.58	2.16*	4.25***	3.82***	5.86***	-
DW, W, or DWR	17.52***	1.84	15.71***	22.45***	3.71**	-
DP or DPR	0.73	0.15	5.29***	1.37	2.25	-
H/E_{-1}	4.97*	8.85***	0.29	0.32	4.17**	-

*Significant at 0.10 level.
**Significant at 0.05 level.
***Significant at 0.01 level.

TABLE LXVII

MONTHLY MODELS FOR THE INDUSTRIAL COMPOSITE

"BEST" AVERAGE-SPECIFICATION REGRESSIONS -- ESTIMATES OF COEFFICIENTS

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	-0.093	-0.082**	-0.214	0.069	-0.373*	0.024
t	-0.008	0.179**[a]	-0.010**	0.003	-0.010*	0.043[a]
t^2	0.049**[a]	0.002[a]	-0.070***[a]	0.019[a]	0.019[a]	-0.001[a]
Z_{-1}	0.932	0.125	-0.093	3.763	14.038***	0.717
Z^Q	0.388	0.219	-1.472	-0.997	-9.134**	-0.094
Z^A	4.781	-0.736	8.563**	-5.449	3.117	-0.906
Z^A_{-12}	3.149	-1.494**	1.225	0.761	2.571	0.230
V/E or V/U	0.584***	0.378***	-	0.024***	0.041*	-0.005
V/E_{-1}	1.067**	0.208*	0.000	-0.001	-0.018	0.013
V/E^Q	0.004	0.134	0.034**	-0.016	-0.041	-0.007
V/E^A	-4.107***	-0.534**	-0.059**	0.028	-0.013	-0.001
V/E^A_{-12}	-0.765	-0.078	-0.003	-0.039	-0.005	0.004
VU/L_{-1}	-7.692**	-2.567***	-	-	-	-
VU/L^Q	-3.561	-0.298	-	-	-	-
VU/L^A	38.313***	4.408**	-	-	-	-
VU/L^A_{-12}	0.902*	0.668	-	-	-	-
VU/V_{-1}	0.145**	0.050**	-0.034**	0.030	-0.012	-0.043*
VU/V^Q	0.060	-0.014	0.001	0.055	0.038	0.033
VU/V^A	-0.694***	-0.090**	0.084***	-0.054	-0.043	0.035
VU/V^A_{-12}	-0.181***	0.013	-0.012	-0.031	-0.100	-0.020

TABLE LXVII (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
$1/U^2_{-1}$	0.112***[c]	0.004[c]	-0.010[c]	0.039[c]	-0.039[c]	-0.022[c]
$(1/U^2)^Q$	-0.111**	-0.009	-0.018	-0.088	0.006	0.024
$(1/U^2)^A$	-0.548***	-0.006	0.232**	-0.157	0.142	0.013
$(1/U^2)^A_{-12}$	-0.321**	-0.040**	0.083	0.304	0.084	-0.036
DW	0.008[d]	0.007[d]	0.007[d]	0.003[d]	-0.053[d]	-0.016[d]
DW^Q	-0.001	-0.003	-0.001	0.003	-0.050	0.016
DW^A	-	-	-	-	-	-
DW^A_{-12}	-	-	-	-	-	-
DP_{-1}	-0.013	0.006	-0.033	0.040	0.053	0.046
DP^Q	-	-	-	-	-	-
DP^A	-	-	-	-	-	-
DP^A_{-12}	-	-	-	-	-	-
H/E_{-1}	0.006	0.060	0.043	-0.137	0.997	-0.334
ρ	-0.152	0.115	-0.159	0.098	-0.240	-0.302
$\bar{R}^2$	0.923	0.931	0.885	0.522	0.163	-0.015
S.E.E.	0.162[a]	0.076[a]	0.177[a]	0.256[a]	0.934[a]	0.392[a]
D.W. for original Regression	0.212	1.97	2.28	1.91	2.07	2.59

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	-0.809**	-0.072*	-0.656**	0.434	-0.958***	-0.025
t	-0.022**	-0.141[a]	-0.020**	0.011	-0.020**	-0.079[a]
t^2	0.016[a]	-0.002[a]	-0.029[a]	0.033[a]	0.009[a]	0.000
Z_{-1}	-0.980	0.065	-2.066	-0.983	4.408**	-0.051
Z^Q	1.846*	-0.428***	-3.490**	6.814***	2.419	0.419
Z^A	7.356**	1.046**	14.595***	-7.611	7.546	-0.128
Z^A_{-12}	1.342	0.676	9.342*	-8.071	7.451	0.465

TABLE LXVII (Continued)

V/E or V/U	0.874***	0.442***	-	0.823***	1.755***	-0.025*
V/E_{-1}	0.173	0.180***	0.035	1.326**	2.316**	0.026
V/E^{Q}	0.023	0.183**	0.035	1.356*	1.805*	0.004
V/E^{A}	-0.620	0.345	-0.089	-3.841***	-1.868	0.003
V/E^{A}_{-12}	2.662*	-0.064	0.003	1.298	2.213	0.005
VU/L_{-1}	0.395	-1.388***	-	-11.264**	-10.812*	-
VU/L^{Q}	-4.356	-0.926	-	4.200	-12.778	-
VU/L^{A}	2.890	-3.605*	-	35.387***	-2.872	-
VU/L^{A}_{-12}	-19.382*	0.111	-	-3.466	-25.586	-
VU/V_{-1}	0.016	0.018***	0.037*	0.136**	0.055	-0.030*
VU/V^{Q}	0.062	0.012	-0.109**	0.062	0.411***	0.033
VU/V^{A}	-0.033	0.034	0.077	-0.640***	-0.220	0.030
VU/V^{A}_{-12}	0.323**	0.017	0.068	-0.014	0.117	-0.020

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
$1/U^2_{-1}$	-0.124	-0.085**	-0.013[c]	-0.398	-0.582	-0.107[c]
$(1/U^2)^Q$	-0.016	0.033	0.758**	-0.510	-0.903	0.160
$(1/U^2)^A$	-0.802*	0.019	-0.609	0.760	1.782*	-0.144
$(1/U^2)^A_{-12}$	-0.510	0.030	-0.657	-0.287	1.811**	-0.037
DW	0.065*[ac]	0.005*[d]	-0.088***[d]	0.112***[d]	0.082*[d]	0.009[d]
DW_{-1}	-0.283***	0.001	-0.090***	0.013	0.110	0.002
DW^Q	0.577***	-	-	-	-	-
DW^A	0.264	-	-	-	-	-
DW^A_{-12}	-0.158	-	-	-	-	-

TABLE LXVII (Continued)

DP_{-1}	0.038	0.007	-0.087**	0.029	-0.041	0.026
DP^{Q}	-0.179	-	-	-	-	-
DP^{A}	0.368	-	-	-	-	-
DP^{A}_{-12}	0.106	-	-	-	-	-
H/E_{-1}	0.285***	-0.100	-0.040	0.422	-1.664	-0.290
ρ	-0.509	0.364	-0.163	-0.376	-0.433	-0.319
$\bar{R}^2$	0.974	0.922	0.845	0.939	0.796	0.050
S.E.E.	0.238[a]	0.062[a]	0.380[a]	0.430[a]	1.062[a]	0.3669
D.W.	2.24	1.97	2.19	2.24	2.29	2.63

[a] Multiplied by 100

[c] $1/UP^2$ used

[d] DWR or DPR used

[e] W used

*Significant at 0.10 level.
**Significant at 0.05 level.
***Significant at 0.01 level.

TABLE LXVIII

MONTHLY MODELS FOR THE INDUSTRIAL COMPOSITE

"BEST" AVERAGE SPECIFICATION REGRESSIONS FOLLOWING

ELIMINATION OF INSIGNIFICANT VARIABLES

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.118 ***	-0.377[a] ***	-0.149 **	-0.012 ***	-0.176 ***	0.093[a]
t	-	-	-0.798[a] ***	0.038[a] ***	-0.449[a] ***	-
t^2	0.049[a] ***	0.002[a] ***	-0.059[a] ***	-	-	-
Z_{-1}	-	-	-	-	18.757 ***	-
Z^Q	-	-		-	-13.981 ***	
Z^A	-	-	6.078 **	-	-	-
Z^A_{-12}	-	-	-	-	-	-
V/E or V/U	0.473 ***	0.429 ***	-	0.024 ***	0.036 **	-
V/E_{-1}	0.996 ***	-	-	-	-	-
V/E^Q	-	-	0.023 ***	-	-0.036 **	
V/E^A	-3.023 ***	-	-0.039 ***	-	-	-
V/E^A_{-12}	-	-	-	-	-	-
$VU/1_{-1}$	-0.847 ***	-1.700 ***	-	-	-	-
VU/L^Q	-	-	-	-	-	-
VU/L^A	3.060 ***	-	-	-	-	-
VU/L^A_{-12}	-	-	-	-	-	-

TABLE LXVIII (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
VU/V_{-1}	0.157 ***	0.034 **	-0.032 ***	0.041 ***	-	-0.029 *
VU/V^Q	-	-0.019 **	-	-	-	-
VU/V^A	-0.495 ***	-	0.087 ***	-	-	0.061 ***
VU/V^A_{-12}	-	-	-	-	-	-0.028**
$1/U^2_{-1}$	0.099 ***	-	-	-	-	-
$(1/U^2)^Q$	-0.124 ***	-	-	-0.046 **	-	-
$(1/U^2)^A$	-0.490 ***	-	0.167[a] ***	-0.123 ***	-	-
$(1/U^2)^A_{-12}$	-0.080 ***	-	0.049 *	0.047 ***	-	-
DW	-	-	-	-	-	-
DW_{-1}	-	-	-	-	-	-
DW^Q	-	-	-	-	-	-
DW^A	-	-	-	-	-	-
DW^A_{-12}	-	-	-	-	-	-
DP_{-1}	-	-	-0.032[c] *	-	-	-
DP^Q	-	-	-	-	-	-
DP^A	-	-	-	-	-	-
DP^A_{-12}	-	-	-	-	-	-
H/E_{-1}	-	-	-	-	-	-
ρ	-	-	-	-	-	-
$\bar{R}^2$	0.904	0.938	0.854	0.556	0.272	0.033
S.E.E.	0.162[a]	0.080[a]	0.173[a]	0.260[a]	0.926[a]	0.392[a]

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	-1.165 ***	-0.019 ***	0.095 ***	-0.010	-0.701 ***	-0.037[a]
t	-0.033 ***	-0.038 **[a]	-	-	0.017 ***	-
t^2	-0.042[a] ***	0.001 *[a]	-	-	0.019 **[a]	-
Z_{-1}	-1.167 *	-	-1.856 **	-	6.627 ***	-
Z^Q	2.595 ***	-0.131 *	-3.945 ***	7.077 ***	-	-
Z^A	8.295 ***	0.533 ***	4.366 ***	-5.479 ***	2.355	-
Z^A_{-12}	-	-	-	-	8.246 ***	-

TABLE LXVIII (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
V/E or V/U	0.830 ***	0.445 ***	-	0.810 ***	1.599 ***	-
V/E_{-1}	0.695 ***	-	0.054 ***	1.236 ***	-	0.007 **
V/E^Q	-	0.082 ***	-	-	2.178 ***	-
V/E^A	4.605 ***	-0.082 ***	-	4.349 ***	-2.302 ***	-
V/E^A_{-12}	-	-	-	1.585 **	-	-
VU/L_{-1}	-0.308 **	-1.403 ***	-	-1.024 ***	-	-
VU/L^Q	-	-	-	-	-18.836 ***	-
VU/L^A	-1.343 ***	-	-	2.104 **	24.152 ***	-
VU/L^A_{-12}	-3.715 ***	-	-	-0.975 **	-	-

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
VU/V_{-1}	0.075 ***	0.017 ***	0.037 *	0.137 ***	-	0.028 ***
VU/V^{Q}	0.063 **	-	-0.115 ***	0.180 ***	0.397 ***	-
VU/V^{A}	0.130 ***	-	0.127 **	-0.604 ***	-0.307 ***	0.033 **
VU/V^{A}_{-12}	0.569 ***	-	-	-	-	-
$1/U^{2}_{-1}$	-	-0.069 ***	-	-	-	-
$(1/U^{2})^{Q}$	-	-	0.388 **	-1.056 ***	-0.776 ***	-
$(1/U^{2})^{A}$	-	-	0.670 **	2.333 ***	-	-
$(1/U^{2})^{A}_{-12}$	-	-	-	-	-	-

TABLE LXVIII (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DW	0.110[ae] ***	0.005[c] *	-0.099[c] ***	0.153[c] ***	-	-
DW_{-1}	-0.279 ***	-	-0.094 ***	0.053 ***	0.101[c] **	-
DW^{Q}	0.446 ***	-	-	-	-	-
DW^{A}	0.501 ***	-	-	-	-	-
DW^{A}_{-12}	-	-	-	-	-	-
DP_{-1}	-	-	0.074[c] *	-	-	-
DP^{Q}	-	-	-	-	-	-
DP^{A}	-	-	-	-	-	-
DP^{A}_{-12}	-	-	-	-	-	-

H/E_{-1} or P/E_{-1}	-	0.299	-	-	-	-
ρ	-0.200	-	-	-	-0.392	-0.262
$\overline{R}^2$	0.961	0.955	0.789	0.897	0.787	0.060
S.E.E.	0.361[a]	0.062[a]	0.398[a]	0.439[a]	1.063[a]	0.362[a]

[a] Multiplied by 100

[c] DPR or DWR used

[d] $1/UP^2$ used

[e] W used

*Significant at 0.10 level.
**Significant at 0.05 level.
***Significant at 0.01 level.

TABLE LXIX

MONTHLY MODELS FOR THE INDUSTRIAL COMPOSITE

SUMMARY OF "BEST" ALMON SPECIFICATIONS

A. Seasonally Adjusted

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER[f]	ΔELF/ELF[f]
t, t^2	F	11.07***	0.84	0.14	8.34***	- +	- +
Z	Sum	-18.152**	-0.046	-0.326	-30.376**	6.060	-0.008
	F	5.19***	0.62	2.93**	5.45***	-	-
	Pattern	+ -	+ (-) -	- (+) -	+ -	+ (-) (+) -	(+)-(+)-
V/E or V/U	Sum	5.931	0.075	0.030	-11.318***	-0.037	0.004
	F	13.85***	62.02***	6.02***	5.39***	-	-
	Pattern	+ - +	+ + -	+ -	+ - -	+ - (+) -	- + -
VU/L	Sum	14.071	5.631	-	14.664***	-	-
	F	8.76***	8.25***	-	7.05***	-	-
	Pattern	(-) + -	- +	-	(-) + +	-	-
VU/V	Sum	0.344	-0.105	0.049	-0.026***	-0.067	0.037
	F	7.72***	7.06***	1.88	5.72***	-	-
	Pattern	(+) - +	+ -	(-) + (-) +	(+) - -	(+) -	(-) + (-) +
$1/U^2$	Sum	-2.618[c]***	-0.090[c]**	-0.169[c]	-2.892***	0.212*[c]	-0.019
	F	9.45***	2.27*	5.77***	9.74***	-	-
	Pattern	- -	- -	(-) + -	- -	- +	+ (-) +
DW	Sum	2.802[ae]***	0.084[e]	3.507***	-8.371***	0.085[d]	-0.021[d]
	F	5.22***	4.12***	5.45***	3.63***	-	-
	Pattern	+ (-) + -	- + -	+ (-) +	+ - (+)	- +	- +
DP	Sum	0.014***	-0.774*	-0.001	-0.007	0.950	-0.839
	F	5.06***	5.86***	2.36*	3.98***	-	-
	Pattern	- +	- (+) -	+ -	- +	- + (-) +	- (+) -
H/E_{-1} or P/E_{-1}	Coefficient	0.023	-0.164**	0.221**	-0.296**	0.679	-0.154
ρ		-0.276	-	-0.367	-	-0.468	-0.346
$\bar{R}^2$		0.946	0.950	0.935	0.683	0.110	0.023
S.E.E.		0.151[a]	0.072[a]	0.163[a]	0.220[a]	0.961[a]	0.386[a]

Note: Where equations are shown as non Hildreth-Lu the F-values are calculated from non Hildreth-Lu equations.

B. Minimum Month

Variable	Quantity	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF[f]
t, t^2	F	2.90*	5.33***	11.83***	11.18***	0.69	- +
Z	Sum	-0.252	-1.283	41.489	-58.741***	8.062	0.475
	F	6.78***	1.48	17.16***	15.51***	31.65***	-
	Pattern	+ -	+ -	- +	+ -	+ (-) (+) -	+ (-) +
V/E or	Sum	7.547**	0.165	-0.072	8.949**	-0.117	0.002
V/U	F	25.22***	134.52***	1.96	15.06***	2.49**	-
	Pattern	+ - +	+ - +	- +	+ + (-) +	+ - (+) -	- + -
VU/L	Sum	-81.361**	4.541	-	-0.092*	-	-
	F	17.94***	20.16***	-	6.72***	-	-
	Pattern	- (+) -	(-) + -	-	(-) + -	-	-
VU/V	Sum	0.471	-0.068	0.205**	0.584	-0.146	0.046
	F	23.86***	10.53***	2.72**	8.04***	4.73***	-
	Pattern	+ - +	(+) - +	+ (-)	- +	+ (-) (+) -	- (+) -
$1/U^2$	Sum	2.114[c]	-0.408**	-1.379[c]	5.174[c]	1.253[c]	-0.058
	F	2.43*	2.63**	8.14***	7.18***	0.95	-
	Pattern	- +	- -	+ - +	(-) + -	- +	+ (-) +
DW	Sum	14.105**	0.889**	11.196***	0.143***[d]	0.227***[d]	-0.006[d]
	F	14.45***	4.49***	15.66***	14.23***	4.77***	-
	Pattern	+ + +	+ - +	- + +	+ +	+ +	- -
DP	Sum	0.007	-0.139	-0.014	0.023***	2.625	-0.295
	F	1.81	1.01	4.31***	5.87***	1.42	-
	Pattern	- +	+ -	- -	+ +	- +	(+) - +
H/E_{-1} or P/E_{-1}	Coefficient	-0.043	-0.306***	-0.164*	0.004	1.513**	0.006
ρ		-	0.216	-0.267	-	-0.484	-0.343
$\bar{R}^2$		0.939	0.934	0.873	0.893	0.782	0.033
S.E.		0.267[a]	0.064[a]	0.369[a]	0.445[a]	1.129[a]	0.370[a]

[a] Multiplied by 100

[c] $1/UP^2$ used

[d] DWR or DPR used

[f] F-value not calculated as the entire equation is insignificant.

*Significant at 0.10 level

**Significant at 0.05 level

***Significant at 0.01 level

TABLE LXX

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE

SUMMARY OF INSTRUMENTAL VARIABLE REGRESSIONS

VALUES OF STANDARD ERRORS OF ESTIMATE

A. Hirings

Specification Form	Seasonally Adjusted			Minimum Month		
	I.V.	Full Regression	Comparable Regression	I.V.	Full Regression	Comparable Regression
$1/U^2$, DW	0.098	0.106	0.147	0.120	0.124	0.235
$1/UP^2$, DW	0.106	0.096	0.131	0.099	0.122	0.236
$1/U^2$, RW	0.183	0.115	0.185	0.160	0.192	0.268
$1/UP^2$, RW	0.099	0.114	0.169	0.101	0.112	0.273
$1/U^2$, DW Almon	0.496	0.086	0.149	-	0.114	0.226
$1/UP^2$, DW Almon	0.190	0.085	0.123	-	0.114	0.210

B. Placements

	Seasonally Adjusted			Minimum Month		
Specification	I.V.	Full Regression	Comparable Regression	I.V.	Full Regression	Comparable Regression
$1/U^2$, DW	0.161	0.049	0.052	0.118	0.040	0.048
$1/UP^2$, DW	0.028	0.048	0.047	0.099	0.040	0.046
$1/U^2$, RW	0.070	0.051	0.054	0.089	0.050	0.056
$1/UP^2$, RW	0.090	0.051	0.051	0.107	0.050	0.054
$1/U^2$, DW Almon	0.020	0.043	0.057	0.280	0.047	0.059
$1/UP^2$, DW Almon	0.085	0.041	0.054	0.100	0.044	0.065

TABLE LXX (Continued)

C. Separations

Specification Form	Seasonally Adjusted I.V.	Seasonally Adjusted Full Regression	Seasonally Adjusted Comparable Regression	Minimum Month I.V.	Minimum Month Full Regression	Minimum Month Comparable Regression
$1/U^2$, DW	0.100	0.111	0.100	0.438	0.142	0.147
$1/UP^2$, DW	0.100	0.106	0.102	0.272	0.113	0.137
$1/U^2$, RW	0.085	0.104	0.095	0.242	0.154	0.168
$1/UP^2$, RW	0.098	0.103	0.096	0.242	0.155	0.154
$1/U^2$, DW Almon	-	0.105	0.098	0.696	0.149	0.170
$1/UP^2$, DW Almon	0.110	0.092	0.102	0.568	0.146	0.164

D. (H-S)/E

Specification Form	Seasonally Adjusted I.V.	Seasonally Adjusted Full Regression	Seasonally Adjusted Comparable Regression	Minimum Month I.V.	Minimum Month Full Regression	Minimum Month Comparable Regression
$1/U^2$, DW	0.109	0.181	0.176	-	0.172	0.298
$1/UP^2$, DW	0.125	0.162	0.179	-	0.171	0.302
$1/U^2$, RW	-	0.174	0.208	0.362	0.237	0.346
$1/UP^2$, RW	0.86	0.179	0.192	0.359	0.237	0.346
$1/U^2$, DW Almon	-	0.174	0.159	-	0.531	0.594
$1/UP^2$, DW Almon	-	0.149	0.126	-	0.178	0.256

TABLE LXXI

QUARTERLY MODELS FOR THE INDUSTRIAL COMPOSITE "BEST AVERAGE

INSTRUMENTAL VARIABLES REGRESSIONS

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.060	-0.015	0.045	0.028	-0.731[a]	-0.035
t	0.010	-0.039[a]	0.148[a]	0.009	0.020*	0.017**
t^2	0.049[a]	-0.001[a]	0.011[a]	0.041[a]	0.115[a]*	0.096**[a]
V/E	-1.986	1.288***	-	-2.004*	12.013*	3.481
V/E_{-1}	3.359**	-1.557***	-0.464	3.600***	-10.065	0.969
$\overline{V/E}$	-1.759***	1.737***	0.373	-1.863***	4.784	0.094
$\overline{V/E}_{-4}$	0.210	-1.065**	-0.025	0.170	0.026	2.343
$1/U^2_{-1}$	-0.358***	0.076***[c]	0.121	-0.362***	-0.018	-0.399**[c]
$\overline{1/U^2}$	0.233	-0.174***	-0.060	0.178	-0.429	-0.193
$\overline{1/U^2}_{-4}$	-0.011	0.163***	-0.050	0.052	-0.210	-0.438*
DW	0.633[b]***	-0.480*	-0.035[b]	0.650[b]***	-6.685[b]	-1.290[b]
DW_{-1}	0.544***	-0.203*	-0.076	0.613***	-4.513	-0.309
$\overline{DW}$	-	-0.577***	-	-	-	-
$\overline{DW}_{-4}$	-	0.614	-	-	-	-
DP_{-1}	-0.224**	-0.205*	0.063	-0.242***	-0.036	-0.640***
$\overline{DP}$	-	0.807*	-	-	-	-
$\overline{DP}_{-4}$	-	1.049***	-	-	-	-
H/E	0.839**	0.524	0.390	0.308***	-5.940*	-7.019***
$\bar{R}^2$	0.966	0.992	0.963	0.936	0.698	0.659
R^2 residuals	0.272	0.258	0.950	-0.929	-3.50	-3.832
D.W. residuals	2.165	1.91	2.55	2.18	2.12	1.02

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.375	-0.010	0.262	0.006	0.036	-0.193
t	0.042	0.148[a]	0.063	0.042	0.029	-0.247[a]
t^2	0.247[a]	0.008[a]	0.308[a]	0.188[a]	0.164[a]	-0.018[a]
V/E	5.100*	0.320*	-	1.029	1.683	-0.765
V/E_{-1}	7.466	-0.539	-10.412	-16.778*	0.014	2.749***
$\overline{V/E}$	-13.126	-0.259	9.969	15.229	-17.989	9.693
$\overline{V/E}_{-4}$	2.377	0.709	-3.020	-3.580	17.626	-3.002
$1/U^2_{-1}$	-5.182	-0.333**	0.190	4.649	-4.997	3.851*
$\overline{1/U^2}$	8.803	0.385	-5.750	-12.431	9.125	-8.498
$\overline{1/U^2}_{-4}$	-8.099	-0.340	0.820	29.155*	-9.326	2.326
DW	-0.687	0.238[b]	-0.336[b]***	0.216[b]	2.010	-0.590
DW_{-1}	-1.879	0.495	-0.378	0.026	5.448	-0.060
$\overline{DW}$	1.795	-	-	-	-2.743	0.294
$\overline{DW}_{-4}$	3.530	-	-	-	-1.351	7.573
DP_{-1}	-1.470	-0.059	1.102	1.795	2.462	-1.899
$\overline{DP}$	14.122	-	-	-	-0.099	0.060
$\overline{DP}_{-4}$	-0.867	-	-	-	0.056	1.676
H/E_{-1}	-5.503	1.943*	6.184	8.978	14.082	-8.200**
$\bar{R}^2$	0.896	0.902	0.961	0.910	0.871	0.798
R^2 residuals	-1.75	0.533	-1.73	-3.41	0.153	-5.85
D.W. residuals	1.60	1.13	1.57	1.62	1.26	1.77

*Significant at 0.10 level
**Significant at 0.05 level
***Significant at 0.01 level

[a] Multiplied by 100
[b] DWR and DPR used
[c] $1/UP^2$ used

TABLE LXXII

MONTHLY MODELS FOR THE INDUSTRIAL COMPOSITE

SUMMARY OF INSTRUMENTAL-VARIABLE REGRESSIONS

VALUES OF STANDARD ERRORS OF ESTIMATE

A. Hirings

	Seasonally Adjusted			Minimum Month		
Specification Forms	IV	Full Regression	Comparable Regression	IV	Full Regression	Comparable Regression
1	0.157	0.185	0.191	0.363	0.252	0.294
2	0.252	0.181	0.193	0.414	0.251	0.295
3	0.074	0.183	0.197	0.613	0.253	0.309
4	0.124	0.180	0.199	0.741	0.251	0.308
5	0.075	0.172	0.195	0.808	0.306	0.479
6	0.118	0.173	0.180	1.451	0.300	0.471

B. Placements

	Seasonally Adjusted			Minimum Month		
Specification Forms	IV	Full Regression	Comparable Regression	IV	Full Regression	Comparable Regression
1	0.100	0.080	0.084	0.111	0.064	0.065
2	0.103	0.080	0.083	0.268	0.063	0.065
3	0.098	0.080	0.085	0.056	0.067	0.068
4	0.099	0.080	0.084	0.084	0.067	0.068
5	0.102	0.082	0.095	0.149	0.081	0.111
6	0.130	0.080	0.095	0.304	0.080	0.110

C. Separations

	Seasonally Adjusted			Minimum Month		
Specification Forms	IV	Full Regression	Comparable Regression	IV	Full Regression	Comparable Regression
1	0.222	0.172	0.178	0.665	0.341	0.531
2	0.271	0.176	0.183	0.625	0.348	0.528
3	0.240	0.178	0.181	1.076	0.368	0.540
4	0.062	0.179	0.181	0.805	0.366	0.540
5	0.213	0.176	0.180	0.398	0.365	0.453
6	0.190	0.174	0.184	0.347	0.355	0.459

D. (H-S)/E

Specification Forms	Seasonally Adjusted IV	Seasonally Adjusted Full Regression	Seasonally Adjusted Comparable Regression	Minimum Month IV	Minimum Month Full Regression	Minimum Month Comparable Regression
1	0.326	0.251	0.251	0.728	0.423	0.639
2	0.237	0.251	0.251	0.773	0.427	0.641
3	0.134	0.259	0.271	1.320	0.442	0.654
4	0.285	0.257	0.270	1.460	0.445	0.659
5	0.314	0.241	0.271	0.706	0.429	0.779
6	0.257	0.235	0.250	0.277	0.423	0.767

E. ΔER/ER

Specification Forms	Seasonally Adjusted IV	Seasonally Adjusted Full Regression	Seasonally Adjusted Comparable Regression	Minimum Month IV	Minimum Month Full Regression	Minimum Month Comparable Regression
1	1.279	0.881	1.016	0.875	1.029	1.360
2	0.955	0.881	1.016	6.486	1.097	1.357
3	1.113	0.945	1.064	2.710	1.150	1.387
4	1.209	0.944	1.064	2.853	1.156	1.385
5	0.911	1.015	1.089	1.465	1.200	1.402
6	1.012	1.013	1.088	3.964	1.197	1.398

F. ΔELF/ELF

Specification Forms	Seasonally Adjusted IV	Seasonally Adjusted Full Regression	Seasonally Adjusted Comparable Regression	Minimum Month IV	Minimum Month Full Regression	Minimum Month Comparable Regression
1	0.456	0.412	0.403	0.306	0.390	0.385
2	0.455	0.413	0.406	0.861	0.390	0.386
3	0.414	0.412	0.405	0.304	0.392	0.389
4	0.458	0.413	0.407	0.276	0.392	0.389
5	0.401	0.416	0.405	0.381	0.393	0.384
6	0.407	0.416	0.408	0.419	0.392	0.386

TABLE LXXIII

MONTHLY MODELS FOR THE INDUSTRIAL COMPOSITE

"BEST" INSTRUMENTAL VARIABLE REGRESSIONS

A. Seasonally Adjusted

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	0.102 ***	0.042	-0.022	0.044 **	-0.050	-0.137
t	-0.465[a] ***	-0.008[a]	0.142[a]	-0.673[a] ***	-0.199	0.044[a]
t^2	-0.122[a] ***	-0.027	0.040[a] *	-0.245[a] ***	-0.034	0.086[a]
V/E	1.165 ***	0.591 **	-	1.190 ***	5.533	-0.133
V/E_{-1}	0.646 **	0.037	2.859 ***	-0.963 *	-0.319	-0.899
V/E^Q	-0.782 **	-0.561	-5.035 ***	1.012	-11.752	-1.884
V/E^A	1.176 ***	-0.357'	3.135 ***	-1.385 ***	13.230	4.504 *
V/E^A_{-12}	0.800 ***	-1.022	-0.963 **	0.910 ***	-6.489	2.655

$1/U^2_{-1}$	1.937***	-0.670	-1.039[d]***	2.392***	2.449[d]	1.825
$(1/U^2)^Q$	-1.541***	0.840	1.357***	-1.357***	-1.824	-1.630
$(1/U^2)^A$	0.617***	0.031	-0.780**	0.121	-1.012	-0.978
$(1/U^2)^A_{-12}$	-0.190***	0.243	0.292**	0.112	0.725	-0.558
DW	-0.085[c]*	-0.085[c]	-0.193[c]***	0.043[c]	-3.743**	0.215[c]
DW_{-1}	-0.164***	0.083	-0.120	-0.240***	1.360	-0.489
DW^Q	-	-	-	-	-3.285*	-
DW^A	-	-	-	-	-8.664	-
DW^A_{-12}	-	-	-	-	4.053	-

TABLE LXXIII (Continued)

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
DP_{-1}	-0.169^{c} ***	0.017^{c}	-0.016^{c}	-0.184^{c} ***	2.033	-0.016^{c}
DP^{Q}	-	-	-	-	-3.360	-
DP^{A}	-	-	-	-	11.193 **	-
DP^{A}_{-12}	-	-	-	-	25.668 **	-
H/E_{-1} or P/E_{-1}	-1.358 ***	1.035	1.450 ***	-1.640 ***	0.706	0.138
$\bar{R}^2$	0.980	0.905	0.981	0.882	0.225	-0.077
R^2 Residuals	-1.527	-1.017	-5.485	-8.289	-11.926	-12.655
D.W. Residuals	1.76	0.89	1.61	1.90	2.18	0.91

B. Minimum Month

Variable	H/E	P/ER	S/E	(H-S)/E	ΔER/ER	ΔELF/ELF
K	-0.090 ***	-0.030	0.201 ***	-0.197 ***	-10.225 ***	0.377 ***
t	-0.516[a]	0.40[a]	0.191[a]	-0.366[a]	0.040 ***	-0.555[a] ***
t^2	-0.217[a] *	0.031[a]	0.267[a]	-0.315[a]	0.280[a]	-0.320[a] ***
V/E	1.444 ***	0.748 ***	-	0.731 *	-1.245	-4.155 ***
V/E_{-1}	-2.484 ***	0.253	5.194 ***	-5.110 ***	89.487 ***	-3.174 **
V/E^Q	0.851	0.103 **	1.276	0.600	68.752 ***	0.637 **
V/E^A	1.520 *	-0.834 *	-7.595 ***	6.179 ***	386.849 ***	4.966 ***
V/E^A_{-12}	-0.171	2.156	3.408 **	-2.380	-98.139 ***	-21.550 ***

TABLE LXXIII (Continued)

$1/U^2_{-1}$	1.741	2.288	-0.179[d]	-2.864	-39.010 ***	-18.809[d] ***
$(1/U^2)^Q$	1.725	-3.289	-4.871 *	9.930 *	113.236 ***	29.407 ***
$(1/U^2)^A$	-3.681	0.856	9.320 **	-10.198 **	-274.552 ***	-9.491 ***
$(1/U^2)^A_{-12}$	2.164 *	-1.183	-7.464 ***	6.285 ***	47.681 ***	12.762 ***
DW	0.081	-0.003[c]	-0.519 ***	0.681 ***	-3.008 **	0.251[c] ***
DW_{-1}	-0.206 ***	0.043	0.109	-0.304 ***	2.804 ***	-0.281 ***
DW^Q	0.774 *	-	-2.361 ***	2.790 ***	6.743 ***	-
DW^A	5.640	-	-12.227	13.060	-280.509 ***	-
DW^A_{-12}	3.830	-	3.995	2.068	1112.511 ***	-

DP_{-1}	0.056	0.027	-0.383	0.578	24.309 ***	-0.400[c] ***
DP^{Q}	-1.606 **	-	2.144 *	-2.489 *	-100.861 ***	-
DP^{A}	-2.873	-	13.686 ***	-11.541 ***	-86.918 ***	-
DP^{A}_{-12}	-3.133	-	2.675	-8.058	459.374 ***	-
H/E_{-1} or P/E_{-1}	1.245 ***	-0.842	-2.335 ***	2.896 ***	-306.151 ***	10.590 ***
$\bar{R}^2$	0.877	0.963	0.482	0.716	0.801	0.482
R^2 Residuals	0.243	-2.683	-4.201	-1.252	-1247.944	-234.854
D.W. Residuals	1.26	0.62	0.90	1.02	1.46	0.59

[a] Multiplied by 100

[c] DPR or DWR used

[d] $1/UP^2$ used

[e] W used

*Significant at 0.10 level
**Significant at 0.05 level
***Significant at 0.01 level

chapter seven

EMPLOYMENT CHANGES BY INDUSTRIAL DIVISION

Introduction

The models investigating hirings, separations, placements and employment changes in the various industrial divisions were fitted only to the monthly data. The basic specifications were based on those explored in the previous chapter. The lag structures used involved the "average" forms used in the earlier investigation, with the exception that in the versions using the current-months form the immediately lagged monthly value was dropped. Thus letting X_t^M be the current months value and letting

$$X_t^Q = \sum_{k=1}^{3} X_{t-k}^{M}/3$$

and

$$X_t^A = \sum_{=1}^{12} X_{t-k}^{M}/12 \qquad (1.1)$$

the current form was

$$C_M\,(X_t) = X_t^M\beta_1 + X_t^Q\beta_2 + X_t^A\beta_3 + X_{t-12}^{A}\beta_4 \qquad (1.2),$$

while the lagged form was

$$L_M(X_t) = X_{t-1}^{M}\beta_1 + X_t^{Q}\beta_2 + X_t^{A}\beta_3 + X_{t-12}^{A}\beta_4 \qquad (1.3).$$

In addition, some Almon-distributed lags were investigated using fourth-degree polynomials distributed over 24 months. They produced usually, though not invariably, slightly poorer results as judged by the standard errors of estimate or posterior probabilities without yielding any more clear-cut or intelligible results. Such conclusions as would emerge from the Almon specifications were the same as the ones which emerged from use of the average specification. As a result, these models were not pursued for all variables and divisions and no extensive reporting of them is made.

The specification experiments conducted for each variable considered three questions. The first was whether it was conditions in the sectoral labor market or in the total which affected things. Thus

$$T_{1i}^{c} = C_M(V_i/E_i) + L_M\,(VU_i/L_i) + L_M(VU_i/V_i) + L_M(1/U_i^2) \quad (1.4)$$

and

$$T_{1T}^{c} = C_M(V/E) + L_M\,(VU/L) + L_M\,(VU/V) + L_M(1/U^2) \quad (1.5)$$

are treated as alternatives. Here an i subscript represents the figures for the industrial division while the lack of a subscript indicates that industrial-composite or (in the case of unemployment) total-economy data are employed. The variables are those defined in Table LVI, with the appropriate substitutions of monthly for quarterly figures.

There is no reason why the sectoral variables and those for the industrial composite must necessarily be regarded as alternatives. Both might play a role and it was largely problems of collinearity and limitations on computational facilities which led to the approach taken. In the same vein, a mixture with some variables being for the industrial composite and others being for the specific industrial division might be appropriate. The number of possible combinations precluded this being investigated extensively, though as discussed below some investigation of mixtures occurred in arriving at the "final" equations. In the service division useful data from the Labour Force Survey were not available for the full period and only VU_i/V_i was available of those included in T_{1i}. For that sector the industrial-composite figures were used elsewhere in T_{1i}. The productivity variable, Z_i, was used only in its sectoral form, again with linear interpolation to obtain monthly values from quarterly data when necessary. RDP was not available in the Finance, Insurance and Real Estate division (FIR) and was simply dropped there. The lagged hirings to average employment or placements to employees reported variable was also used only in sectoral form. Even with these limitations, only eight divisions were investigated; for the others adequate data were not available.

The second question investigated was whether T_1^c or T_2^c, in which V/U replaces V/E and VU/L, was the appropriate labor-market tightness form. This, it will be recalled, was not resolved in the industrial-composite investigations.

The third issue was the inclusion of both sectoral and industrial-composite wage variables with wages being represented by Average Weekly Wages and Salaries. Despite some evidence in chapter six that the accelerationist variable DWR might be more appropriate, the alternative $DW_{it} = (W_{it}-W_{it-1})/W_{it-1}$ was used in all equations, in the form of $C_M(DW_i)$. The wages in the industrial composite were tried in three ways: a) $L_M(W_i/W)$, b) $L_M[D(W_i/W)]$, and c) $L_M[D(W)]$. All three forms presume that wages elsewhere act in a lagged fashion, while current wages in the sector operate only through their own rate of change. The first form presumes that relative wages matter; the second, that it is the rate of change of relative wages which is important; while the third assumes that the rate of change of other wages is to be set against the rate of increase of wages in the particular sector.

The possibilities considered yield twelve specifications. These are:

Specification	"Tightness"	Level	Wages
1	T_1	Sectoral (Sect)	W_i/W
2	T_1	Industrial Composite (I.C.)	W_i/W
3	T_1	Sect	$D(W_i/W)$

Specification	"Tightness"	Level	Wages
4	T_1	I.C.	$D(W_i/W)$
5	T_1	Sect	DW
6	T_1	I.C.	DW
7	T_2	Sect	W_i/W
8	T_2	I.C.	W_i/W
9	T_2	Sect	$D(W_i/W)$
10	T_2	I.C.	$D (W_i/W)$
11	T_2	Sect	DW
12	T_2	I.C.	DW

In presenting the results, we concentrate on the specification yielding the lowest standard error of estimate. (This also happened to yield the highest posterior probabilities in almost all cases.) To arrive at "final" equations, the following procedure was used. First, variables all of whose coefficients were not significantly different from zero at the 0.10 level were eliminated progressively, starting with the least significant ones. If the variable involved occurred in T_1 or T_2, it was first replaced by the corresponding variable from the alternative specification: industrial-composite figures if the lowest value of the standard error of estimate occurred with the industrial-division figures and conversely; and this variable was retained if it was significant.[1] Where all remaining variables were significant, individual coefficients were set equal to zero when their t-statistics were not significant at the 0.10 level, until all were significant. Exceptions to this means of elimination were the annual values of a variable when this

---

[1] By inadvertance this substitution was not attempted in a few instances: trade for placements seasonally adjusted; forestry, manufacturing and trade for placements minimum-month, and in the minimum-month employees reported equations.

quantity lagged 12 months was significant and the constant terms, which were retained whether or not they were significant. This procedure allows concentration on the more pronounced associations present in the data; there is virtually no chance that it has led to the "right" equations. The analyses were done separately for the seasonally-adjusted and the minimum-month figures described in chapter four.

Hirings and Placements

The results for the various specifications investigated for hirings and placements are shown in Tables LXXIV and LXXV. The highest value in each column is indicated by being underlined twice. The highest using the alternative types of variable for indicating labor-market tightness (sectoral versus overall) are shown by a single underlining.

Several things emerge from Tables LXXIV and LXXV. First, all values of $\bar{R}^2$ are very significantly different from zero; indeed, they might generally be considered to be very large. Second, there is not complete agreement as to whether T_1, which was stronger when hirings in the industrial composite was investigated, or T_2 was the better representation of labor-market tightness. T_2 gave stronger results than T_1 twice in the seasonally-adjusted hirings equations and once for placements, but it was always weaker when the minimum-month figures were used. Third it was unclear as to whether variables for the industrial division or for the industrial composite should be used in defining labor-market tightness. The industrial-composite figures produced the strongest results in 15 of the 32 columns. The industrial-composite was strongest in all four instances for mining and services. The industrial-division was strongest in all cases for forestry and construction. The other four divisions showed some diversity. Fourth, the same specification was strongest for the seasonally-adjusted and the minimum-month equations for only two divisions for the hirings equations and for two in the placement equations. Construction was common to both, though the specification for hirings was different from that for placements. The same specifications for hirings and placements occurred for three divisions with the seasonally-adjusted figures and for a different three for the minimum-month data. Evidently, no specification is suggested as having general validity and the picture which is suggested is one of diversity in hirings and placements among divisions.

The results for the strongest equations are shown in Tables LXXVI through LXXIX. The summary is in terms of the values of F for the hypothesis that the coefficients for a variable are zero and the sign of the sum of the coefficients. A zero indicates that the coefficients summed almost to zero in the sense that the sum was less than 10 per cent of the sums of coefficients having the same sign. In the case of V/E and DW_i, the sign of the coefficient for the current value is shown. The values of the Durbin-Watson statistic are also presented. Since the values here, and for other variables used in this chapter are usually fairly close to two and significant auto-correlation of residuals is not indicated by them or by Durbin's (1970) asymptotic test no correction for possible auto-correlation was made.

Care must be taken in examining Tables LXXVI through LXXIX because the specifications vary among the columns. For example, if a past rise in overall wages, lowering relative wages, tends to reduce hirings, there would tend to be negative coefficients for the DW terms in the tables for specifications 5, 6, 11, and 12 and by positive coefficients in the other specifications where the variables referred to are actually W_i/W or D (W_i/W). Similarly, odd-numbered specifications use variables for the division in defining "tightness" while even-numbered ones use variables for the industrial composite. This difference is apt to be most confusing in the case of the current value of V/E. When this variable refers to the industrial division, it is no surprise if a positive coefficient arises, indicating that hiring tends to rise when vacancies increase. When industrial-composite figures are used, such a sign might seem surprising. It may, however, still have the same interpretation with the overall figure being taken to be a good proxy for demand in the sector. This may arise because the vacancy figures for the division are of weak quality or because the lagged values, representing expectations quite possibly for the industrial composite are actually the relevant figures. Our procedure did not permit substitution of sectoral for industrial composite figures in only one instance -- and the very large number of possibly interesting cases militated against such experimentation. Finally, it was very far from being the usual pattern that all coefficients for a particular variable tended to have the same sign. Instead, often at least one was of different sign and this reversal of sign tended to recur in other variables for the corresponding coefficients.

However, it did not seem worthwhile to present all the separate coefficients, but this feature should be remembered in considering the signs presented.

There are two main findings of Tables LXXVI to LXXIX. The first is that all variables were significant in some equation and, with the exceptions of V/U (one in three), the trend (15 out of 32) and the H/E_{i-1} or P/ER_{i-1} variable (13 out of 32), all were significant in more than half their appearances. Ignoring the trend, about 60 per cent of the entries in the tables are significant. These findings, together with the very great significance for each of the equations, indicates that, either because of data limitations or as a genuine feature of the processes at work, only a rather complicated specification appears to be suitable.

The second finding is that there is very little consistency among equations in the overall signs for the variables. In only one case did a variable have the same sign throughout. This was the current value of the vacancy-employment ratio or vacancies-unemployment ratio. All other terms showed diversity of coefficients among the regressions for different industrial divisions as well as between the different types of regressions. There was also substantial diversity within industrial divisions among the four regressions involved. Although this feature is made more extreme by the use of different divisions and quantities remains a feature of the results when the same specifications are compared.

This diversity makes qualitative generalizations extremely difficult and precarious. It is not only the case that the data suggest that the operations of the labor market differ among sectors. They suggest also that the use of placements may suggest different things from the use of hirings and that the method of handling seasonality may have some substantial effects on the qualitative nature of the results. Despite these difficulties, it may be worth examining some of the signs indicated in Tables LXXVI to LXXIX and the coefficients of the "final" equations which are shown in Tables LXXX to LXXXIII. There "sect" refers to the use of figures for the division and "I.C." to the use of those for the industrial composite.

Probably the most important aspect concerns the role of wages. We have already noted that the current value of the rate of change of sectoral wages did not always have a positive sign. This carries over to the final equations, though it is also worth noting that this variable survived rarely in the equations for placements and in a minority of the cases for seasonally-adjusted hirings equations. It is also worth noting that the coefficients tended to be much smaller than those for the lagged values of this variable. Wages themselves, in some form, did play highly significant roles in most of the equations. It may be that the weakness of the wage data, especially since it is used on a monthly basis, as an indicator of variations in hiring rates of pay is at the root of the problems with the current values. One certainly cannot conclude from the results that the rate of hirings is unaffected by wages, though with these data it does appear that lagged values play the predominant role.

It is also not at all clear from the results what the effect of relative wages is, partly because of the variety of forms used. In many cases in the final equations and also in the original ones the use of W_i/W or DW_i/W would suggest more hirings when relative wages are higher or increasing, but this was far from being always the case. In some instances, this suggestion would be offset by coefficients of opposite sign for DW_i. One might interpret these coefficients as indicating that wage increases have more effect when they are not furthering disparity from the (trend) rate of relative wages or vice-versa. However, such an interpretation is tenuous. Furthermore, in some cases, most notably the seasonally-adjusted equation for hirings in construction, the data simply indicate that increasing wages and higher relative wages result in less hiring. This might, of course, represent a demand-side effect not adequately captured by other variables. Given the overall diversity of results, any particular interpretation is bound to be highly arbitrary and tenuous.

The situation was hardly any better when the rate of change of overall wages was used. However, it was usually, though not always, of opposite sign to the rate of change of wages within the division. In the same vein, no clear-cut pattern emerged for the effect of the rate of change of consumer prices. In conjunction with the wage terms, it would sometimes suggest that real wages matter in that changes in money wages are offset by corresponding changes in prices. In other cases, the interpretation could be made that the price changes reinforce wage changes in the process of forming expectations.

The coefficients for all the various indicators of labor market tightness show considerable strength for the annual average and that value lagged. As is the case throughout these regressions, no pattern emerged invariably but there was a large number of instances where these annual values are clearly much more important than the monthly or quarterly ones. Taken at face value, these results, which also appeared when the higher level of aggregation was used, suggest the importance of perceptions formed on the basis of experience extending over a very long period of time. They also suggest that sluggish response to changes in conditions in the labor market can be expected. The responses may then seem peculiar if they are considered only in the light of more immediate developments.

Separations

The specifications for the separations equations were the same as those used for hirings, with the exception that the current value of the vacancies-to-employment ratio was replaced by its lagged values. In terms of producing strong equations with no simple or clear-cut patterns emerging the results were very similar to the ones obtained from the hirings equations.

Table LXXXIV summarizes the results obtained from the various specifications in terms of the values of $\overline{R}^2$. In all cases the regressions are very highly significant. Unlike the results for the industrial composite, the first type of specification for labor-market tightness tended to give the strongest results, the only exceptions being the seasonally-adjusted equations for manufacturing and trade. The definition of tightness in terms of the figures for the industrial composite gives the strongest results in five cases both in the seasonally-adjusted equations and the minimum-month ones. In three divisions this was true for both types of equations. Only for services, where the lack of data required the use of industrial composite figures for VU/L, was the sectoral definition strongest in both types of equation. The overlap in the best specifications with these shown in Table LXXIV for hirings was also far from being complete. The wage-form W_i/W was strongest in seven of the eight seasonally-adjusted equations and two of the minimum-month ones. The rate of change of W_i/W gave the strongest results in one of the minimum-month cases while DW was strongest in the remaining ones.

The results in the "best" equations are summarized in terms of their overall signs and values of F in Tables LXXXV and LXXXVI. In each row of these tables the variable is significant at the 0.10 level at least once and usually more frequently. The rarest occasions are with the trend and the unemployment rate in the minimum-month regressions. As in the case of the hirings regressions, variations in signs occurred for the various variables and this is also the case when only significant occurrences are examined.

The confusion of sign patterns again prevents any firm conclusions. It is noticeable that the current rate of change of the sectoral wage variable more often than not has a positive rather than a negative coefficient. However, examination of Tables LXXXVII and LXXXVIII reveals that this variable "dropped out" in arriving at the final equations in all but four cases. In two of these, the coefficient was negative but of much smaller magnitude than the coefficients for lagged values of this variable. As those tables also indicate, there was also no clear pattern in historical relative wages. The most that could be said is that in the majority of instances there are ranges of the variables which are likely to occur where a rise in the sectoral wage is likely subsequently to lower the rate of separations. Given the fact that separations involve both voluntary and involuntary terminations of employment, the weakness of the data, and the econometric difficulties mentioned in chapter three, this is possibly the most one could hope for here in any case.

The coefficients in the "final" equations for separations also tended to display the predominance of the annual values and of those values lagged one year in many of the variables which represent labor-market tightness in a general sense. At the same time, there was no clear indication of the form in which this tightness is best measured, or any unambiguous indication that tightness in labor markets produced larger rates of separations. Almost as often as not the indications were that higher unemployment rates encouraged separations rather than discouraged them. Of course, given that the variable in question is a mixture of voluntary and involuntary separations (quits and fires) and that useful indicators may differ among parts of the labor market, this may not be surprising. However, like the other findings, it does indicate that drawing any simple inferences about the performances of this aspect of labor markets or relying on simple formulations for a crucial flow in labor markets, either theoretical or empirical, are highly perilous undertakings.

Employment Changes

The models for the various rates of change of employment showed many of the same features as those for hirings, placements and separations and may be summarized fairly briefly. No additional substantive findings emerged from considering the differences between hirings and separations and it seems pointless to discuss these equations further.

The results for the rate of change of employees reported and of employment as measured by the Labour Force Survey were remarkable mainly for the weakness of the fit of the equations in relation to those for hirings and separations. This was not simply a result of estimating these equations over a longer period; the values of $\overline{R}^2$ were similar when they were estimated for the same period as the hirings and separations equations to the values obtained with the longer time period. This weakness of fit was most pronounced for the seasonally-adjusted version of employment when even the best equations were significant in only two cases (manufacturing and TCU) and then only at the 0.10 level. Further work was not done with the models for this variable.

The values of $\overline{R}^2$ in the other models for the "best" equations were usually highly significant though, as Tables IXC through XCI show, they were often rather modest. As in the models considered in the earlier sections, there was considerable variation in which specification yielded the highest values of $\overline{R}^2$. This feature was again accompanied by a considerable diversity in the sign patterns and which variables were significant. Possibly the most interesting of the results indicated by the regressions is the strong, positive role for the output-to-employment variables, Z_i, in the equations for employees reported. Only in the case of mining, seasonally adjusted, is this variable not significant. Only in the case of trade, seasonally adjusted, is the effect not clearly positive and in that case a positive first-difference interpretation might be made. This tendency was, however, not invariable in all the results. Negative coefficients appeared for this variable in the minimum-month employment equations for TCU and trade, and they were highly significant in the first case. The equation, however, would also support in the pattern of signs obtained a first-difference approach and the sum was not significantly negative. In several other cases also, although the sum of coefficients was positive, their pattern would indicate that the first difference of Z_i plays at least some role.

This finding about the productivity variable does not mean that the rate of change of employment equations were fairly simple things. The variables for labor-market tightness collectively continued to play a role which was usually highly significant when the equation itself was. Here, however, clear-cut patterns of signs or agreement on which variables operated in which ways were not present. Similarly, there was no clear pattern on the effects of wages. The current values of the sectoral values did not always have the same sign, though most of these were insignificant. The lagged values also certainly gave no conclusive support to the notion that either rising or relatively high wages in a sector tends to lead to an increase in employment. Finally, the minimum-month equations for employment also revealed no clear-cut patterns nor did they match those achieved with employees reported.

Conclusion

The results gave no clear answer to the three specification questions asked. In some cases sectoral, but in others industrial-composite figures gave the stronger results. In several instances going to the "final" equations introduced both types of variables, but the procedure was not designed to introduce both the industrial-composite and the industrial-division versions of a particular variable into an equation. In the same vein, both versions of the labor-market tightness specifications showed strength, though the first (and wider) one produced the strongest results more frequently. The analyses were also unclear on the forms in which relative wage considerations enter the models, or on what the effects might be.

It is thus clear that to the very modest level of disaggregation pursued here, the way in which labor-markets operate is unclear. The results give every reason to suppose that this operation is highly complicated and varies among sectors. This conclusion arises from the very significant fits which the regressions as a whole usually provided, even though monthly data were used; from the large number of times each of the types of variables we considered was significant; and from the wide variety of sign patterns which were observed. It is also a pronounced feature of the results that they indicate long and complicated lag patterns operating in labor markets. It is also noticeable that the method by which seasonality was handled affected the qualitative nature of the results.

These conclusions, though negative and inconvenient, come as little surprise when it is remembered that the economic theory developed in the earlier parts of the study predicted few signs, that the econometric difficulties associated with the use of weak data could alter the nature of the parameters actually being estimated and their signs, and that the specifications are weak and arbitrary. Given these considerations, indeed, the results, together with those of the previous chapter, could be considered possibly to be more in line with the conclusions to be drawn from theory than opposed to it; but in no way can they be taken to give it strong confirmation. Similarly, provided that the variation of the errors and of the true sectoral variables were appropriate, they certainly do not preclude the possibility that a simple account which is similar (or even identical) among industrial sectors exists and that the diverse and baffling results which we obtained are simply the result of difficulties with data and with specification. What is clear, however, is that the extent to which such an account, if it exists, must fit the data is very high since our specifications gave very strong fits which a correct model must be able to surpass. Furthermore, taking the models simply in terms of associative indications, the diversity of specifications which show strength points to even more complicated and extensive patterns of association than it was feasible for us to investigate, not to simpler ones. It is also the case that with these data and with similar types of specification it is highly unlikely that simple, similar, and close-fitting models can be found. This proposition also appears to be a feature of the wage data available, as we shall see in chapter nine.

TABLE LXXIV

SECTORAL MODELS FOR HIRING/AVERAGE EMPLOYMENT

SUMMARY OF RESULTS FOR ALTERNATIVE SPECIFICATIONS[a]

(Values of $\bar{R}^2$)

A. Seasonally Adjusted

Specification	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
1	0.672	0.907	0.844	0.678	0.700	0.878	0.611	0.547
2	0.667	0.932	0.823	0.579	0.732	0.881	0.643	0.576
3	0.660	0.892	0.852	0.663	0.681	0.876	0.606	0.542
4	0.608	0.926	0.807	0.587	0.714	0.874	0.652	0.582
5	0.661	0.892	0.846	0.669	0.679	0.877	0.613	0.541
6	0.612	0.928	0.804	0.575	0.709	0.874	0.668	0.577
7	0.657	0.900	0.831	0.615	0.694	0.874	0.616	0.601
8	0.637	0.916	0.800	0.595	0.742	0.874	0.616	0.607
9	0.647	0.879	0.839	0.598	0.672	0.874	0.609	0.601
10	0.589	0.902	0.806	0.599	0.726	0.873	0.634	0.608
11	0.649	0.879	0.834	0.597	0.668	0.875	0.611	0.601
12	0.591	0.902	0.802	0.592	0.720	0.874	0.646	0.609

B. Minimum Month

Specification	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
1	0.843	0.788	0.886	0.961	0.846	0.845	0.781	0.843
2	0.777	0.870	0.908	0.943	0.882	0.845	0.748	0.866
3	0.855	0.754	0.905	0.950	0.840	0.857	0.776	0.836
4	0.800	0.855	0.906	0.919	0.845	0.846	0.734	0.863
5	0.858	0.743	0.904	0.952	0.832	0.844	0.789	0.838
6	0.810	0.849	0.901	0.921	0.823	0.849	0.750	0.863
7	0.840	0.688	0.801	0.922	0.824	0.841	0.739	0.787
8	0.706	0.853	0.840	0.921	0.863	0.804	0.757	0.832
9	0.827	0.668	0.820	0.885	0.810	0.856	0.708	0.768
10	0.758	0.843	0.827	0.902	0.830	0.781	0.708	0.793
11	0.825	0.648	0.815	0.878	0.787	0.848	0.733	0.785
12	0.765	0.837	0.822	0.903	0.819	0.807	0.741	0.806

[a] Significance levels for $\bar{R}^2$ are approximately 0.10 level - 0.11
0.05 level - 0.15
0.01 level - 0.21

TABLE LXXV

SECTORAL MODELS FOR PLACEMENTS/EMPLOYEES REPORTED

SUMMARY OF RESULTS FOR ALTERNATIVE SPECIFICATIONS[a]

(Values of $\bar{R}^2$)

A. Seasonally Adjusted

Specification	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
1	0.899	0.649	0.961	0.950	0.894	0.877	0.856	0.823
2	0.872	0.652	0.934	0.933	0.476	0.888	0.895	0.831
3	0.898	0.630	0.961	0.951	0.897	0.876	0.858	0.813
4	0.871	0.652	0.935	0.932	0.468	0.873	0.899	0.822
5	0.898	0.628	0.961	0.951	0.895	0.880	0.858	0.811
6	0.871	0.652	0.935	0.931	0.471	0.873	0.898	0.821
7	0.872	0.550	0.920	0.907	0.831	0.864	0.826	0.832
8	0.860	0.603	0.914	0.919	0.413	0.886	0.840	0.838
9	0.856	0.508	0.910	0.907	0.829	0.861	0.831	0.822
10	0.853	0.599	0.915	0.916	0.407	0.873	0.844	0.824
11	0.864	0.505	0.912	0.906	0.830	0.863	0.830	0.820
12	0.853	0.599	0.915	0.916	0.407	0.872	0.843	0.822

B. Minimum Month

Specification	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
1	0.826	0.694	0.970	0.951	0.917	0.873	0.847	0.882
2	0.685	0.800	0.911	0.913	0.282	0.864	0.790	0.890
3	0.825	0.685	0.971	0.953	0.912	0.867	0.850	0.878
4	0.719	0.783	0.909	0.892	0.282	0.851	0.813	0.881
5	0.836	0.696	0.971	0.952	0.911	0.867	0.873	0.879
6	0.743	0.783	0.909	0.891	0.319	0.853	0.827	0.880
7	0.737	0.541	0.828	0.848	0.679	0.832	0.790	0.867
8	0.657	0.708	0.804	0.869	0.250	0.837	0.738	0.865
9	0.722	0.495	0.831	0.808	0.670	0.816	0.762	0.851
10	0.703	0.689	0.810	0.824	0.252	0.815	0.744	0.854
11	0.723	0.541	0.831	0.795	0.676	0.821	0.809	0.852
12	0.718	0.695	0.810	0.826	0.275	0.827	0.795	0.854

Values of $\bar{R}^2$ significantly different from zero are approximately 0.10 level - 0.08
0.05 level - 0.10
0.01 level - 0.15

TABLE LXXVI

SECTORAL MODELS FOR HIRINGS/AVERAGE EMPLOYMENT

(Summary of Signs and Significance of Variables in Selected Regressions)

(Seasonally Adjusted)

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Spec.	1	2	3	1	8	1	6	12
t, t^2	F	1.2	4.6^y	0.5	0.9	2.5^x	0.7	2.8^x	0.9
z_i	F	2.6^y	0.9	0.7	3.1^y	0.9	2.3^y	-	1.8
	Sign	-	-	+	+	-	-	-	+
V/E or V/U	F	4.3^z	13.4^z	11.6^z	7.8^z	4.0^z	1.1	4.8^z	9.4^z
	Sign	+ -	+ -	+ -	+ -	+ -	+ -	+ -	+ +
VU/L	F	1.6	9.6^z	0.8	1.9	-	1.1	0.4	-
	Sign	+	+	+	+	-	+	+	-
VU/V	F	0.3	9.1^z	1.8	1.4	1.0	1.1	1.5	0.6
	Sign	-	-	-	-	+	-	+	-
$1/U^2$	F	1.7	5.6^z	0.4	1.1	4.9^z	3.4^y	3.9^z	1.2
	Sign	-	-	-	+	-	-	+	-
DW_i	F	4.3^z	3.3^y	3.0^y	1.9	1.7	0.9	0.7	0.5
	Sign	+ -	+ +	+ +	+ -	+ +	- -	- +	- -
DW	F	4.7^z	2.3^x	1.8	1.8	3.2^y	0.9	2.0^x	0.9
	Sign	+	-	-	-	+	-	-	+
DCPI	F	2.8^y	0.5	0.3	2.0^x	0.9	0.5	4.3^z	2.1^x
	Sign	-	-	+	+	-	+	+	-
H/E_{-1}	t	-0.6	-2.1^y	-0.4	2.6^y	-1.8^x	1.2	-2.2^y	-2.6^y
	D.W.	1.98	2.02	2.07	2.03	2.25	2.11	2.10	2.17

x - significant at 0.10 level
y - significant at 0.05 level
z - significant at 0.01 level

TABLE LXXVII

SECTORAL MODELS FOR HIRINGS/AVERAGE EMPLOYMENT

(Summary of Signs and Significance of Variables in Selected Regressions)

(Minimum Month)

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Specification	5	2	3	3	1	1	5	2
t, t^2	F	1.0	3.8^z	0.9	0.3	0.3	0.6	2.0	0.8
z_i	F	8.0^z	9.7^z	9.8^z	15.9^z	10.5^z	1.0	- -	19.9^z
	Sign	-	+	-	+	-	-	-	0
V/E	F	8.2^z	10.8^z	31.0^z	20.0^z	3.7^z	4.5^z	1.6	7.8^z
	Sign	+ 0	+ +	+ +	+ -	+ +	+ -	+ -	+ +
VU/L	F	0.5	4.0^z	4.3^z	2.9^z	4.0^z	6.8^z	2.3^x	11.7^z
	Sign	+	-	-	-	-	+	+	-
VU/V	F	5.4^z	5.2^z	2.7^y	2.4^x	6.0^z	2.8^y	0.3	3.5^z
	Sign	-	+	+	+	+	-	-	+
$1/U^2$	F	0.1	4.2^z	3.8^z	1.5^x	0.8	0.8	2.4^x	1.1
	Sign	+	+	+	-	+	-	+	+
DW_i	F	9.7^z	13.2^z	12.5^z	3.4^y	2.7^y	4.5^z	3.1^y	5.3^z
	Sign	- -	+ +	+ +	+ +	+ +	- -	- -	+ +
W_i/W	F	6.2^z	4.8^z	6.3^z	10.8^z	11.6^z	2.3^x	8.7^z	1.9
	Sign	-	+	+	+	+	0	-	-
DCPI	F	3.8^z	1.0	0.2	2.5^y	1.6	0.3	0.8	1.1
	Sign	+	+	+	+	+	0	-	-
H/E_i	t	3.7^z	-1.2	-0.1	4.8^z	1.8^x	0.4	1.0	-7.8^z
	D.W.	1.97	1.81	2.18	2.24	2.33	2.32	2.34	2.16

x - significant at 0.10 level
y - significant at 0.05 level
z - significant at 0.01 level

TABLE LXXVIII

SECTORAL MODELS FOR PLACEMENTS/EMPLOYEES REPORTED

(Summary of Signs and Significance of Variables in Selected Regressions)

(Seasonally Adjusted)

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Specification	1	6	3	5	3	2	4	8
t, t^2	F	1.9	5.3^z	6.7^z	1.8	7.7^z	12.0^z	33.1^z	2.3^x
z_i	F	3.8^z	1.9	4.6^z	5.5^z	1.0	8.4^z	-	2.1^x
	Sign	+	+	-	+	+	-	-	-
V/ER	F	15.9^z	10.6^z	80.2^z	42.8^z	100.3^z	6.1^z	24.5^z	4.1^z
	Sign	+ 0	+ +	+ +	+ -	+ -	+ +	+ -	+ 0
VU/L	F	2.7^y	1.5	7.0^z	3.5^z	7.1^z	0.9	8.6^z	-
	Sign	0	-	-	-	+	-	+	-
VU/V	F	1.3	1.5	4.5^z	1.7	4.1^z	2.5^y	7.0^z	3.5^z
	Sign	+	+	+	0	-	+	-	0
$1/U^2$	F	3.9^z	3.0^y	7.1^z	3.6^z	6.2^z	0.5	5.9^z	1.8
	Sign	-	+	+	+	-	-	-	0
DW_i	F	5.5^z	0.9	0.9	1.2	3.5^z	0.5	2.3^x	0.7
	Sign	- +	- +	+ +	- -	- -	- +	+ -	+ -
DW	F	0.7	0.3	1.1	1.9	3.2^y	6.7^z	6.6^z	3.8^z
	Sign	+	-	-	+	+	-	+	+
DCPI	F	2.3^x	4.2^z	2.2^x	2.3^x	3.5^z	2.7^y	5.5^z	2.8^y
	Sign	-	+	-	-	+	-	+	-
$(P/ER)_{i-1}$	t	-0.2	-1.1	1.2	1.0	0.3	-1.0	0.8	1.8^x
	DW	2.19	2.04	2.06	2.14	1.99	2.07	1.98	2.09

x - significant at 0.10 level.
y - significant at 0.05 level.
z - significant at 0.01 level.

TABLE LXXIX

SECTORAL MODELS FOR PLACEMENTS/EMPLOYEES REPORTED

(Summary of Signs and Significance of Variables in Selected Regressions)

(Minimum Month)

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Specification	5	2	5	3	1	1	5	2
t, t^2	F	3.4^y	9.8^z	1.7	2.2	0.4	4.4^z	6.1^z	4.4^z
z_i	F	5.1^z	3.8^z	4.9^z	5.8^z	3.5^z	6.6^z	- -	4.4^z
	Sign	+	+	-	+	-	-	-	-
V/ER	F	25.2^z	24.8^z	264.0^z	128.4^z	25.1^z	12.5^z	7.9^z	21.9^z
	Sign	+ -	+ +	+ +	+ -	+ -	+ -	+ -	+ +
VU/L	F	0.9	3.4^y	11.1^z	4.8^z	9.6^z	2.8^y	4.6^z	1.2
	Sign	+	+	-	+	+	+	-	+
VU/V	F	3.7^z	3.4^y	0.7	1.7	1.3	2.0^x	1.3	2.2^x
	Sign	+	+	+	-	0	+	+	+
$1/U^2$	F	0.3	2.1^x	2.8^y	1.6	4.5^z	0.5	7.2^z	1.8
	Sign	+	+	+	-	-	+	+	-
DW_i	F	1.8	10.2^z	0.2	1.8	3.0^y	3.0^y	2.6^y	1.7
	Sign	+ -	+ +	- 0	+ +	- -	- -	- -	+ +
DW	F	6.7^z	3.5^z	2.2^x	1.4	5.5^z	1.9	16.6^z	3.6^z
	Sign	+	+	+	-	+	+	+	+
DCPI	F	0.9	0.7	2.1^x	2.9^y	2.5^y	2.1^x	0.6	1.9
	Sign	0	+	-	-	+	0	-	-
$(P/ER_i)_{-1}$	t	2.2^y	0.4	0.9	2.7^z	-0.6	-0.07	2.2^y	-1.3
	D.W.	2.18	2.21	1.83	2.41	1.81	2.08	2.05	1.98

^{x} Significant at 0.10 level.
^{y} Significant at 0.05 level.
^{z} Significant at 0.01 level.

TABLE LXXX

SECTORAL MODELS FOR HIRINGS/AVERAGE EMPLOYMENT--SEASONALLY ADJUSTED

Final Equation

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
K	10.49***	75.46***	3.53***	67.32***	2.54	-6.52	-1.61*	2.33
t	-	-0.13***	-	-	-	-	-0.05***	-
t^2	-	0.08***	-	-	0.04***	0.02***	-	-
z_{i-1}^{M}	-	-	-	2.22***	-	-	-	-
z_i^{Q}	-	-	-	-	-	-	-	9.89***
z_i^{A}	-	-	-	-	-	3.53***	-	-8.98***
z_{i-12}^{A}	-	-	-	-	-	-	-	-
	Sect.	IC	Sect.	Sect.	V/U IC	Sect.	IC	V/U IC
V/E^{M}	0.82***	0.50***	0.91***	0.71***	-	-	0.28***	0.44***
V/E^{Q}	-	-0.57***	-	-	-	-	-	-0.37***
V/E^{A}	-	-4.84***	-0.38**	-2.41***	0.34**	-1.19***	0.85***	0.60***
V/E_{-12}^{A}	-	-3.92***	-	-	-	-0.71***	-0.71***	-
	Sect.	IC	IC	Sect.		Sect.		
VU/L_{-1}^{M}	-	-	-	-	-	-	-	-
VU/L^{Q}	-	-	-	-1.33***	-	-	-	-
VU/L^{A}	0.25**	3.67***	0.13*	2.90***	-	0.87***	-	-
VU/L_{-12}^{A}	0.21***	3.76***	-0.14**	-	-	0.46**	-	-
				Sect.		Sect.	IC	IC
VU/V_{-1}^{M}	-	-	-	-	-	-0.21**	-	-
VU/V^{Q}	-	-	-	5.81***	-	0.87***	-	-0.78**
VU/V^{A}	-	-7.73***	-	-13.71***	-	-2.86***	1.77***	1.48**
VU/V_{-12}^{A}	-	-8.25***	-	2.72***	-	-	-	-

TABLE LXXX (Continued)

Variable	For. Sect.	Min. IC	Mfg. IC	Cons. Sect.	TCU IC	Trade	FIR IC	Serv. IC
$(1/U^2)^M_{-1}$	-	-	-	-	0.13**	-	-	-
$(1/U^2)^Q$	-	-	-	-	-0.20***	-	-	-
$(1/U^2)^A$	-0.29***	-0.31***	-0.10**	3.11***	-0.20	-	-0.32***	-0.46***
$(1/U^2)^A_{-12}$	-	-0.96***	0.13***	-	0.06**	-	0.19***	-
		(x100)	(x100)	(x100)	(x100)			
DW^M_i	-	0.59**	0.70***	-	0.34**	-	-	-
DW^Q_i	-	-	-	-	-	-	-	-
DW^A_i	-	8.59**	8.28***	0.20	4.53	-	-	-
DW^A_{i-12}	-	11.27***	-	-6.31**	5.01*	-	-	-
		W_i/W	DW_i/Wx1000	W_i/W	W_i/W	W_i/W	DWx100	
DW^M	-	-	0.08**	-0.21***	0.11***	-	-0.60*	-
DW^Q	-	-		-	-0.18***	-	-	-
DW^A	-	-0.29***	-1.30***	-0.27***	0.29***	-0.08	-8.13**	-
DW^A_{-12}	-	-	-0.92**	-	-0.23***	0.25***	-	-
$DCPI^M_{-1}$	-	-	-	0.07**	-	-	-	-
$DCPI^Q$	-	-	-	-0.15*	-	-	-0.09***	-
$DCPI^A$	-	-	-.	-0.25	-	-	0.15*	-
$DCPI^A_{-12}$	-	-	-	-0.34*	-	-	0.22***	-
$(H/E)_{i-1}$	0.42***	-	-	0.21***	-	-	-	-0.15*
$\bar{R}^2$	0.54	0.93	0.83	0.70	0.73	0.88	0.66	0.62
S.E.E.	3.88	0.23	0.17	0.66	0.23	0.16	0.24	0.37
D.W.	2.01	2.04	1.54	1.98	2.41	1.94	2.20	2.10

TABLE LXXXI

SECTORAL MODELS FOR HIRINGS/AVERAGE EMPLOYMENT

MINIMUM MONTH

Final Equations

Variable	For	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
K	1.41	-56.73***	12.44	3.21	25.41***	7.13***	1.53***	-0.53
t	-	-1.49***	-	-	-	-	-	-
t^2	-	0.11***	-	-	-	-	-	-
$z_{i\ -1}^{M}$	0.91***	-	-7.89***	-1.43***	-	-	-	-22.29***
z_i^Q	-0.54**	1.21***	11.81***	3.07***	3.43***	-	-	22.76***
z_i^A	1.06*	0.38	-	-1.78***	-2.86***	-	-	-
$z_{i\ -12}^{A}$	-1.71***	0.89***	-	-	-	-	-	-
	Sect.	I.C.	I.C.	Sect.	I.C.	Sect.	Sect.	I.C.
V/E^M	1.20***	0.80***	0.83***	1.45***	0.28***	0.24***	0.21**	0.36***
V/E^Q	1.85***	-	0.51**	-1.27***	-	1.26***	0.54***	1.84***
V/E^A	-	-	-0.62**	0.61***	-	-1.44***	-1.43**	-1.06***
V/E^A_{-12}	-	-	0.48*	0.43***	-	0.99*	-	0.61***

TABLE LXXXI (Continued)

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
		I.C.	I.C.	Sect.	I.C.	Sect.	Sect.	I.C.
VU/L^{M}_{-1}	-	0.29***	-	-0.57***	0.23***	0.50***	0.29***	0.90***
VU/L^{Q}	-	-	-0.42***	-	-0.58***	-1.32***	-	-1.61
VU/L^{A}	-	0.66**	-0.13	-	0.45***	1.56***	-0.06	-
VU/L^{A}_{-12}	-	-1.36***	0.80***	-	-	1.52**	-0.15**	-
	Sect.	I.C.	I.C.	Sect.	I.C.	Sect.	I.C.	I.C.
VU/V^{M}_{-1}	4.28***	-	-0.27**	1.42***	-	-	-	-
VU/V^{Q}	-4.29***	1.70***	1.34***	-	1.31***	2.65***	0.82***	1.87***
VU/V^{A}	-	-2.12**	-	-	-1.11***	-3.80***	-0.66**	-
VU/V^{A}_{-12}	-	-	-	-	-	-2.77***	0.73**	-
		I.C.	I.C.	Sect.			Sect.	
$1/U^{2\,M}_{-1}$	-	-	-	-	-	-	-0.07*	-
$1/U^{2\,Q}$	-	-	0.47***	0.07***	-	-	0.73***	-

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
$1/U2^{A}$	-	1.66***	0.64***	-	-	-	-	-
$1/U2^{A}_{-12}$	-	2.44***	0.83***	-	-	-	-	-
		(x100)	(x100)	(x100)	(x100)	(x100)	(x100)	(x100)
DW_i^{M}	-	0.37***	0.59***	0.45***	0.27*	-1.48***	-1.38***	0.88**
DW_i^{Q}	0.19***	-4.23***	-2.05***	-	-	-	-	-3.16***
DW_i^{A}	-0.40***	4.10	9.20**	-	-	-	-11.88***	-
$DW_{i\ -12}^{A}$	-	8.42*	9.21**	-	-	-	-9.70***	-
	DW	W_i/W	W_i/W	W_i/W	W_i/W	$D(W_i/W)x100$	DWx100	W_i/W
DW^{M}_{-1}	-0.12***	-	-0.16*[d]	-0.19***	0.14***	0.10***	0.60***	0.18***
DW^{Q}	-0.94***	0.29***	0.64***	0.21***	-0.39***	-0.21***	-2.37***	-
DW^{A}	-	-	0.63***	-	-	-	-	-0.20**

TABLE LXXXI (Continued)

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
DW^{A}_{-12}	-	-	-	-	-	-	-	-
$DCPI^{M}_{-1}$	-	-	-	-	-	-	-	-
$DCPI^{Q}$	-1.29***	-	-	-0.12*	-	-	-	-
$DCPI^{A}$	2.27**	-	-	-	-	-	-	-
$DCPI^{A}_{-12}$	2.68***	-	-	-	-	-	-	-
$H/E_{i\ -1}$	0.26***	-	-	0.37***	0.24***	-	-	-0.55***
$\bar{R}^2$	0.87	0.87	0.91	0.96	0.88	0.86	0.82	0.86
S.E.E.	5.31	0.39	0.22	0.82	0.26	0.28	0.26	0.42
D.W.	1.69	1.75	2.00	2.14	2.00	2.02	2.27	2.10

TABLE LXXXII

SECTORAL MODELS FOR PLACEMENTS/EMPLOYEES REPORTED

SEASONALLY ADJUSTED

Final Equations

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
k	1.58	0.11	6.96***	-0.33	-0.01	7.51**	1.67***	-64.23*
t	-0.07*	-0.04***	0.26***	-0.12***	-0.01***	0.04***	-0.03***	-0.93**
t^2	-	-0.01**	-	-	0.01***	-0.01***	0.01***	0.08**
$z_{i\,-1}^{M}$	-	-	-	0.55***	-	0.49*	-	-
z_i^{Q}	0.13***	0.04**	-	-	-	1.10**	-	-
z_i^{A}	-	-	-5.15***	0.20*	-	-2.06***	-	-2.42**
$z_{i\,-12}^{A}$	-	-	-4.89***	-0.17**	-	-2.11***	-	2.15***
	Sect.	I.C.	Sect.	Sect.	Sect.	I.C.	I.C.	V/U I.C.
V/ER^M	0.19***	0.11***	0.51***	0.57***	0.47***	0.27***	0.12***	0.32***
V/ER^Q	0.27***	-	-	-	-0.10**	-	0.15***	-

TABLE LXXXII (Continued)

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
V/ER^{A}	-0.12	-0.02	0.09	0.00	-0.13	-0.26***	-0.25***	-0.57
V/ER^{A}_{-12}	-0.16**	-0.17***	0.20***	-0.26***	-0.21**	-0.30***	-0.24***	1.12**
	Sect.		Sect.	Sect.	Sect.		I.C.	
VU/L^{M}_{-1}	-	-	-0.04**	-0.11***	-	-	-	-
VU/L^{Q}	-0.07***	-	-	-	0.11***	-	-0.10***	-
VU/L^{A}	0.04	-	-0.10***	-	0.16***	-	0.19***	-
VU/L^{A}_{-12}	0.09***	-	-0.22***	-	0.25***	-	0.21***	-
	Sect.	I.C.	Sect.		Sect.	I.C.	I.C.	I.C.
VU/V^{M}_{-1}	0.08*	-	0.07*	-	-	-	-	-
VU/V^{Q}	-	-	-0.16***	-	-	-	0.16***	-
VU/V^{A}	-0.13	-0.09	0.41***	-	0.06	-0.32***	-0.29***	1.65
VU/V^{A}_{-12}	-0.40**	0.26***	0.54***	-	-0.24***	-	-0.46***	3.13***

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Sect.	I.C.	Sect.	Sect.	Sect.		I.C.	I.C.
$(1/U^2)^M_{-1}$	0.84***	-	-0.02***	0.51***	-	-	-	-
$(1/U^2)^Q$	-	-0.03***	0.02***	-	-	-	-	-
$(1/U^2)^A$	-4.97***	0.07***	0.02**	-	-0.07***	-	-0.03***	0.57
$(1/U^2)^A_{-12}$	-	-	0.02***	-	-0.06***	-	-0.05***	-1.20***
	(x100)			(x100)	(x100)			
DW_i^M	-	-	-	-	-	-	-	-
DW_i^Q	-1.96***	-	-	1.55*	-	-	-	-
DW_i^A	4.34***	-	-	-	-4.59***	-	-0.02***	-
$DW^A_{i\ -12}$	5.37***	-	-	-	-2.30*	-	-	-
					$D(W_i/W)$	W_i/W	$D(W_i/W)^{x100}$	W_i/W
DW^M	-	-	-	-	-	-	-	-
DW^Q	-	-	-	-	-	-	-	-

TABLE LXXXII (Continued)

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
DW^A	-	-	-	-	0.05***	-1.24***	0.24***	1.51
DW^A_{-12}	-	-	-	-	0.04**	1.57***	-	9.90***
			x100				(x100)	
$DCPI^M_{-1}$	-	-	-	-	0.01***	-	-	-
$DCPI^Q$	-	-	-0.68**	-	-0.01*	-0.03***	-0.77**	-
$DCPI^A$	-0.28***	-	-	-0.19***	0.08***	0.18***	5.50***	-0.43***
$DCPI^A_{-12}$	-0.34***	-	-	-0.12***	0.05***	-	1.93**	-0.34*
$(P/ER)_{i\ -1}$	-	-	0.12*	-	-	-	-	-0.15*
$\bar{R}^2$	0.90	0.64	0.96	0.95	0.90	0.88	0.90	0.84
S.E.E.	0.36	0.07	0.04	0.25		1.17	0.04	0.71
D.W.	2.14	2.02	2.05	1.93	1.83	1.88	1.83	2.08

TABLE LXXXIII

SECTORAL MODELS FOR PLACEMENTS/EMPLOYEES REPORTED

MINIMUM MONTH

Final Equations

Variable	For.	Min.	Mfg.	Cons	TCU	Trade	FIR	Serv.
K	-16.04***	-5.60***	1.14***	0.20	-5.47***	11.42***	0.27**	-55.53***
t	-0.72***	-0.05***	0.03***	-	-	-	0.01***	0.71***
t^2	-0.07***	-0.06***	-	-	-	-0.01**	-	0.05***
z_{i-1}^{M}	0.85***	0.04***	-0.68**	-	-	-	-	-
z_i^{Q}	-	-	1.72***	0.23***	-0.60***	1.30***	-	0.78***
z_i^{A}	3.40***	-	-2.27***	-0.27**	0.35	-2.16***	-	-1.31*
z_{i-12}^{A}	-	-	-	-	-0.62***	-0.88***	-	-
	I.C.	I.C.	Sect.	Sect.	Sect.	Sect.	Sect.	I.C.
V/ER^M	0.89***	0.15***	0.56***	0.74***	0.42***	0.21***	0.06***	1.06***
V/ER^Q	-	-0.04*	0.09**	-	-	0.16***	0.07***	1.19***

TABLE LXXXIII (Continued)

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
V/ER^{A}	-0.43***	0.23***	-0.12***	0.21**	-	-	-0.27***	-0.27
V/ER^{A}_{-12}	-	-	-	-0.33***	-	-	-	1.13***
		I.C.	Sect.	Sect.	Sect.	Sect.	Sect.	I.C.
VU/L^{M}_{-1}	-	0.04***	-0.03***	-0.13***	0.16***	-	0.04***	-
VU/L^{Q}	-	-	-	-	-	-0.13***	-	-0.64***
VU/L^{A}	-	0.18***	-0.07***	-0.29***	0.15***	-0.01	-0.00	-
VU/L^{A}_{-12}	-	-0.14***	-0.02***	0.21***	0.36***	-0.26***	-0.03***	-
	Sect.	I.C.		Sect.	Sect.	Sect.	Sect.	I.C.
VU/V^{M}_{-1}	0.88***	-	-	-	-	-	0.02*	-
VU/V^{Q}	-0.91**	0.07*	-	0.28*	-	0.22***	-	0.72*
VU/V^{A}	0.49	0.01	-	-	0.23***	-0.06	-0.04	0.29

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
VU/V^{A}_{-12}	0.63**	0.50***	-	-	-0.14**	0.51***	0.07***	2.37***
		I.C.	Sect.	Sect.	Sect.		Sect.	I.C.
$1/U^{2M}_{-1}$	-	-	0.02***	-	-0.01**	-	-	-
$1/U^{2Q}$	-	-	0.02***	0.01**	-	-	-	-
$1/U^{2A}$	-	0.12***	0.08***	-0.01	-0.10***	-	0.12***	0.23
$1/U^{2A}_{-12}$	-	-	-	-0.04**	-0.07***	-	-	-1.22***
		(x100)		(x100)	(x100)	(x100)	(x100)	
DW_i^{M}	-	-	-	0.09***	-	0.39***	-	-
DW_i^{Q}	0.12*	-0.55***	-	-	-	-0.89***	-	-0.03***
DW_i^{A}	-0.97**	1.46***	-	-	-1.58***	-	-0.63**	-
$DW_{i\,-12}^{A}$	-	1.24**	-	-	-	-	-1.17***	-

TABLE LXXXIII (Continued)

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	DW	W_i/W	DW(x100)		W_i/W	W_i/W	DWx100	W_i/W
DW^M	-0.04***	-	0.06***	-	0.57***	-0.30**	0.15***	1.12**
DW^Q	-0.20***	3.13***	-0.33***	-	-	0.79***	-0.16**	3.26**
DW^A	0.20	-	2.11***	-	-	-1.62***	0.28	3.52**
DW^A_{-12}	0.62***	-	2.59***	-	-	-	0.84*	-
			(x100)		(x100)			
$DCPI^M$	-	-	-	-	0.78*	-	-	-
$DCPI^Q$	-	-	-0.59***	-0.04***	-	-0.02***	-	-
$DCPI^A$	-	-	-	-	4.35**	0.05**	-	-0.21**
$DCPI^A_{-12}$	-	-	-	-	-	-	-	-0.21*
$(P/ER_i)_{-1}$	0.11***	-	-	0.15***	-	-	0.22***	-

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
$\overline{R}^2$	0.84	0.80	0.97	0.95	0.92	0.88	0.88	0.89
S.E.E.	1.60	0.06	0.03	0.23	1.05	1.11	0.36	0.45
D.W.	2.04	1.99	1.71	2.36	1.80	2.00	2.08	1.96

TABLE LXXXIV

SECTORAL MODELS FOR SEPARATIONS/AVERAGE EMPLOYMENT

SUMMARY OF RESULTS OF ALTERNATIVE SPECIFICATIONS[a]

(Values of $\bar{R}^2$)

A. Seasonally Adjusted

Specification	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
1	0.858	0.807	0.357	0.731	9.547	0.806	0.753	0.528
2	0.831	0.812	0.366	0.691	0.579	0.833	0.801	0.476
3	0.846	0.779	0.338	0.715	0.594	0.803	0.759	0.523
4	0.822	0.804	0.366	0.695	0.593	0.818	0.798	0.468
5	0.843	0.779	0.356	0.725	0.597	0.826	0.757	0.525
6	0.822	0.804	0.366	0.701	0.598	0.825	0.793	0.470
7	0.854	0.797	0.376	0.699	0.548	0.813	0.736	0.480
8	0.828	0.810	0.381	0.690	0.541	0.834	0.774	0.457
9	0.838	0.760	0.320	0.698	0.587	0.799	0.743	0.476
10	0.823	0.788	0.373	0.700	0.585	0.821	0.770	0.453
11	0.835	0.760	0.329	0.705	0.589	0.817	0.746	0.483
12	0.823	0.786	0.373	0.704	0.590	0.830	0.766	0.458

B. Minimum Month

Specification	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
1	0.716	0.630	0.623	0.910	0.568	0.581	0.556	0.640
2	0.725	0.690	0.664	0.923	0.635	0.706	0.508	0.642
3	0.710	0.646	0.614	0.885	0.545	0.601	0.513	0.647
4	0.730	0.616	0.565	0.903	0.611	0.717	0.436	0.647
5	0.776	0.651	0.672	0.880	0.519	0.561	0.556	0.647
6	0.778	0.613	0.644	0.890	0.630	0.699	0.440	0.634
7	0.720	0.625	0.562	0.905	0.556	0.570	0.499	0.602
8	0.737	0.629	0.597	0.913	0.545	0.558	0.502	0.613
9	0.709	0.592	0.536	0.888	0.518	0.611	0.450	0.578
10	0.719	0.526	0.517	0.880	0.540	0.594	0.430	0.579
11	0.765	0.593	0.594	0.879	0.476	0.578	0.490	0.588
12	0.753	0.524	0.561	0.879	0.534	0.576	0.430	0.582

[a] Significance levels for $\bar{R}^2$ are approximately 0.10 level - 0.11
0.05 level - 0.15
0.01 level - 0.21

TABLE LXXXV

SECTORAL MODELS FOR SEPARATIONS/AVERAGE EMPLOYMENT

SUMMARY OF SIGNS AND SIGNIFICANCE OF VARIABLES IN SELECTED REGRESSIONS

(Seasonally Adjusted)

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Specification	1	2	8	1	6	8	2	1
t, t^2	F	0.0	2.0	1.1	0.7	2.8^y	3.7^y	0.1	1.4
z_i	F	0.2	1.5	0.4	1.6	3.1^y	2.4^y	-	1.6
	Sign	-	+	-	-	-	+	-	+
V/E	F	0.9	1.2	0.5	3.1^y	1.6	0.6	3.1^y	2.7^y
	Sign	+	-	+	+	+	+	-	-
VU/L	F	1.7	1.2	-	3.4^y	1.2	-	3.6^z	1.6
	Sign	+	+	-	-	-	-	+	-
VU/V	F	0.5	1.5	2.1^x	3.3^y	1.1	4.3^z	4.7^z	1.9
	Sign	+	-	-	+	+	+	-	0
$1/U^2$	F	5.0^z	0.5	1.0	3.7^z	3.4^y	0.5	0.9	1.1
	Sign	-	+	+	-	+	-	+	+
DW_i	F	4.4^z	0.9	1.1	4.0^z	4.3^z	1.2	2.6^y	0.9
	Sign	+ -	+ -	+ -	+ -	- +	+ -	+ -	- -
DW	F	4.5^z	2.4^y	1.6	2.4^y	5.3^z	2.6^y	3.3^y	0.6
	Sign	-	+	+	+	-	-	-	-
DCPI	F	1.3	0.7	0.3	3.1^y	2.2^x	2.7^y	1.0	1.9
	Sign	+	-	-	-	-	-	+	+
$(H/E)_{i-1}$	t	3.9^z	-1.3	0.8	0.9	1.1	0.9	1.3	2.4^y
	D.W.	2.16	1.94	2.61	2.42	2.11	2.25	2.40	2.35

x - significant at the 0.10 level
y - significant at the 0.05 level
z - significant at the 0.01 level

TABLE LXXXVI

SECTORAL MODELS FOR SEPARATIONS/AVERAGE EMPLOYMENT

SUMMARY OF SIGNS AND SIGNIFICANCE OF VARIABLES IN SELECTED REGRESSIONS

Minimum Month

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Specification	6	2	5	2	6	4	5	5
t, t^2	F	1.1	3.5^y	0.7	1.0	0.9	0.7	0.7	0.5
z_i	F	1.4	7.3^z	11.9^z	8.0^z	2.0^x	0.12	-	8.8^z
	Sign	+	+	+	+	-	-	-	0
V/E	F	2.2^x	4.8^z	6.0^z	4.6^z	2.7^y	10.0^z	0.9	0.7
	Sign	-	-	+	0	+	+	-	+
VU/L	F	1.6	5.3^z	4.8^z	4.1^z	2.1^x	8.0^z	1.8	3.7^z
	Sign	+	+	-	-	-	-	+	-
VU/V	F	2.4^x	5.4^z	3.3^y	7.4^z	0.4	3.6^z	1.4	0.6
	Sign	0	-	+	+	-	+	+	-
$1/U^2$	F	1.7	0.4	3.1^y	1.1	1.1	0.7	1.7	0.5
	Sign	-	-	+	+	+	+	+	-
DW_i	F	0.5	7.1^z	6.4^z	51.7^z	3.7^z	4.4^z	0.5	1.6
	Sign	+ -	- +	- -	- -	+ -	+ +	- -	+ +
W_i/W	F	6.0^z	7.3^z	5.0^z	20.6^z	3.6^z	5.1^z	3.5^y	1.5
	Sign	-	+	+	+	-	-	+	-
DCPI	F	0.7	2.3^x	1.3	2.8^y	2.6^y	1.4	1.1	0.7
	Sign	-	-	+	-	-	-	-	+
$(H/E_i)_{-1}$	t	1.0	-2.0^x	-3.5^z	1.5	-5.8^z	-0.1	0.5	-3.7^z
	D.W.	2.19	2.09	2.04	2.20	2.06	2.30	1.91	2.30

x - significant at 0.10 level
y - significant at 0.05 level
z - significant at 0.01 level

TABLE LXXXVII

SECTORAL MODELS FOR SEPARATIONS/AVERAGE EMPLOYMENT--SEASONALLY ADJUSTED

Final Equation

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
k	48.96***	26.30***	41.64**	-3.50	6.69***	3.89	5.71***	0.63
t	-	-	-	-	0.17***	-0.32***	-	-
t^2	-	-	-	-	-	-	-	-
z_{i-1}^M	-	-	-	-1.74*	-	1.37**	-	-
z_i^Q	-	-	-	2.67**	-	-	-	-
z_i^A	-	-	-	-5.20***	-1.74***	8.49	-	-
z_{i-12}^A	-	-	-	-	-	-	-	-
	IC	IC	V/U Sect.	Sect.			IC	Sect.
V/E_{-1}^M	-	-	-	0.44***	-	-	-	0.38***
V/E^Q	-	-	-	-0.87***	-	-	0.47***	-0.25**
V/E^A	-3.41***	-2.42***	0.19**	1.01**	-	-	-1.00***	-
V/E_{-12}^A	-	-2.89***	-	-	-	-	-0.98***	-
	Sect.	IC		Sect.			IC	
VU/L_{-1}^M	-0.11***	-	-	-	-	-	0.14**	-
VU/L^Q	0.30***	-	-	0.66**	-	-	-0.36***	-
VU/L^A	0.23***	2.05***	-	-0.85*	-	-	0.65***	-
VU/L_{-12}^A	0.39***	1.98***	-	1.11***	-	-	0.75***	-
	IC	IC	IC	Sect.		IC	IC	Sect.
VU/V_{-1}^M	-	-	-0.20*	-	-	-0.32***	-0.35***	-
VU/V^Q	-	-	-	-3.14***	-	-	1.08***	-
VU/V^A	-5.55***	-4.15***	-	5.06***	-	0.51**	-1.01**	0.86***
VU/V_{-12}^A	-	-5.41***	-	-2.62***	-	0.62***	-2.42***	-

TABLE LXXXVII (Continued)

Variable	For. Sect.	Min.	Mfg. IC	Cons. Sect.	TCU IC	Trade	FIR	Serv.
$(1/U^2)^M_{-1}$	-	-	-	-	-	-	-	-
$(1/U^2)^Q$	-0.43**	-	-	-	0.12***	-	-	-
$(1/U^2)^A$	0.54	-	-0.05	-0.12	0.07	-	-	-
$(1/U^2)^A_{-12}$	-2.15***	-	-0.04***	-0.88***	0.04*	-	-	-
			(x100)		(x100)			
DW_i^M	-	-	0.61*	-	-	-	-	-
DW_i^Q	-0.05*	-	-	-	-	-	-	-
DW_i^A	-0.61***	-	-	-0.13***	-0.40	-0.04	-0.03	-
DW^A_{i-12}	-0.31***	-	-	-	5.65**	-0.10***	-0.04*	-
	W_i/W		W_i/W	W_i/W	DW(x100)	W_i/W	W_i/W	
DW^M_{-1}	0.76***	-	0.11*	0.14***	-	-	3.74***	-
DW^Q	-	-	-	-	-3.00***	-	-	-
DW^A	-0.78***	-	-0.46***	0.21***	-	-0.06	-	-
DW^A_{-12}	-	-	-	-	-	-0.16**	-	-
$DCPI^M_{-1}$	-	-	-	-0.06**	-	-	-	-
$DCPI^Q$	-0.45***	-	-	0.13**	0.05**	-	-	-
$DCPI^A$	-	-	-	-0.48***	-0.12*	-0.16***	-	-
$DCPI^A_{-12}$	-	-	-	-	-	-0.13***	-	-
H/E_{-1}	0.24***	-	-	-	-	-	0.12**	0.26***
$\bar{R}^2$	0.86	0.80	0.40	0.74	0.60	0.84	0.80	0.50
S.E.E.	2.01	0.31	0.24	0.53	0.21	0.15	0.14	0.41
D.W.	2.07	1.64	2.24	2.41	2.07	2.18	2.33	2.14

TABLE LXXXVIII

SECTORAL MODELS FOR SEPARATION/AVERAGE EMPLOYMENT--MINIMUM MONTH

Final Equation

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
K	47.67***	47.21*	-8.17**	36.67***	5.76	4.59***	5.07***	1.05
t	-2.72***	-0.51***	-	-	-	-	0.05***	-
t^2	-	-	-	-0.11**	-	-	-	-
z^M_{i-1}	-0.17***	-0.83***	-13.73**	-	-0.78***	-	-	-18.91***
z^Q_i	-	-	-14.05**	-1.52***	-	-	-	6.80**
z^A_i	-	1.65***	31.25***	-	-	-	-	12.64***
z^A_{i-12}	-	-	-	-	-	-	-	-
	IC	IC	Sect.	IC	IC	IC	IC	
V/E^M_{-1}	3.92**	-	1.22***	-2.63***	-0.28**	-1.72***	0.31*	-
V/E^Q	-9.80***	1.14***	1.24**	2.72***	0.93***	1.57***	-0.68***	-
V/E^A	-	-4.88***	-1.70***	-	-0.83***	-	-	-
V/E^A_{-12}	-	-6.61***	4.60**	-	-	-	-	-
	IC	IC	Sect.	IC	IC	IC	Sect.	IC
VU/L^M_{-1}	1.90*	-	0.28***	1.69***	0.40***	1.02***	-0.46***	0.82***
VU/L^Q	-	-1.01***	-0.69***	-2.66***	-0.36***	-0.57***	1.08***	-0.55***
VU/L^A	7.15***	4.36***	0.14	2.10***	-	-	-0.32***	-
VU/L^A_{-12}	4.92*	7.57***	-4.36***	-1.71***	-	-	-	-
	IC	IC	Sect.	IC		IC	Sect.	Sect.
VU/V^M_{-1}	-	0.87***	-	-4.35***	-	-0.91***	0.49***	-
VU/V^Q	-9.79***	-6.18***	-	4.48***	-	-	-1.04***	-
VU/V^A	-	-14.66***	1.41*	-	-	-	-	0.75*
VU/V^A_{-12}	-	-	4.69***	-	-	-	-	-

TABLE LXXXVIII (Continued)

Variable	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	IC	Sect.	Sect.	IC	IC		Sect.	
$(1/U^2)^M_{-1}$	-	-0.90***	-	-	-	-	-	-
$(1/U^2)^Q$	4.00**	-	-	-	-	-	-	-
$(1/U^2)^A$	-7.08**	1.48	0.02	-0.10	0.53***	-	0.27***	-
$(1/U^2)^A_{-12}$	-8.14**	-6.94***	0.28***	2.99***	-	-	-	-
							(x100)	
DW_i^M	-	-	-0.05***	-0.04***	-	0.02***	-	-
DW_i^Q	-	0.05***	-0.06***	-0.02**	-0.03***	-0.03***	-1.97*	-0.03***
DW_i^A	-	-	-0.33**	-0.09***	-	0.19***	-	-
DW^A_{i-12}	-	-	-	-	-	-	-	-
	DW	W_i/W	DW	W_i/W	W_i/W	$D(W_i/W)$	DW(x100)	
DW^M	-0.18***	-0.19***	0.05***	-0.38***	0.12***	0.02***	0.92***	-
DW^Q	-0.54***	-0.24***	0.06***	0.25***	-0.12**	-	-	-
DW^A	-	0.38**	0.33	-	-	-0.16***	-	-
DW^A_{-12}	-	-	-0.19*	-	-	-	-	-
$DCPI^M_{-1}$	-	-0.08***	-	-	-0.03**	-	-0.03**	-
$DCPI^Q$	-	0.12**	0.06*	0.21***	0.07**	-	-	-
$DCPI^A$	-	-0.46***	-	-0.76***	-	-	-	-
$DCPI^A_{-12}$	-	-0.35*	-	-	-	-	-	-
H/E_{i-1}	0.10***	-0.13***	-0.59	-	-0.50***	-	-	-0.38***
$\bar{R}^2$	0.80	0.72	0.69	0.93	0.65	0.75	0.62	0.67
S.E.E.	3.62	0.42	0.40	0.84	0.30	0.39	0.36	0.57
D.W.	2.16	2.01	2.00	2.13	1.81	2.14	1.70	2.11

TABLE IXC

SECTORAL MODELS FOR RATE OF CHANGE OF EMPLOYEES REPORTED

SUMMARY OF SIGNS AND SIGNIFICANCE OF VARIABLES IN SELECTED REGRESSIONS

Seasonally Adjusted

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Specification	7	6	5	7	6	4	11	10
t, t^2	F	1.2	0.5	0.7	6.4***	11.2***	3.5**	0.1	12.0***
z_i	F	3.8***	0.8	5.8***	8.9***	14.2***	19.8***	-	4.8***
	Sign	+	+	+	+	+	0		+
V/ER	F	0.5	1.4	1.4	7.7***	4.3***	1.3	1.6	7.5***
	Sign	+ -	+ -	- -	+ -	- -	- +	- +	+ +

TABLE IXC (Continued)

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
DCPI	F	2.6**	1.6	2.3*	3.5**	4.4***	2.4*	2.2*	1.6
	Sign	+	+	-	-	+	-	+	+
P/ER_i	t	2.6**	0.6	0.9	1.8*	-1.5	-3.1***	1.4	-0.1
D.W.		2.23	2.63	2.42	2.24	2.34	2.44	2.75	2.09
$\bar{R}^2$		0.189^z	0.046	0.226^z	0.278^z	0.362^z	0.282^z	0.091^x	0.221^z

VU/L	F	-	1.0	0.6	-	3.7***	2.1*	-	-
	Sign		+	+		+	-		
VU/V	F	4.3***	0.2	0.8	1.1	3.0**	1.1	0.3	2.7**
	Sign	-	-	-	+	-	+	+	-
$1/U^2$	F	0.8	0.1	1.7	4.5***	2.6**	2.1*	2.9**	3.4**
	Sign	-	-	-	+	-	+	-	-
DW_i	F	0.8	1.5	2.0	2.2*	3.8***	1.5	2.7**	1.7
	Sign	- -	- -	+ -	- -	- 0	+ +	- +	+ +
DW	F	0.7	3.7***	3.8***	2.9**	6.8***	3.4**	6.4***	2.0*
	Sign	+	-	+	-	-	-	+	-

TABLE XC

SECTORAL MODELS FOR RATE OF CHANGE OF EMPLOYEES REPORTED

SUMMARY OF SIGNS AND SIGNIFICANCE OF VARIABLES IN SELECTED REGRESSIONS

Minimum Month.

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Specification	1	2	1	2	6	1	3	2
t, t^2	F	3.0^y	0.3	0.8	2.7^y	3.8^z	9.1^z	0.4	0.8
z_i	F	6.3^z	8.1^z	11.5^z	15.0^z	9.9^z	14.2^z	-	24.2^z
	Sign	+	+	+	+	+	+	-	+
V/ER	F	1.5	4.5^z	4.7^z	12.4^z	4.4^z	5.8^z	1.2	11.3^z
	Sign	+ -	+ +	+ -	+ -	+ 0	+ +	+ +	+ +
VU/L	F	1.9	1.5	1.7	3.8^z	4.2^z	2.7^y	1.8	5.6^z
	Sign	0	-	+	-	+	-	-	-

VU/V	F	7.7^z	0.9	1.6	5.2^z	3.8^z	3.2^y	1.7	8.9^z
	Sign	+	+	-	-	0	+	+	+
$1/U^2$	F	0.5	0.6	3.9^z	2.4^x	0.7	5.6^z	0.3	0.7
	Sign	+	+	+	+	-	-	-	-
DW_i	F	13.7^z	5.5^z	2.1^z	1.3	3.0^y	2.3^x	1.2	4.4^z
	Sign	- -	- +	+ +	+ +	- -	- +	- +	+ -
DW	F	12.9^z	2.0^x	1.4	4.4^z	2.8^y	18.8^z	1.7	3.4^y
	Sign	+	-	+	-	-	-	-	+
DCPI	F	1.0	1.0	0.4	2.9^y	3.4^y	2.2^y	0.8	0.6
	Sign	+	-	-	-	+	-	+	-
$(P/ER_i)_{-1}$	t	4.9^z	0.3	1.4	1.7^x	-2.2^y	0.10	1.1	-1.2
	D.W.	1.99	2.56	2.37	2.24	2.26	2.16	2.84	2.01
	$\overline{R}^2$	0.795^z	0.300^z	0.528^z	0.830^z	0.323^z	0.649^z	-0.014	0.669^z

TABLE XCI

SECTORAL MODELS FOR RATE OF CHANGE OF EMPLOYMENT (LFS)

SUMMARY OF SIGNS AND SIGNIFICANCE OF VARIABLES IN SELECTED REGRESSIONS

Minimum Month.

Variable	Quantity	For.	Min.	Mfg.	Cons.	TCU	Trade	FIR	Serv.
	Speci-fication	1	5	10	5	7	2	4	2
t, t^2	F	2.5^x	3.3^y	2.2^x	0.7	3.1^y	0.1	0.1	0.8
Z_i	F	1.2	4.7^z	10.0^z	10.4^z	6.1^z	1.8	-	1.1
	Sign	+	+	+	+	-	-	-	+
V/ER	F	2.1^x	1.6	1.9	7.5^z	3.4^y	3.2^y	2.3^x	0.4
	Sign	+ -	- -	+ -	+ -	+ +	- +	- +	- -
VU/L	F	4.0^z	1.9	-	1.6	-	1.7	1.0	4.2^z
	Sign	+	+	-	+	-	-	-	+
VU/V	F	0.6	1.7	3.9^z	0.5	5.4^z	3.7^z	0.1	4.3^z
	Sign	-	-	-	-	+	+	+	+

$1/U^2$	F	1.3	3.7^z	1.5	1.3	4.9^z	0.7	1.1	1.9
	Sign	+	+	+	-	-	+	+	-
DW_i	F	10.2^z	1.9	3.2^y	1.0	1.1	3.8^z	1.2	0.4
	Sign	- -	- -	- -	- -	- -	+ +	+ +	+ +
DW	F	6.8^z	2.0^x	2.9^y	1.7	3.2^y	8.5^z	0.6	2.4^y
	Sign	+	-	-	+	-	-	+	-
DCPI	F	0.4	0.4	0.3	0.7	0.7	1.2	1.5	0.7
	Sign	+	+	-	-	-	-	+	+
$(P/ER_i)_{-1}$	t	3.2^z	0.3	2.3^y	1.5	-1.6	-0.1	0.2	0.2
	D.W.	2.11	2.20	2.45	1.99	2.32	2.23	2.44	1.90
	$\bar{R}^2$	0.587^z	0.087^x	0.374^z	0.811^z	0.416^z	0.357^z	-0.010	0.250^z

chapter eight

UNEMPLOYMENT AND LABOR-FORCE PARTICIPATION

Introduction

Unemployment and labor-force participation were examined in chapter five through simple models which used only data from the Labour Force Survey. We now turn to models using in addition vacancies, wages, prices and productivity. Besides using other variables, the models differ somewhat in their handling of current values of the variables. The models of chapter five were purely associative; those of the present chapter are based on the specification arguments developed in earlier chapters of this study. However, the lack of comparability among the various series and the partial coverage of some of them, as described in chapter three, means that these models can at best be regarded only as indicative rather than as yielding direct estimates of the parameters of the process at work in the labor market. The main questions being raised concern the roles of vacancies and of wages, of current and lagged values of variables, and the similarities or differences among the various groups.

The models of this chapter investigate unemployment, labor force participation and gross movements among the principal categories recorded in the Labour Force Survey. They concentrate on the sex-age breakdown of the data. The specifications are based on those developed in chapter six. The models were all fitted on a monthly basis. Distributed lags were handled through the inclusion among the independent variables of quarterly and annual averages of variables over the three and 12 months preceding the current observation, denoted respectively by Q and A superscripts. The superscript M denotes a monthly observation. Labor-market tightness was represented by the T_1 rather than the T_2 form of chapter six.

The main difference from the specification of chapter six was the use of all vacancies and placements rather than those for the industrial composite. Corresponding to this change, vacancies and placements are divided by total employment as recorded by the Labour Force Survey rather than by employees reported. It was discovered inadvertently, through a clerical error, that the ratio of RDP in the industrial composite to lagged total employment tended to give stronger results in at least a selection of equations than did use of RDP for the total economy and this is the form of the Z variable used.[1] The monthly rate of change of Average Weekly Wages and Salaries (DW), the wage-change variable used, does refer to the industrial composite.

Both the unemployment rate for males 25-44 and the rate for the group being considered were used in the models, though it was not possible to disaggregate the other data. They were used in the form of the squares of their reciprocals. This form in a small selection of equations, where comparisons were made, was found to produce at least as strong results as use of the rates or of their reciprocals. The specifications also included the variables S/U_{-1}, the ratio of those without work and seeking work for more than four months to unemployment lagged one month, a variable that was used in chapter five, and either $\Delta L/L_0$, the rate of change of the group labor force, or L/P_{0-1} the lagged labor-force participation rate for the group.

One problem with using monthly data is that the data from the Labour Force Survey refer to the middle of the month while the others are either data for events during the month or measures taken at the end of the month. In the previous two chapters this fact was ignored, the Labour Force Survey data being taken to refer to the same month as the others.

---

[1] Time constraints on the study precluded full exploration of the basis or strength of this oddity. They also encouraged reliance on the results obtained with this oddity rather than re-doing the various calculations.

In this chapter it seemed wiser to try to get the data "in phase" by averaging the current and preceeding months to obtain the figures taken to correspond to the Labour Force Survey data. This averaging was done before ratios were taken or, in the case of Average Weekly Wages and Salaries and the Consumer Price Index, before rates of change were calculated. The variables used are listed in the notes to the tables for this chapter.

Gross Movements

As pointed out in chapters three and five, the gross-movements data refer to the number in each category who recall being in each others category in the previous month. The models fitted used two forms for the dependent variables. First, as in chapter five, the proportion of those who recall being in each category who are now in each of the categories was used. That is, if X_{jkt} refers to those who are in category k who recall being in category j at period t, the dependent variables, Y_{jkt}, were of the form

$$Y_{jkt} = X_{jkt}/\sum_k X_{jkt}.$$

The other form which arises from Theil's (1969) extension of logit analysis to the multinomial distribution, was $Y_{jkt} = \log (X_{jkt}/X_{jjt})$. It is the logarithm of the ratio of the proportion of those who enter category k from category j to the proportion who stay in category j. Regarding the proportions as estimates of probabilities, these variables may be regarded as the logarithms of the odds in favor of entering category k over staying in category j.

The same set of independent variables was used with both forms of dependent variables. They are listed in the stub of Table XCII. When the second type of dependent variable is used, the coefficients are estimates of the partial derivatives of the logarithms of the odds with respect to the variables. The difference between the coefficients for a variable in the equations for $\log (X_{jkt}/X_{jjt})$ and $\log (X_{jmt}/X_{jjt})$ are estimates of the partial derivatives of the log of the odds in favor of moving from category j to category k over those for moving from category j to category m, that is of $\log (X_{jkt}/X_{jmt})$.

The second form for the dependent variable is more appealing on *a priori* grounds in that there is no danger of its predicting proportions outside the range zero to unity. It also tended to produce better results in the sense that, when translated back into the proportions used in the first form it produced smaller sums of squared deviations of actual observations from predicted observations than did the models using the first form.[2] In view of these considerations, results are presented only for the second form. The models were fitted from January 1961 to November 1970, a total of 119 observations.

The estimates for the six equations investigated are shown in Table XCII. In each pair one equation is highly significant; the other, either insignificant or, in the case of movements from unemployment out of the labor-force, (U-N)/(U-U), barely significant at the 0.10 level. The three which are significant refer to movements out of employment into unemployment, (E-U)/(E-E), into employment from unemployment (U-E)/(U-U), and from being not in the labor-force to employment (N-E)/(N-N). Even in these equations most of the individual coefficients are not significantly different from zero, only 13 of the 104 coefficients being significant even at the 0.10 level. This lack of precision is possibly the result of strong collinearity in the independent variables combined with many fewer observations than were used in the monthly models explored in chapters six and seven rather than being necessarily an indication of the variables playing no role. Indeed, the hypothesis that all the coefficients applying to each of the variables with a distributed lag were zero could be easily rejected in at least one of the significant equations. To focus attention better on the associations found in the data, insignificant coefficients were eliminated progressively until all were significant at the 0.10 level.[3] The results are shown in Table XCIII.

The results for movements from employment to unemployment have several interesting features. Wage changes have an over-

---

[2] This exercise was conducted only for the total figures and then only the second form was used for males and females separately.

[3] Again the annual averages were retained as long as these variables lagged remained and t was not eliminated without elimination of t^2.

all negative effect. This occurs in the full model only for the annual average and its lagged value, and only the three lagged values remain (with negative coefficients) in the "final" models. In the full models, the wage terms are counter-balanced by price-change coefficients of opposite sign, but these coefficients disappear from the "final" models. The results then suggest primarily that deviations of wages from trend, or possibly changes in real wages keep people in employment rather than immediate wage-change differences from those of the recent past playing a role.

The various variables for conditions in the labor market also provide some suggestive results. The reciprocal of the total unemployment rate has coefficients in the full model which sum to a positive value while in the final version a negative total results. The negative effects come in both instances from the annual average and hint that an increase in the unemployment rate from the previous year increases the flow into unemployment which then occurs. The unemployment rate for males 25-44 has a negative effect, with the annual average being the form of this variable which shows greatest strength.

It is hardly surprising that the pattern with respect to unemployment is ambiguous. The flow represents both voluntary and involuntary separations and those who leave one job and find another in the month are presumably counted in those who remain employed so that the flow is not representative of all those who at some time in the month leave employment. While a negative effect of the perceived unemployment rate on voluntary separations is to be expected, the other two movements might well account for the positive effect.

The vacancy variables also show mixed patterns of signs. Vacancies available to employment (V/E) has a negative effect, including the current value; unfilled vacancies to the labor-force (VU/L), a positive one concentrated in the annual average; and the ratio of unfilled vacancies to vacancies available (VU/V), a negative one which drops out of the final model and whose point estimates in the full model indicate that change may have a negative effect. Again the diversity of the flows included in the dependent variable may account for the pattern or it may reflect the multi-dimensional aspects of the demand-side of labor market tightness.

The productivity variable (Z) is highly significant with a generally negative set of coefficients. The quarterly average, however, has a positive coefficient in both the full and final versions of the models of roughly the same absolute magnitude as either the lagged monthly value or the annual average.

The equation for movement from unemployment also has some interesting features. In the full model the current month's wage change and the annual average have positive coefficients while the quarterly average and the lagged annual average have negative coefficients. These are offset by an exactly opposite sign pattern for price changes. In the "final" model only the monthly values survive, with a positive coefficient for wage changes and a negative one for (lagged) price changes.

The total unemployment rate has a generally negative effect on the flow into employment in the full model partly offset by a positive effect from the rate for males 25-44. When insignificant coefficients have been eliminated, only the total rate remains, with the difference between the annual average of the squared reciprocal of the rate and this value lagged one year appearing to be important; that is, past increase in the unemployment rate from one year to another is indicated as increasing the flow into employment.

The vacancy variables again show mixed sign patterns both within each type of variable and between them, with the coefficients for VU/L (generally positive) being of opposite sign from those for V/E and VU/V. These signs are generally the same as those for the flow from employment to unemployment rather than being the opposite. In terms of the magnitude of the coefficients, especially in the "final" equation, the annual averages and their values lagged swamp the more short-term versions. The coefficients for the productivity variable in the full model are of opposite sign to those in the model for movement from employment to unemployment, though the lagged annual average has a much larger coefficient than the others. Only the (positive) coefficient for the annual average survives in the "final" equation.

The equation for movement into employment from being out of the labor force presents other interesting patterns. Both wage changes and price changes have generally positive effects which survive strongly into the "final" equations. The total unemployment rate tends to have coefficients of opposite sign from those for males 25-44, but only the annual average of the latter survives into the final equation. The negative coefficient thus supports the additional-worker hypothesis while the pattern of signs in the full model indicates that both the additional-worker and the discouraged-worker hypotheses are at work. However, the importance of the annual average seems a bit odd if the additional-worker hypothesis is regarded as giving rise to the result. The insignificant results for the flows out of the labor force, of course, provide no support for these hypotheses from the other direction.

Probably little is to be learned from the jumble of signs for the vacancy and productivity variables. Only the current value of V/E and the annual average of VU/L survive. The positive coefficient for the latter is no surprise, the negative coefficient for the former is.

The negative coefficient for the lagged labor-force participation rate is of interest in suggesting, as one might suspect, that the higher the participation rate, the smaller the odds in favour of people entering employment. On the other hand, the large positive coefficients this variable gets in the (insignificant) model for movement into unemployment from being not in the labor force gives one pause. However, within the range of observed variations of the variables, the partial derivative of the predicted proportion who remain out of the labor force with respect to the participation rate is positive.

The models were also fitted for males and females separately. The only changes in the independent variables were the substitution of the unemployment rates and labor-force participation rates for the groups for those pertaining to the total. The results for the full models are shown in Tables XCIV and XCVI while the "final" equations after elimination of insignificant coefficients are found in Tables XCV and XCVII.

The main differences in the overall results are (1) that for males the equation for the flow from unemployment out of the labor force becomes significant while that for the flow into employment from being out of the labor force becomes insignificant and (2) that, for females, the equation for going from unemployment into employment is quite without significance while the model for leaving the labor force from being employed is highly significant.

The wage and price-change effects found for the flows from employment to unemployment in the full versions basically support the findings indicated for the total. However, this does not carry over to the "final" equations in the case of males where only the monthly price-change variable remains and has a negative coefficient. For females only the annual wage-change coefficient remains, with a positive coefficient. The full male equation shows the same difference in sign between the group unemployment rate and that for males 25-44, but this does not survive to the "final" equation where the overall effects of both reciprocals are positive. For females in the full models both types have positive effects, with only the group unemployment rate surviving to the "final" equation. The patterns of coefficients for vacancies in the case of the males largely support those found for the totals and the survivors in the "final" equations are the same. This is also the case for the productivity variables. The annual averages of the vacancy variables for the females had opposite signs to those in the total equations. Only V/E and VU/L survived and then it was the annual averages lagged one year that showed strength. The productivity patterns in the full equations, however, were the same. In the female equation the lagged participation rate survived with a negative coefficient.

The patterns of coefficients for wage and price change in the male equation for movement into employment from unemployment were somewhat different from those for the total; but in the "final" equation the same pattern of a positive effect for the current wage change and a negative one for the lagged monthly price change emerged. In the final equation, the group unemployment rate did not show a mixture of signs, but instead the rate for males 25-44 survived with a negative coefficient for the annual average of the squared reciprocal and its lagged value. The indications about vacancies in the "final" equations were the same as those found for the total though the variables capturing these effects differ a bit. On the other hand, instead of the annual average of the productivity variable having a strong positive coefficient, its value lagged a year had a strong negative one. This does correspond to the indications given by the full equation for the total.

There were a number of differences between the full equation for the females and that for the total for the movement from not-in-the-labor-force into employment. This carried over to producing a rather different set surviving independent variables in the "final" equations. For example, only the annual-average wage change survives with a negative coefficient. Both the group unemployment rate and that for males 25-44 survive, with opposite effects and with the effect for males 25-44 different from its value in the final total equation. It is not clear which, if either, of these equations is to be preferred.

Turning to equations which were insignificant for the total, the model for males going from unemployment to not-in-the-labor-force shows no significant effects for the unemployment rates. Wage changes, especially the average lagged a year, have negative effects as does the annual price-change variable. The productivity variable indicates that the change over the year has a negative effect. Vacancies again show a mixed pattern.

In the model for female movement from employment out of the labor force, the annual average wage change has a strong positive coefficient more than balanced by negative coefficients for the annual price change variables. In connection with the negative wage coefficient in the final model for the female flow from employment to unemployment, rising wages, indeed rising real wages, appear to induce women to leave the labor force from being employed. The reciprocal of the square of the unemployment rate also exerts a positive influence on the flows out of the labor force as does the lagged participation rate. The effect of vacancies is concentrated in the annual average as is the effect of productivity. The coefficients for V/E and VU/V are positive; those for Z and VU/L, negative on balance.

The main disappointment about these models has been their rather poor success in accounting for labor force participation. An alternative way of structuring the flows was attempted by building models first for the probability of leaving the labor force from employment or from unemployment and then calculating for the odds for those staying in the labor force of being employed or unemployed. The latter is given by the first and third columns of Tables XCII to XCVII. This approach did not produce significant models when the earlier one did not, and in the case of females leaving employment it was weaker than the model already developed. This was also the case for the model for entering or staying out of the labor force.

Given the nature of the data, the short run of observations, and the problems for the interpretation of coefficients discussed in chapter three, these models for the gross movements are quite encouraging. The question then arises as to what sort of account these models give when used for the unemployment rate itself.

The Unemployment Rate

The models for the unemployment rate investigated each of the 14 age-sex categories investigated in chapter five. They also were fitted for all males, all females and the total. They were fitted both to seasonally-adjusted data and to those adjusted to the minimum months of employment and labor-force participation developed in chapter four. The main difference in specification from the models for the gross movements was the inclusion of the current rate of change of the group labor force, $\Delta L/L_0$, in place of lagged participation rate. In addition, the group unemployment lagged one month replaced the squared reciprocal of this variable to allow more directly for the specification of chapter two.

The models developed here are not comparable to those discussed in section two of chapter five in one very important respect. Those models included the current value of the unemployment rate for males 25-44; these ones do not. To discover how a simple model like that of chapter five would compare with the more complicated formulation, that model was altered to include the lagged value of this unemployment rate and its average over the six months preceeding the observation. The model also included the six-month average of the unemployment rate for each group. Otherwise, it was the same as the model in chapter five, but the period used was shorter.

The comparison between the models is shown in Table XCVIII in terms of the standard errors of estimate and their ratios. The altered version of the earlier model is referred to as the "simple" model, and the one using the very extensive specification is called the "full" model. Comparison is rendered difficult because of the different ways in which the unemployment rates are handled. If the unemployment rates used in the simple model occurred in exactly the same form in the full model, a value for the ratio of the standard error of estimate in the simple model to that in the full model of 1.03 would indicate significance at the 0.10 level. A value of 1.05

would be significant at the 0.05 level. On the other hand, only values greater than 1.31 would indicate that the posterior probability of the full model calculated according to equation (3.14) of chapter three was greater than that of the simple model. The prior probabilities used there implicitly weight the simple models very heavily when there is a great deal of multicollinearity.

The results of Table XCVIII are only weakly in favor of the full model. The ratios usually surpass the smallest of the three values mentioned, though more so in the seasonally-adjusted equations than in the minimum-month ones. They never exceed the highest of the values. However, two other considerations also point towards the full models. First, if the models were run with the variables, other than K, t, and t^2 and U_{0-1}, of the simple model removed, the resulting model appears to be as strong as the full model and would tend to be superior to the simple model. Second, the removal of two or three of the variables which were least significant from all the models would have resulted in full models that were clearly stronger than the simple ones. It seems then that to a considerable extent the collinearity of the data is such that various models of rather different substance are about equally able to account for the unemployment rates. The full models may contain "too many" coefficients; but it is not at all clear that all those distinguishing it in spirit from the simple models are redundant.

One feature of Table XCVIII is the weakness of the minimum-month models. The switch from the models of chapter five to the simple model of this section weakened the relative position of the minimum-month models. Proceeding to the full models tended to add less to the minimum-month versions than to the seasonally-adjusted ones. The effect of these changes is that in 15 of the 17 instances of Table XCVIII the standard error of estimate for the minimum-month model is greater than for the seasonally-adjusted ones. Given the basic ambiguities referred to in the specification of the full models, it does not seem worthwhile to pay attention to the full minimum-month models.

The full seasonally-adjusted models are shown in Table IC for the males and the total and in Table C for the females. As might be expected, most of the individual coefficients of these models are not significantly different from zero. The results obtained by removing insignificant coefficients are shown in Tables CI and CII.

The estimates give comparatively little support to the notion that wage changes help to reduce unemployment rates. The monthly changes are as apt to have positive as negative coefficients; they are all of smaller magnitude than other wage-change coefficients; and they drop out of the final equations. The lagged wage-change coefficients show a variety of signs among the equations. If they would directly support any conclusion it would be that past wage changes, especially in the previous year, may lead to a higher unemployment rate for several groups; but the evidence is far from clear. Evidence on the price-change coefficients was equally unclear; they showed some tendencies to reinforce the wage-change terms but in several instances they appear instead to offset them.

The current vacancy rate in most instances, and all significant ones, had a negative effect in the equations for the males, but not in those for the females. As could be expected from many of the earlier results, various different vacancy variables pulled in opposite directions and there were various mixtures of signs within each of the groups. No generalizations appear to emerge. The same conclusions appear to apply to the productivity variables.

The unemployment variables also showed a mixture of patterns, with sometimes the group rate pulling in opposite directions from the rate for males 25-44, sometimes with it; sometimes showing a pattern that indicated that differences matter, sometimes not. Even the lagged unemployment rate did not always show positive coefficients and it "dropped out" of several equations. The rate of change of the labor force had positive effects and remained in the models for the youngest two groups and for the oldest.

Labor-Force Participation

The models for labor-force participation differed from the unemployment rate models in (1) using the lagged monthly value of V/E in place of the current one, (2) using the reciprocal of the square of the lagged monthly unemployment rate of the group instead of the level of this variable, (3) lagging the monthly wage-change term, and (4) replacing the rate of change of the labor force with the lagged labor-force participation rate.

Comparisons with the simpler types of model developed in chapter five were again made with a slightly different model from the one used there. The unemployment rate for males 25-44 and its six-month average were used in lagged rather than current form.[4] The comparisons are shown in Table CIII in terms of the standard errors of estimate and their ratios.

Even more than in the unemployment-rate models, there was no very clear-cut superiority of the full models over the simple ones. However, in terms of the F values suggested in the previous section for the ratios, most show the full model to be superior. The additional considerations raised in connection with the unemployment-rate models also apply: versions based on the distinct elements of the full models, except for K, t, t^2 and the lagged group participation rate, again hold a slight edge over the simple models. As was found in chapter five, of course, much of the association found among the variables comes from these four which are common to both versions.

Unlike the findings for the unemployment-rate models, the minimum-month models for labor-force participation continue to hold an edge over the seasonally-adjusted ones both for the simple versions and the full models. Unfortunately, there are enough differences between them that the minimum-month models may not always be a good indication of what the seasonally-adjusted versions show. Both sets of models are therefore presented. Tables CIV and CV contain the full seasonally-adjusted models and Tables CVI and CVII contain the full minimum-month ones. The models following elimination of insignificant coefficients appear in Tables CVIII and CIX for the seasonally-adjusted equations and in Tables CX and CXI for the minimum-month equations.

Wage changes appear to spur on labor-force participation,

---

[4] It is possible that the current value of this unemployment rate should enter the models, for reasons alluded to in chapter two. However, it seems likely that the effect would be more adequately represented by the immediately lagged value than by one recorded at the end of the month whose labor-force decisions are reflected in the dependent variable. In any case, use of the lagged values avoids an identification problem that may arise if some of the coefficients for the models of the previous section should be zero.

in the sense that the sum of the wage-change coefficients is positive in most of the equations. Exceptions do occur, especially among males 20-44, in terms of the full models. There is also some tendency for price changes to play a negative role, though this tendency is weak, particularly in the case of females in the full models and in the final minimum-month models. It is not the case that the effects of price changes always balance those of wage changes to suggest clearly a real-wage interpretation.

Rather surprisingly, the unemployment rate coefficients for males 14-24 and over 55, where the hypotheses are most likely to be relevant, tend to show an additional-worker effect through the coefficients for $1/U_p{}^2$ and a discouraged-worker one for the coefficients of $1/U_o{}^2$. These effects are usually concentrated in the coefficients for the annual averages and these averages lagged, though this is not always the case; and some "odd" signs appear, possibly indicating a change effect of the sort found in chapter five. The change interpretation was much less evident in these results than in the models of chapter five. Neither of the two hypotheses tends to show up clearly among the unemployment coefficients of the females in the full models, where they are most to be expected, though first-difference interpretations seem more likely than they did among the males. Not many of the coefficients for the unemployment rates survive in the final models. Those that do tend to suggest, if anything, that large unemployment rates produce low participation rates, in line with the discouraged-worker hypothesis. The other discouragement variable, S/U_{-1}, tends to be weak, but to suggest a discouraged-worker interpretation among the young though not among the old.

The vacancy and productivity variables appear to matter. However, there was no very evident pattern in the results. Various types of variables had different overall and particular coefficients among the equations and different groups differed from each other. Sometimes difference interpretations are suggested, sometimes not; and the particular interpretations would differ among the equations.

These sets of results clearly yield no simple interpretation of labor-force participation. They do suggest that it is not uniform at all among groups. At least in some instances, particular ways of looking at the data - via seasonally-adjusted variables or minimum-month ones, by full or final versions of the models, or through simple or full models - can yield different impressions. These conclusions also apply to the other models fitted in this chapter. They also resemble those of earlier chapters and, indeed, are typical of the empirical results of this study.

NOTES TO TABLES XCII TO CXI

Symbol	Variable	Units XCII-XCVII	Units XCVIII-CXI
(E-U)/(E-E)	Logarithm of those currently unemployed, last month employed divided by those currently employed, last month employed.	log. of proportion	-
(E-H)/(E-E)	Logarithm of those currently not-in-labor force, last month employed divided by those currently employed, last month employed.	log. of proportion	-
(U-E)/(U-U)	Logarithm of those currently employed, last month unemployed divided by those currently unemployed, last month unemployed.	log. of proportion	-
(U-N)/(U/U)	Logarithm of those currently not-in-the-labor force, last month unemployed divided by those currently unemployed, last month unemployed.	log. of proportion	-
(N-E)/(N-N)	Logarithm of those currently employed, last month not-in-the-labor force divided by those currently not-in-labor force, last month not-in-the-labor force.	log. of proportion	-
(N-U)/(N-N)	Logarithm of those currently unemployed, last month not-in-the-labor force divided by those currently not-in-the-labor force, last-month-not-in-labor force.	log. of proportion	-
K	Constant	Unity	Unity

NOTES TO TABLES XCII TO CXI (Continued)

Symbol	Variable	Units XCII-XCVII	Units XCVIII-CXI
t	Time	1/12 per month	Same
t^2	Square of time	0 in Dec. 1961	
Z	Ratio of RDP in industrial composite to total employment.	Index/Million people	Index/Thousand people
V/E	All vacancies available divided by total employment in previous month.	%	proportion
VU/L	All unfilled vacancies divided by total labor force.	%	%
VU/V	Unfilled vacancies divided by vacancies available.	%	proportion
U_o	Unemployed in group divided by labor force in group.	-	proportion
$1/U_o^2$	Square of reciprocal of U_o	$(10/\%)^2$	$(10/\%)^2$
$1/U_p^2$	Square of reciprocal of unemployment rate for males aged 25-44.	$(10/\%)^2$	$(10/\%)^2$

NOTES TO TABLES XCII TO CXI (Continued)

Symbol	Variable	Units	
		XCII-XCVII	XCVIII-CXI
DW	Rate of Change of Average Weekly Wages and Salaries in Industrial Composite.	% per month	proportion per month
DP	Rate of Change of Consumer Price Index.	% per month	proportion per month
PL/E	Total Placements divided by total employment.	%	proportion
S/U	Number unemployed four months and more to total unemployment.	%	proportion
L/P_o	Labor force in group divided by group population.	%	proportion
$\Delta L/L_o$	Rate of change of group labor force.	-	proportion per month
a	Multiplied by 100.		
b	Divided by 100.		
c	All standard errors multiplied by 100.		

NOTES TO TABLES XCII TO CXI (Continued)

Symbol	
M	Monthly observation.
Q	Quarterly observation - $X_t^Q = \sum_{i=1}^{3} X_{t-i}^M / 3$
A	Annual observation - $X_t^A = \sum_{i=1}^{12} X_{t-i}^M / 12$
x	Significantly different from zero at 0.10 level.
y	Significantly different from zero at 0.05 level.
z	Significantly different from zero at 0.01 level.

TABLE XCII

ESTIMATES OF GROSS-MOVEMENTS MODELS -- TOTAL

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
K	17.467[x]	10.647	15.523	37.115	-3.037	-30.307
t	0.150	0.970	0.425	1.215	0.044	0.522
t^2	0.048[y]	0.005	-0.012	-0.029	-0.019	-0.114
z^M_{-1}	-0.460[y]	-0.136	0.112	-0.445	0.110	-0.389
z^Q	0.655[y]	0.028	-0.029	0.517	-0.088	0.531
z^A	-0.591	-1.723	0.046	-0.764	0.336	1.195
z^A_{-12}	-0.822[y]	-0.929	-0.564	-1.506	-0.054	0.656
V/E^M	-0.187	0.098	-0.048	-0.441	-0.202	1.086
V/E^Q	-0.332	-2.803	-0.618	-0.851	-0.097	-1.511
V/E^A	-1.020	5.468	-3.187[x]	-2.770	-1.158	-9.644
V/E^A_{-12}	0.506	3.287	0.922	4.912	0.945	-2.591

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
VU/L^{M}_{-1}	0.897	-1.134	0.772	4.677	-0.082	-5.912
VU/L^{Q}	-0.415	8.464	1.804	1.655	0.847	-2.437
VU/L^{A}	9.073	-17.219	12.599	-0.038	3.269	49.787
VU/L^{A}_{-12}	-2.825	-11.175	-8.215	-28.106	-5.496	-6.743
VU/V^{M}_{-1}	-0.013	0.024	-0.018	-0.021	0.000	0.079
VU/V^{Q}	0.007	-0.221	-0.024	0.018	-0.010	-0.098
VU/V^{A}	-0.094	0.516	-0.285^{x}	-0.125	0.114	-1.062
VU/V^{A}_{-12}	0.039	0.408	0.078	0.420	0.083	-0.251
$(1/U_o^2)^{M}_{-1}$	0.066^{x}	0.087	-0.018	-0.087	-0.019	0.227
$(1/U_o^2)^{Q}$	0.147^{x}	-0.228	0.005	-0.302	-0.011	0.562
$(1/U_o^2)^{A}$	-0.331	0.882	0.105	1.918	0.073	-1.531
$(1/U^2)^{A}_{-12}$	0.244	0.355	0.762^{y}	1.104	0.184	-1.574

TABLE XCII (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
$(1/U_p^2)^M_{-1}$	0.007	-0.022	0.002	0.002	-0.003	0.009
$(1/U_p^2)^Q$	-0.028	0.054	0.004	0.085	0.006	-0.212
$(1/U_p^2)^A$	0.079	-0.115	-0.101	-0.475	-0.067	0.059
$(1/U_p^2)^A_{-12}$	0.012	-0.120	-0.208^y	-0.155	-0.017	-0.583
DW^M	0.003	-0.044	0.068^x	0.092	0.066^x	0.099
DW^Q	0.131	-0.307	-0.033	0.009	-0.112	0.110
DW^A	-0.546	1.052	0.036	2.358	0.773	-0.247
DW^A_{-12}	-0.411	-0.401	-0.094	-1.741	0.350	-0.978
DP^M_{-1}	-0.159^x	0.153	-0.140	-0.336	0.054	-0.868
DP^Q	-0.085	0.402	0.136	0.188	-0.209	-0.604
DP^A	0.252	-2.975	-0.612	-4.301	0.175	6.541

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
DP^{A}_{-12}	0.582	-2.269	0.327	-0.438	0.757	4.640
PL/E_{-1}	-0.071	0.585	0.007	-0.113	0.399	0.656
S/U_{-1}	0.146	-0.006	-0.002	-0.007	-0.004	-0.004
L/P_{o-1}	-0.012	0.170	-0.033	-0.136	-0.076	0.597
$\bar{R}^2$	0.772	0.176	0.726	0.272	0.818	-0.006
D.W.	2.26	2.62	2.55	2.49	2.43	2.49

TABLE XCIII

FINAL GROSS-MOVEMENTS MODELS -- TOTAL

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
K	13.032^z	-5.195^z	-2.998^y	-17.684^y	0.94	-24.789
t	0.093	-	-0.012	-	-	-
t^2	0.046^z	-	-0.018^x	-	-	-
z^M_{-1}	-0.329^y	-	-	-	-	-
z^Q	0.423^z	-	-	-	-	-
z^A	-0.634^z	0.075^z	0.414^y	-0.866^x	-	-
z^A_{-12}	-0.544^z	-	-	-	-	-
V/E^M	-0.165^x	-	-	-	-0.117^y	-
V/E^Q	-0.472^z	-	-	-	-	-
V/E^A	-	-	-1.710^y	6.376^x	-	-
V/E^A_{-12}	-	-	-	3.684^y	-	-

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
VU/L_{-1}^{M}	1.131^{y}	-	0.719^{y}	3.323^{z}	-	-
VU/L^{A}	5.299^{z}	-	5.958^{z}	-34.177^{y}	0.887^{z}	-
VU/L_{-12}^{A}	-	-	-2.026^{x}	-13.449^{y}	-	-
VU/V_{-1}^{M}	-0.021^{x}	-	-	-	-	-
VU/V^{A}	-	-	-0.137^{y}	0.687^{y}	-	-
VU/V_{-12}^{A}	-	-	-	0.397^{x}	-	-
$(1/U_o^{2})^{Q}$	0.067^{z}	-	-	-0.540^{z}	-	-
$(1/U_o^{2})^{A}$	-0.270^{y}	-	-0.145^{y}	2.081^{z}	-	-
$(1/U_o^{2})_{-12}^{A}$	0.137^{z}	-	0.113^{y}	-	-	-
$(1/U_p^{2})^{Q}$	-	-	-	0.101^{x}	-	-

TABLE XCIII (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
$(1/U_p{}^2)^A$	0.073^y	-	-	-0.408^y	-0.012^x	-
DW^M	-	-	0.066^y	-	0.060^y	-
DW^Q	-	-	-	-	-0.120^y	-
DW^A	-0.312	-	-	2.075^y	0.633^z	-
DW^A_{-12}	-0.343^x	-	-	-1.911	-	-
DP^M_{-1}	-0.160^y	-	-0.124^x	-	-	0.911^y
DP^A	-	-	-	-3.925^z	0.019	-
DP^A_{-12}	-	-	-	-	0.682^z	-
$L/P_{o\ -1}$	-	-	-	-	-0.092^z	0.356^z
$\overline{R}^2$	0.802	0.261	0.751	0.377	0.837	0.153
D.W.	2.23	2.14	2.34	2.30	2.19	2.17

TABLE XCIV

ESTIMATES OF GROSS MOVEMENTS MODELS -- MALES

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
K	13.143	-17.611	21.840^{x}	23.283	43.144	-0.387
t	-0.065	2.167	0.698^{x}	0.178	0.564	0.648
t^2	0.052^{z}	-0.240	-0.031	-0.019	0.012	-0.070
z^M_{-1}	-0.406^{y}	-1.121	0.038	-0.080	0.087	-1.044
z^Q	0.596^{y}	1.404	0.021	-0.333	-0.237	1.057
z^A	-0.533	-0.875	-0.229	0.310	-1.042	-0.111
z^A_{-12}	-0.590	-0.389	-0.693	0.801	-0.521	0.497
V/E^M	-0.178	1.850^{y}	-0.067	-0.303	-0.235	0.747
V/E^Q	-0.378	-0.701	-1.716^{y}	-3.269	-0.957	0.555
V/E^A	-0.250	1.024	-2.445	-2.868	1.050	-4.533
V/E^A_{-12}	-0.032	12.638	1.331	-9.737	0.498	-0.958

TABLE XCIV (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
VU/L^{M}_{-1}	1.591	-9.465	0.255	4.981	2.375	2.043
VU/L^{Q}	-0.377	12.476	6.862^{y}	7.022	0.841	-13.199
VU/L^{A}	6.399	-30.631	9.157	18.327	-2.063	19.887
VU/L^{A}_{-12}	0.036	-44.670	-10.784^{x}	17.236	-1.435	-2.697
VU/V^{M}_{-1}	-0.026	0.154	0.006	0.036	0.106^{y}	-0.128
VU/V^{Q}	0.011	0.329	-0.143	0.051	-0.010	0.149
VU/V^{A}	-0.034	0.085	-0.197	-0.274	0.108	-0.474
VU/V^{A}_{-12}	0.007	1.273^{x}	0.142	-0.865	0.007	-0.156
$(1/U^{2}_{-1})^{M}$	-0.065^{x}	-0.123	-0.049	0.047	-0.134	-0.013
$(1/U^{2})^{Q}$	0.189^{y}	-0.117	-0.014	-0.214	0.052	0.840
$(1/U^{2})^{A}$	-0.457	1.700	0.443	-1.101	1.337	1.048

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
$(1/U^2)^A_{-12}$	0.018	0.050	1.272^z	0.115	0.826	1.484
$(1/U_p^2)^M_{-1}$	0.013	2.095	0.009	0.048	0.014	0.071
$(1/U_p^2)^Q$	-0.033	-4.985	0.004	0.052	0.020	-0.324
$(1/U_p^2)^A$	0.104	2.421	-0.189^x	0.219	-0.345	-0.487
$(1/U_p^2)^A_{-12}$	0.064	27.638	-0.335^z	0.119	-0.416	-0.731
DW^M	-0.005	0.177	0.079^y	0.195	0.038	-0.026
DW^Q	0.074	0.392	-0.065	-0.148	-0.135	-0.126
DW^A	-0.365	2.421	-0.113	0.069	1.003	0.527
DW^A_{-12}	-0.388	4.676^y	0.054	-1.979	0.461	-1.558
DP^M_{-1}	-0.159	-0.551	-0.095	0.275	0.402^x	-0.730

TABLE XCIV (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
DP^Q	0.020	-0.866	0.045	0.452	-0.276	-0.234
DP^A	0.348	1.406	-0.526	-7.395^y	-1.357	6.463
DP^A_{-12}	0.615	-8.043^x	0.430	1.503	1.340	5.612
PL/E_{-1}	-0.179	1.465	0.009	-0.341	-0.988	-1.531
S/U_{-1}	0.006	0.008	0.001	-0.016	0.005	0.020
L/P_{o-1}	-0.027	0.014	-0.025	0.021	-0.251^y	0.087
$\bar{R}^2$	0.755	-0.019	0.725	0.412	0.128	0.010
D.W.	2.42	2.48	2.57	2.68	2.64	2.43

TABLE XCV

FINAL GROSS MOVEMENTS MODELS -- MALES

Variable	(E-U)/(E-E)	(E-N)/(E-E)√	(U-E)/(U-U)√	(U-N)/(U-U)√	(N-E)/(N-N)√	(N-U)/(N-N)√
K	11.302^z	12.492^y	19.310^y	11.664^y	17.453^z	-3.346^z
t	0.152^x	0.732^y	0.709^z	-	-	-
t^2	0.027^z	-0.050^x	-0.036^z	-	-	-
z^M_{-1}	-0.300^y	-	-	-	-	-
z^Q	0.304^y	-	-	-	-	-
z^A	-0.507^z	-	0.005	-0.621^y	-0.161^y	-
z^A_{-12}	-0.407^z	-	-0.761^z	1.459^z	-	-
V/E^M	-0.217^y	0.757^y	-	-	-	-
V/E^Q	-0.507^z	-	-1.357^z	-3.455^z	-	-
V/E^A	-	-6.302^z	-3.216^z	1.061	-	-
V/E^A_{-12}	-	-	1.474^x	-9.227^z	-	-

TABLE XCV (Continued)

Variable	(E-U)/(E-E)	$\sqrt{(E-N)/(E-E)}$	$\sqrt{(U-E)/(U-U)}$	$\sqrt{(U-N)/(U-U)}$	$\sqrt{(N-E)/(N-N)}$	$\sqrt{(N-U)/(N-N)}$
VU/L_{-1}^{M}	1.309^{y}	-	-	9.149^{z}	-	-
VU/L^{Q}	-	-	5.310^{z}	-	-	-4.045^{z}
VU/L^{A}	3.132^{z}	16.088^{z}	10.536^{y}	2.815	-	-
VU/L_{-12}^{A}	-	-	-10.516^{z}	20.181^{z}	-	-
VU/V_{-1}^{M}	-0.026^{y}	-	-	-	-0.045^{z}	-
VU/V^{Q}	-	-	-0.111^{y}	-	-	-
VU/V^{A}	-	-0.570^{z}	-0.256^{z}	0.115	-	-
VU/V_{-12}^{A}	-	-	0.142^{x}	-0.870^{z}	-	-
$(1/U^2)_{-1}^{M}$	-0.045^{y}	-	-	-	-	-
$(1/U^2)^{Q}$	0.096^{z}	-	-	-	-	0.653^{y}
$(1/U^2)^{A}$	-	-	0.383	-	0.601^{y}	-

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
$(1/U^2)^A_{-12}$	-	-	0.937^z	-	0.428^y	-
$(1/U_p^2)^M_{-1}$	-	-	-	-	-	0.098^y
$(1/U_p^2)^Q$	-	-	-	-	-	-0.292^z
$(1/U_p^2)^A$	-0.005	-	-0.161^y	-	-0.186^y	-
$(1/U_p^2)^A_{-12}$	0.032^z	-	-0.198^y	-	-0.236^z	-
DW^M	-	-	0.095^z	-	-	-
DW^A	-	-	-	-1.104	-	0.944
DW^A_{-12}	-	-	-	-2.039^y	-	-1.692^y
DP^M_{-1}	-0.117^y	-0.722^x	-0.145^x	-	-	-0.939^y
DP^Q	-	-	-	1.012^x	-	-
DP^A	-	2.866^x	-	-6.732^z	-0.513	2.583^x

TABLE XCV (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)$^{\surd}$	(U-E)/(U-U)$^{\surd}$	(U-N)/(U-U)$^{\surd}$	(N-E)/(N-N)$^{\surd}$	(N-U)/(N-N)$^{\surd}$
DP^{A}_{-12}	-	-	-	-	1.787^{z}	-
P/E_{-1}	-	-	-	-	-0.621^{y}	-
L/P_{o-1}	-	-	-	-	-0.216^{z}	-
$\overline{R}^2$	0.780	0.108	0.758	0.471	0.242	0.154
D.W.	2.32	2.21	2.52	2.49	2.48	2.17

TABLE XCVI

ESTIMATES OF GROSS MOVEMENTS MODELS -- FEMALES

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
K	11.145	-7.172	3.362	2.505[b]	-28.536[z]	-86.998
t	0.333	0.283	-1.506	4.630	-0.476[y]	-1.169
t^2	0.041[x]	-0.024	0.183[y]	0.715	-0.030	-0.185
z^M_{-1}	-0.681[z]	-0.063	0.378	-2.339	0.210	0.590
z^Q	0.808[y]	-0.013	-1.050	1.432	-0.448[x]	-1.345
z^A	-0.863[x]	-0.696[x]	1.086	0.086	0.950[z]	1.236
z^Q_{-12}	-0.651	-0.101	-0.395	-24.896[x]	0.570[x]	4.177
V/E^M	-0.149	0.118	-0.717	4.754	-0.082	0.846
V/E^Q	-0.197	-2.019[y]	5.068	6.670	0.687	-5.028
V/E^A	1.603	4.347[y]	-3.726	-28.886	0.970	5.592
V/E^A_{-12}	1.141	1.713	-1.768	-37.809	0.715	-6.751

TABLE XCVI (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
VU/L^M_{-1}	0.402	-1.420	1.987	-58.476	0.162	-5.131
VU/L^Q	0.178	8.357^y	-16.095	-72.553	-2.385	12.725
VU/L^A	-3.590	-15.257^y	23.456	2.115^b	-6.081	-13.759
VU/L^A_{-12}	-3.813	-5.616	13.400	-1.264^b	-3.793	18.968
VU/V^M_{-1}	-0.004	0.010	0.010	1.183	-0.003	0.115
VU/V^Q	-0.019	-0.172^y	0.544^x	0.446	0.055	-0.514
VU/V^A	0.197	0.384^y	-0.428	-1.872	0.112	0.392
VU/V^A_{-12}	0.110	0.264^y	-0.488	2.975	0.082	-0.517
$(1/U^2_{-1})^M$	1.191	0.812	4.986	0.825^b	-0.455	8.527
$(1/U^2)^Q$	-0.799	-2.750	0.739	0.881^b	1.170	-17.155
$(1/U^2)^A$	4.873	8.438	-33.762	-1.074^b	-0.472	-9.805

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
$(1/U^2)^A_{-12}$	11.245^x	-4.132	-12.722	2.218^b	-9.118^y	-16.920
$(1/U_p{}^2)^M_{-1}$	0.621	-0.612	-1.058	-0.145^b	-0.828	9.917
$(1/U_p{}^2)^Q$	-0.053	0.183	5.995	0.202^b	-0.158	-11.443
$(1/U_p{}^2)^A$	4.296	2.864	-6.892	0.132^b	-3.774	-17.394
$(1/U_p{}^2)^A_{-12}$	0.433	3.394	0.141	0.865^b	8.790^y	-42.960
DW^M	-0.008	0.034	0.107	0.032	0.028	-0.199
DW^Q	0.037	-0.043	-0.059	6.187	-0.103	-0.738
DW^A	0.071	0.775^x	1.353	-0.163^b	0.306	1.102
DW^A_{-12}	-0.233	-0.037	-1.516	-0.164^b	-0.216	0.825
DP^M_{-1}	-0.218^x	-0.025	-0.030	0.007^b	0.098	-0.426

TABLE XCVI (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
DP^Q	-0.007	-0.021	-0.857	-0.133[by]	-0.370[y]	-0.407
DP^A	-1.082[x]	-0.577	1.261	0.420[bx]	0.948[y]	3.176
DP^A_{-12}	-0.555	-0.931	2.555	0.416[b]	0.954[x]	-1.049
PL/E_{-1}	0.166	0.465[x]	-0.084	0.245[by]	0.438[x]	0.761
S/U_{-1}	-0.005	0.016[y]	-0.018	0.402	0.006	0.015
L/P_{-1}	0.091[x]	0.138[z]	-0.025	0.685	-0.053	0.884[y]
$\bar{R}^2$	0.570	0.480	0.125	0.067	0.863	0.071
D.W.	1.96	2.77	2.42	2.52	2.23	2.66

TABLE XCVII

FINAL GROSS MOVEMENTS MODELS -- FEMALES

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
K	-1.854	-7.693^{y}	-0.391^{y}	-7.335	-26.312^{z}	-37.462^{z}
t	0.133^{z}	0.207^{y}	-	-7.018^{y}	-0.507^{z}	-0.849^{y}
t^2	-	-0.017^{x}	-	0.930^{z}	-0.023^{z}	-
z^{M}_{-1}	-0.503^{z}	-	-	-	0.283^{y}	-
z^{Q}	0.502^{z}	-	-	-	-0.554^{z}	-
z^{A}	-	-0.612^{z}	-	2.230	0.776^{z}	0.195
z^{A}_{-12}	-	-	-	-8.427^{y}	0.690^{z}	1.232^{z}
V/E^{Q}	-	-1.326^{z}	-	-	-	-
V/E^{A}	-0.145	3.346^{z}	-	7.822	1.622^{y}	-
V/E^{A}_{-12}	0.292^{z}	1.098^{y}	-	13.323^{z}	-	-
VU/L^{M}	-	-	-	-0.665^{bz}	-	-

TABLE XCVII (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
VU/L^{Q}	-	4.582^{y}	-	-	-	-
VU/L^{A}	-0.406	-10.571^{z}	-	0.804^{by}	-7.543^{z}	-
VU/L^{A}_{-12}	-2.523^{z}	-4.126^{z}	-	-	-	-
VU/V^{M}	-	-	-	1.189^{z}	-	-
VU/V^{Q}	-	-0.112^{y}	-	-	-	-
VU/V^{A}	-	0.279^{z}	0.077^{z}	-	0.167^{z}	-
VU/V^{A}_{-12}	-	0.182^{z}	-0.089^{z}	-	-	-
$(1/U^2)^{M}_{-1}$	-	-	-	0.936^{bz}	-	-
$(1/U^2)^{A}$	0.011	0.065^{y}	-	-2.093^{bz}	-0.057^{y}	-
$(1/U^2)^{A}_{-12}$	0.074^{z}	-	-	-	-0.140^{z}	-
$(1/U_p^{\ 2})^{A}$	-	-	-	-	-0.009	-0.111

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
$(1/U_p^2)^A_{-12}$	-	-	-	-	0.083^z	-0.146^z
DW^Q	-	-	-	-	-0.122^y	-
DW^A	-0.221	0.438^x	-	-	-	-
DW^A_{-12}	-	-	-	-	-	-
DP^M_{-1}	-	-	-	-	0.133^x	-
DP^Q	-	-	-	-0.106^{by}	-0.415^z	-
DP^A	-	-0.898^z	-	0.407^{bz}	0.899^z	-
DP^A_{-12}	-	-0.891^y	-	0.500^{bz}	-	-
P/E_{-1}	-	-	-	24.727^z	0.374^y	-
S/U_{-1}	-	0.010^y	-	-	-	-
L/P_{-1}	-0.082^y	0.140^z	-	-	-	0.305^y

TABLE XCVII (Continued)

Variable	(E-U)/(E-E)	(E-N)/(E-E)	(U-E)/(U-U)	(U-N)/(U-U)	(N-E)/(N-N)	(N-U)/(N-N)
$\overline{R}^2$	0.592	0.503	0.145	0.177	0.872	0.184
D.W.	1.75	2.58	1.90	2.44	2.20	2.27

TABLE XCVIII

COMPARISONS OF SIMPLE MODELS FOR THE UNEMPLOYMENT RATE

WITH MORE COMPLICATED ONES

STANDARD ERRORS OF ESTIMATE

Group	Seasonally Adjusted			Minimum Month		
	Simple	Full	Ratio	Simple	Full	Ratio
M 14-19	1.167	1.038	1.123	1.165	1.135	1.026
M 20-24	0.678	0.573	1.185	0.728	0.679	1.072
M 25-34	0.376	0.343	1.096	0.442	0.415	1.066
M 35-44	0.337	0.266	1.270	0.373	0.347	1.076
M 45-54	0.348	0.322	1.081	0.368	0.368	1.001
M 55-64	0.416	0.370	1.123	0.429	0.425	1.010
M 65 +	0.687	0.616	1.116	0.684	0.619	1.104
M Total	0.315	0.267	1.179	0.348	0.323	1.075
F 14-19	1.025	0.986	1.039	1.032	0.985	1.048
F 20-24	0.480	0.456	1.052	0.479	0.475	1.009
F 25-34	0.394	0.394	1.000	0.395	0.422	0.937
F 35-44	0.358	0.306	1.168	0.362	0.331	1.093
F 45-54	0.437	0.382	1.146	0.435	0.360	1.209
F 55-64	0.672	0.651	1.031	0.681	0.670	1.017
F 65 +	1.655	1.691	0.979	1.702	1.726	0.986
F Total	0.217	0.208	1.042	0.248	0.244	1.019
Total	0.247	0.212	1.167	0.295	0.276	1.071

TABLE IC

UNEMPLOYMENT MODELS -- SEASONALLY ADJUSTED -- MALES AND TOTAL

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
K	0.49	0.33	0.25	0.11	0.14	0.38^{x}	0.10	0.07	0.06
t	0.01^{a}	0.01	0.89^{ay}	0.16^{a}	0.22^{a}	1.41^{az}	0.08^{a}	0.28^{a}	0.19^{a}
t^{2}	-0.05^{a}	-0.06^{y}	-0.07^{z}	-0.06^{az}	-0.02	0.07^{az}	-0.04^{a}	-0.03^{az}	-0.03^{ay}
z^{M}_{-1}	-6.00	-7.38	-2.06	-9.62^{z}	-4.13	0.86	-7.69	-6.53^{x}	-6.66^{y}
z^{Q}	-18.07	17.26^{x}	3.27	8.07^{x}	5.76	3.01	-15.19	8.14^{x}	8.00^{y}
z^{A}	-25.35^{x}	-24.80^{z}	-10.87^{y}	-12.76^{z}	-1.30	-7.31	23.10^{y}	-6.88^{x}	-5.74^{y}
z^{A}_{-12}	1.79	-9.76	-10.94	11.39^{x}	-3.42	-15.19^{y}	0.34	-2.66	-1.60
V/E^{M}	-1.94	-1.14^{x}	-1.21^{z}	-0.82^{y}	0.01	-1.06^{y}	0.40	-0.65^{x}	-0.60^{y}
V/E^{Q}	-8.56^{y}	-8.38^{z}	-4.62^{z}	-6.50^{z}	-2.84^{x}	-2.83	-1.10	-4.01^{z}	-3.11^{z}
V/E^{A}	8.79	11.97^{y}	5.50^{y}	14.30^{z}	0.78	0.55	-2.20	6.13^{z}	5.15^{z}
V/E^{A}_{-12}	0.71	6.09^{y}	4.81^{y}	-0.35	1.39	5.45^{y}	-2.76	1.48	0.61
VU/L^{M}_{-1}	0.03	-0.02	0.03	-0.01	0.01	0.03	-0.09^{x}	-0.01	-0.01
VU/L^{Q}	0.25	0.27^{y}	0.12^{x}	0.25^{z}	0.06	0.06	0.13	0.13^{y}	0.11^{y}
VU/L^{A}	-0.27	-0.49^{y}	-0.25^{x}	-0.56^{z}	-0.06	-0.10	-0.05	-0.25^{z}	-0.20^{z}
VU/L^{A}_{-12}	-0.15	-0.28^{y}	-0.24^{z}	-0.06	-0.08	-0.27^{z}	0.11	-0.07	-0.03
VU/V^{M}_{-1}	-0.21	0.07	-0.10	0.03	-0.10	0.10	0.23^{y}	-0.03	-0.03
VU/V^{Q}	-0.78^{x}	0.612^{z}	-0.248	-0.61^{z}	0.16	-0.20	-0.27	-0.30^{y}	-0.26^{z}
VU/V^{A}	0.61	0.92^{y}	0.51	1.29^{z}	-0.03	0.06	0.04	0.54^{z}	0.47^{z}
VU/V^{A}_{-12}	0.10	0.61^{y}	0.58^{z}	0.14	0.18	0.45^{y}	-0.16	0.27^{x}	0.17
$(1/U_p^2)^{M}_{-1}$	0.00	-0.08	0.01	0.04	-0.03	0.03	0.06	-0.01	0.00
$(1/U_p^2)^{Q}$	-0.10	-0.07	-0.20^{x}	-0.11	-0.01	-0.07	0.00	0.01	-0.03
$(1/U_p^2)^{A}$	-0.21	0.51^{x}	0.91^{y}	-0.18	-0.04	0.22^{y}	-0.10	0.15	0.16
$(1/U_p^2)^{A}_{-12}$	-0.05	0.53^{x}	0.56^{x}	-0.41^{y}	0.13	0.22^{x}	0.05	0.35^{x}	0.22^{x}

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
U^M_{o-1}	0.09	0.37	0.58^z	0.36^z	0.50^z	0.43^z	0.12	0.66^z	0.67^z
$(1/U_o^2)^Q$	3.64^y	-0.44	0.17^x	0.14^y	0.05	0.16^x	0.04	0.12	0.11
$(1/U_o)^A$	-0.65	-0.17	-0.49	0.36^y	0.37^y	0.32	0.17	-0.06	-0.17
$(1/U_o)^A_{-12}$	5.77	-0.65	-0.23	0.56^z	-0.01	0.64^x	0.00	-0.51	-0.30
DW^M	-0.04	-0.01	0.09	0.00	0.06	0.08	-0.03	0.00	0.04
DW^Q	0.22	-0.13	-0.09	0.31^x	0.29	0.41	0.66^x	0.20	0.20
DW^A	-2.02	2.28	-0.24	-0.20	-0.45	0.34	-1.49	-0.50	-0.63
DW^A_{-12}	4.92^x	3.42^y	0.51	1.11	0.57	2.33^y	-1.63	0.75	0.41
DP^M_{-1}	-0.37	-0.41	-0.34	-0.12	-0.300	-0.10	-0.98^y	-0.27	-0.21
DP^Q	-0.88	-0.14	0.71^x	0.01	0.57	0.80^x	0.62	0.44	0.27
DP^A	6.22	1.27	-0.68	-0.82	0.48	-3.30^y	3.86^x	-0.20	-0.02
DP^A_{-12}	-0.04	-1.03	0.06	-1.08	-1.40	-4.91^z	0.56	-0.66	-0.33
P/E_{-1}	-2.23	-0.98	0.28	1.97^z	-0.34	0.63	5.58^z	0.73	0.38
S/U_{-1}	-0.06	-0.04	-0.02	-0.02^x	0.00	-0.05^z	-0.04	-0.02	-0.01
$\Delta L/L_o$	0.09^z	0.10^x	0.13	0.07	0.08	0.08	0.06^y	0.28^z	0.15^z
$\bar{R}^2$	0.86	0.95	0.96	0.96	0.95	0.93	0.51	0.97	0.97
D.	2.06	2.25	2.27	2.31	2.11	2.31	2.08	2.35	2.13

TABLE C

UNEMPLOYMENT MODELS -- SEASONALLY ADJUSTED -- FEMALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Females
K	0.33	0.14	-0.03	0.06	-0.05	0.69[x]	-0.07	0.16
t	-0.04	-0.05[a]	-0.27[a]	0.56[a]	0.30[a]	1.31[ax]	-0.76[a]	0.25[a]
t^2	0.13[y]	-0.02[a]	0.02[a]	-0.02	0.02[a]	0.04[a]	0.11[a]	0.02[ax]
z^M_{-1}	-29.72[y]	-6.89	-1.79	-6.63	2.30	-0.50	1.89	-6.89[y]
z^Q	27.73	3.85	2.47	3.91	-8.54	4.00	-4.00	6.05[x]
z^A	-16.37	3.02	-4.99	10.14[y]	-2.42	-10.38	17.24	-6.29[y]
z^A_{-12}	17.05	1.70	10.73	-11.36[x]	5.31	-18.06	16.90	2.49
V/E^M	-0.05	-0.07	1.08[y]	0.37	-0.28	-1.21	2.53	0.14
V/E^Q	-4.18	-1.82	-3.34[y]	2.75[y]	-0.16	-3.54	-3.02	-2.02[y]
V/E^A	5.10	6.38	3.63	-2.69	6.22	-6.51	-5.58	1.94
V/E^A_{-12}	-8.00	2.08	-2.59	3.50[y]	-0.05	3.00	-8.28	-1.73
VU/L^M_{-1}	-0.15[x]	0.02	-0.01	0.00	0.00	0.03	-0.15	-0.04[x]
VU/L^Q	0.16	-0.02	0.10	-0.08	0.03	0.15	0.22	0.06
VU/L^A	0.00	-0.18	-0.14	0.02	-0.26[y]	0.24	0.24	-0.01
VU/L^A_{-12}	0.45[y]	-0.12	0.11	-0.17[y]	0.06	-0.07	0.46	0.08[x]
VU/V^M_{-1}	0.02	0.03	0.01	-0.08	0.03	-0.17	0.05	0.00
VU/V^Q	-0.33	0.00	-0.29[x]	0.34[y]	-0.03	-0.41	-0.33	-0.13
VU/V^A	0.22	0.38	0.31	-0.46[y]	0.44	-0.45	-0.43	0.08
VU/V^A_{-12}	-0.97[x]	0.33	-0.17	0.30[x]	-0.09	0.07	-0.94	-0.19
$(1/U_p^2)^M_{-1}$	-0.01	-0.02	-0.01	0.03	-0.10[z]	-0.02	0.04	0.00
$(1/U_p^2)^Q$	-0.04	0.01	-0.02	-0.04	0.12[y]	-0.02	0.02	0.02
$(1/U_p^2)^A$	0.03	-0.03	0.01	0.11	0.03	0.01	-0.45	0.02
$(1/U_p^2)^A_{-12}$	-0.84[y]	0.17	-0.15	0.26[y]	-0.19[x]	-0.07	-0.89[y]	-0.17[y]
U^M_{o-1}	0.02	0.17[x]	-0.12	0.00	-0.06	0.12	0.05	0.14

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Females
$(1/U_o^2)^Q$	-0.10	0.03	0.00	0.00	0.00	0.00	-0.03	0.00
$(1/U_o^2)^A$	-1.53^y	-0.02	0.01	0.05^z	0.00	0.02^x	-0.15	-0.08^x
$(1/U_p^2)^A_{-12}$	0.02	-0.02	-0.02	0.03^z	0.09^x	0.00	-0.22	0.03
DW^M	-0.10	0.07	-0.04	0.09	-0.01	0.17	-0.71	-0.01
DW^Q	-0.34	0.08	0.15	0.50^y	-0.02	-0.06	-0.74	-0.09
DW^A	2.38	-0.64	-2.03	0.65	0.33	0.49	-6.72	0.52
DW^A_{-12}	0.99	-1.49	1.31	1.77^y	-0.74	0.74	-1.51	0.78
DP^M_{-1}	0.15	-0.38	-0.11	0.00	0.53	-0.67	-0.16	-0.04
DP^Q	-0.73	0.19	-0.17	0.10	0.43	0.77	1.16	0.10
DP^A	-0.77	-0.63	1.01	0.18	-1.50	-0.55	-5.88	-0.56
DP^A_{-12}	-3.43	1.47	-0.80	-1.20	0.17	1.58	-2.65	-0.57
P/E_{-1}	0.91	-0.13	0.47	-0.61	0.48	-2.28	-1.48	0.15
S/U_{-1}	-0.02	-0.01	-0.02	0.02^x	-0.02	-0.01	0.01	-0.01
$\Delta L/L_o$	0.15^z	0.08^z	0.01	0.00	0.02	0.02	0.06^y	0.02
$\bar{R}^2$	0.76	0.75	0.52	0.65	0.59	0.40	0.03	0.90
D.W.	2.12	2.04	2.05	2.00	1.93	2.00	2.07	2.09

TABLE CI

FINAL UNEMPLOYMENT MODELS -- SEASONALLY ADJUSTED -- MALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	All
K	0.67^{z}	0.08	0.19^{y}	-0.11	0.06^{z}	0.12^{y}	-0.06	0.10^{y}	0.03
t	1.08^{z}	0.41^{y}	0.66^{az}	0.23^{a}	-	1.05^{az}	-0.24^{a}	0.31^{z}	0.08^{a}
t^2	-	-0.05^{y}	-0.06^{az}	-0.06^{az}	-	-0.07^{az}	0.04^{az}	-0.03^{z}	-0.02^{az}
z^{M}_{-1}	-	-	-	9.61^{z}	-	-	-	-6.33^{y}	-4.84^{y}
z^{Q}	11.48^{y}	9.16^{y}	-	8.17^{y}	-	-	-24.49^{z}	7.62^{y}	5.87^{y}
z^{A}	-26.97^{z}	-20.42^{z}	5.74^{y}	-14.85^{z}	-	-6.16^{z}	30.68^{z}	-8.64^{z}	-5.20^{y}
z^{A}_{-12}	-	-	10.48^{y}	11.52^{y}	-	-	-	-	-
$(V/E)^{M}$	-1.81^{x}	-	-1.20^{z}	-0.72^{z}	-	-0.86^{y}	-	-0.69^{z}	-0.55^{z}
$(V/E)^{Q}$	-7.32^{z}	-1.56^{z}	-2.07^{z}	-5.91^{z}	-0.77^{z}	-1.08^{x}	-	-3.45^{z}	-2.34^{z}
$(V/E)^{A}$	3.36^{x}	-8.00^{z}	2.98^{x}	14.34^{z}	-	2.14^{x}	-3.10^{z}	5.61^{z}	4.91^{z}
$(V/E)^{A}_{-12}$	-	13.02^{z}	3.90^{z}	-	-	4.75^{z}	-	-	-
$(VU/L)^{M}_{-1}$	-	-	0.06^{z}	-	-	0.05^{y}	-6.88^{ax}	-	-
$(VU/L)^{Q}$	0.17^{y}	0.24^{z}	-	0.22^{z}	-	-	8.23^{ax}	0.12^{z}	0.08^{z}
$(VU/L)^{A}$	0.00	-0.47^{z}	-0.14^{y}	-0.56^{z}	0.98^{a}	-0.16^{z}	-	-0.20^{z}	-0.19^{z}
$(VU/L)^{A}_{-12}$	-0.09^{y}	-0.24^{z}	-0.19^{z}	-0.07^{z}	-0.83^{az}	-0.27^{z}	-	-0.03^{z}	-
$(VU/V)^{M}_{-1}$	-0.20^{x}	-	0.14^{z}	-	-0.10^{z}	-0.13^{z}	0.21^{y}	-	-0.06^{z}
$(VU/V)^{Q}$	-0.58^{z}	-0.66^{z}	-	-0.51^{z}	-	-	-0.18^{x}	0.32^{z}	-0.17^{z}
$(VU/V)^{A}$	-	0.98^{z}	0.28^{y}	1.27^{z}	-	0.05	-	0.48^{z}	0.45^{z}
$(VU/V)^{A}_{-12}$	-	0.52^{z}	0.48^{z}	0.13^{z}	-	0.28^{z}	-	0.11^{z}	0.11^{z}
$(1/U_p^{2})^{M}_{-1}$	-	-0.11^{y}	-	-	-0.04^{y}	-	-	-	-
$(1/U_p^{2})^{Q}$	-0.15^{y}	-	-0.20^{y}	-	-	-	-	-	-
$(1/U_p^{2})^{A}$	-	0.31^{z}	0.74^{z}	-0.30^{z}	-	-	-0.10	0.07^{y}	0.14^{x}
$(1/U_p^{2})^{A}_{-12}$	-	0.25^{y}	0.25^{z}	-0.59^{z}	-	-	0.11^{z}	0.08^{y}	0.21^{z}
U_{o-1}	-	0.44^{z}	0.64^{z}	0.63^{z}	0.68^{z}	0.49^{z}	-	0.69^{z}	0.70^{z}
$(1/U_o^{2})^{Q}$	3.34^{y}	0.34^{y}	0.19^{z}	0.05^{y}	-0.08^{z}	-	-	0.10^{x}	-
$(1/U_o^{2})^{A}$	-4.81^{x}	-	-0.39^{z}	0.57^{z}	-	0.97^{z}	-	-	-0.08

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	All
$(1/U_o^{2})^{A}_{-12}$	3.64^{y}	-	-	0.73^{z}	-	1.14^{z}	-	-	-0.40^{z}
DW^{A}	-1.91	1.21	-	0.23	-0.78^{x}	0.27	-	-0.24	-0.69^{y}
DW^{A}_{-12}	5.27^{y}	3.15^{z}	-	1.50^{z}	-	2.31^{z}	-	1.32^{y}	-
DP^{Q}	-	-	-	-	-	0.82^{y}	-	-	-
DP^{A}	6.00^{z}	-	-	-	1.51^{z}	-4.46^{z}	2.97^{y}	-	-
DP^{A}_{-12}	-	-	-	-	-	-4.36^{z}	-	-	-
P/E_{-1}	-	-	-	1.75^{z}	-	-	5.97^{z}	-	-
S/U_{-1}	-0.07^{x}	-	-	-	-	-0.03^{y}	-	-	-
$\Delta L/L$	0.08^{z}	0.13^{y}	-	-	-	-	0.06^{y}	0.28^{z}	0.15^{z}
$\bar{R}^2$	0.87	0.95	0.96	0.96	0.94	0.93	0.53	0.97	0.97
D.W.	1.86	2.30	2.21	2.33	2.20	2.28	1.87	2.19	2.07

TABLE CII

FINAL UNEMPLOYMENT MODELS -- SEASONALLY ADJUSTED -- FEMALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Females
K	0.39	0.08^{z}	-0.29^{z}	-0.12^{z}	-0.14^{z}	0.27^{z}	-0.25^{a}	0.18^{z}
t	-0.05^{a}	0.26^{az}	-0.64^{z}	-	-	0.50^{az}	-	0.30^{az}
t^{2}	0.15^{az}	-	-	-	-	0.03^{az}	-	0.02^{ay}
$\underline{z}^{M}_{-1}$	-35.30^{z}	-4.24^{z}	-	-5.54^{z}	-	-	-	-6.49^{z}
$\underline{z}^{Q}$	30.49^{y}	-	-	-	-4.01^{x}	-	-	6.56^{y}
$\underline{z}^{A}$	-15.70^{x}	-	13.39^{z}	12.71^{z}	5.76^{z}	-8.96^{y}	-	-6.46^{z}
$\underline{z}^{A}_{-12}$	19.17^{x}	-	-	-	-	-	-	-
V/E^{M}	-	-	1.21^{z}	-	-	-	-	-
V/E^{Q}	-	-1.78^{z}	-1.24^{z}	2.43^{z}	-	-3.01^{x}	-	-2.25^{z}
V/E^{A}	0.65	3.18^{z}	5.36^{z}	-	5.52^{z}	0.15	-	1.94^{y}
V/E^{A}_{-12}	-10.05^{z}	-	-0.86^{z}	-	-	0.89^{y}	-	-1.30^{x}

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Females
VU/L^{M}_{-1}	-0.13^{z}	-	-	-	-	-	-	-0.03^{z}
VU/L^{Q}	-	-	-	-0.09^{z}	-	0.13^{y}	-	0.07^{y}
VU/L^{A}	0.21	-7.54^{az}	-0.20^{z}	-0.03^{y}	-0.21^{z}	-	5.17^{ay}	-0.02
VU/L^{A}_{-12}	0.53^{z}	-	-	-0.03^{z}	0.01^{y}	-	5.87^{az}	0.07^{y}
VU/V^{M}_{-1}	-	-	-	-	-	-0.16^{y}	-	-
VU/V^{Q}	-	-	-0.08^{z}	0.07^{y}	-	-0.24^{x}	-	-0.16^{z}
VU/V^{A}	-0.19	0.12^{y}	0.50^{z}	0.32^{z}	0.42^{z}	-	0.12^{z}	0.09
VU/V^{A}_{-12}	-1.16^{z}	-	-	-	-	-	-	-0.13^{x}
$(1/U_p^{2})^{M}_{-1}$	-	-	-	-	-0.09^{z}	-	-	-
$(1/U_p^{2})^{Q}$	-	-	-	-	0.08^{z}	-	-	-
$(1/U_p^{2})^{A}$	-0.10	-	-	-0.01	-	0.00	0.11	0.04
$(1/U_p^{2})^{A}_{-12}$	-1.00^{z}	-	-	0.09^{z}	-	-0.19^{z}	-0.38^{z}	-0.13^{z}

TABLE CII (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Females
U^M_{o-1}	-	0.17^y	-	-	-	0.18^y	-	0.17^y
$(1/U_o^2)^A$	-1.41^z	-	-	0.05^z	0.02^a	1.36^{ay}	-	-0.08^z
$(1/U_o^2)^A_{-12}$	-	-	-	0.02^z	0.62^{az}	-	-	-
DW^Q	-	-	-	0.44^y	-	-	-	-
DW^A	-	-	-2.09^z	-0.61	-	-	-	0.31
DW^A_{-12}	-	-	-	1.30^y	-	-	-	0.82^x
DP^M_{-1}	-	-	-	-	0.67^z	-	-	-
DP^A	-	-	-	-	-1.69^z	-	-	-
P/E_{-1}	-	-	-	-	-	-2.60^y	-	-
S/U_{-1}	-	-	-	0.03^z	-	-	-	-
$\Delta L/L$	0.15^z	0.08^z	-	-	-	-	0.06^z	-

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Females
$\bar{R}^2$	0.78	0.76	0.54	0.67	0.57	0.44	0.12	0.91
D.W.	2.08	1.99	1.96	1.92	1.86	2.00	2.05	2.10

TABLE CIII

COMPARISON OF SIMPLE MODELS FOR LABOR-FORCE PARTICIPATION

WITH MORE COMPLICATED ONES

STANDARD ERRORS OF ESTIMATE[c]

Group		Seasonally Adjusted		Minimum Month		
	Simple	Full	Ratio	Simple	Full	Ratio
M14-19	0.975	0.945	1.032	0.842	0.820	1.028
M20-24	0.648	0.617	1.051	0.619	0.583	1.062
M25-34	0.187	0.189	0.998	0.187	0.187	1.000
M35-44	0.163	0.165	0.989	0.162	0.164	0.987
M45-54	0.220	0.191	1.154	0.219	0.206	1.064
M55-64	0.421	0.414	1.043	0.409	0.392	1.043
M65+	0.513	0.443	1.158	0.485	0.455	1.067
M Total	0.226	0.212	1.067	0.209	0.193	1.078
F14-19	0.760	0.665	1.143	0.687	0.631	1.089
F20-24	0.641	0.610	1.051	0.634	0.598	1.076
F25-34	0.405	0.368	1.099	0.394	0.373	1.056
F35-44	0.487	0.458	1.063	0.475	0.459	1.033
F45-54	0.504	0.449	1.121	0.497	0.462	1.075
F55-64	0.472	0.469	1.007	0.460	0.456	1.009
F65+	0.279	0.260	1.075	0.264	0.238	1.109
F Total	0.267	0.242	1.104	0.252	0.231	1.093
Total	0.203	0.188	1.085	0.191	0.180	1.063

TABLE CIV

LABOR-FORCE PARTICIPATION MODELS -- SEASONALLY ADJUSTED -- MALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
K	0.18	0.94	0.56[z]	0.77[z]	0.59[z]	0.53[y]	1.29[z]	0.64[z]	0.46[z]
t	-0.01	0.20[a]	-0.19[a]	0.01[a]	-0.66[z]	-0.03[a]	0.90[ay]	-0.28[a]	0.45[ay]
t^2	0.05[a]	0.02[a]	0.00[a]	0.01[a]	-0.01	-0.03[a]	0.08[az]	0.01[a]	-0.01[a]
z^M_{-1}	-1.03	-7.52	0.58	-1.33	5.00[y]	0.69	-0.75	0.08	0.47
z^Q	5.33	5.11	-0.61	1.58	-5.06[x]	-1.26	1.07	-0.54	1.10
z^A	11.86	-1.45	4.07	3.30	5.35[y]	5.03	-1.62	3.40	-2.00
z^A_{-12}	-3.21	-4.67	0.23	-3.25	8.65[y]	4.47	-32.46[z]	0.26	-5.56
V/E^M_{-1}	3.25	-0.25	1.74[y]	0.74	0.85	-1.11	2.26	0.89	0.24
V/E^Q	-0.95	0.26	-1.79[x]	-0.71	-4.24[z]	2.33	-1.09	-0.67	-0.14
V/E^A	-3.66	-5.15	0.42	-1.81	4.77[z]	-3.87	-20.38[z]	-3.41[x]	-2.40
V/E^A_{-12}	3.09	-3.33	-0.11	-0.26	0.22	-0.34	2.34	-1.20	1.52

TABLE CIV (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
VU/L^{M}_{-1}	0.06	0.02	-0.05	-0.02	-0.06[x]	0.06	-0.06	0.00	0.03
VU/L^{Q}	-0.22	-0.02	0.07	0.01	0.17[z]	-0.09	-0.04	-0.02	-0.04
VU/L^{A}	-0.15	0.19	-0.02	0.07	-0.18[z]	0.12	0.78[z]	0.13[x]	0.06
VU/L^{A}_{-12}	-0.12	0.19	-0.04	0.03	-0.03	-0.03	0.24[y]	0.03	-0.07
VU/V^{M}_{-1}	0.18	-0.24	0.13[x]	0.06	0.11	-0.09	0.16	-0.02	-0.09
VU/V^{Q}	0.31	0.10	-0.24	-0.06	-0.43[z]	0.12	-0.15	-0.01	0.06
VU/V^{A}	-0.34	-0.36	0.09	-0.15	0.46[z]	0.26	-1.50[z]	-0.25	-0.12
VU/V^{A}_{-12}	0.17	-0.37	-0.06	-0.10	-0.06	-0.14	-0.52[x]	-0.21[x]	0.07
$(1/U_p^{2})^{M}_{-1}$	-0.03	0.17	-0.01	0.01	0.01	0.02	-0.03	-0.01	0.00
$(1/U_p^{2})^{Q}$	-0.15	0.06	-0.02	-0.04	-0.06[y]	-0.04	-0.01	0.00	-0.03
$(1/U_p^{2})^{A}$	-0.07	-0.16	0.12	0.05	0.04	-0.21[y]	0.06	-0.19	0.07

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
$(1/U_p^2)^A_{-12}$	0.10	-0.45	0.28	0.01	0.02	-0.17	-0.35^y	-0.36^y	-0.05
$(1/U^2)^M_{-1}$	1.30^x	-0.05	0.00	-0.01	0.02	0.02	-0.04	0.02	0.03
$(1/U^2)^Q$	1.55	-0.36	0.01	0.03	0.00	-0.06	0.08	-0.03	0.06
$(1/U^2)^A$	0.36	0.35	-0.14	-0.07	-0.22	0.58	-0.20	0.42	0.09
$(1/U^2)^A_{-12}$	1.41	0.39	-0.23	-0.03	0.01	0.75^x	-0.03	0.81^y	0.34
DW^M_{-1}	0.06	0.09	0.01	0.07	-0.01	0.05	-0.19	0.02	-0.07
DW^Q	-0.30	0.25	-0.06	-0.06	-0.08	0.32	0.19	-0.08	-0.14
DW^A	2.04	-2.47	-0.69	-0.09	0.24	0.19	4.63^z	0.36	1.47^y
DW^A_{-12}	0.03	0.94	0.22	-0.14	0.61	-0.95	1.78	0.13	1.00^y
DP^M_{-1}	0.28	-0.21	-0.22	-0.10	0.23	-0.12	0.59^x	0.05	-0.04
DP^Q	2.12^x	1.16	0.13	0.18	0.15	-0.29	0.66	0.57^y	0.55^y

TABLE CIV (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
DP^A	-5.61	-3.83	0.44	0.17	-0.15	-0.83	-1.60	-1.48^x	-1.65^y
DP^A_{-12}	-2.42	0.91	0.45	0.54	-0.66	2.00	-2.20	-0.46	-1.26^y
P/E_{-1}	-3.10	-3.77^y	-0.45	0.49	0.27	-0.05	0.36	0.81	-0.19
S/U_{-1}	-0.09^y	-0.07^y	0.00	-0.01	-0.00	0.00	0.02	-0.02^x	-0.02^z
L/P_{o-1}	0.21^y	0.43^z	0.37^z	0.27^z	0.13	0.34^z	0.15^x	0.31^z	0.43^z
$\bar{R}^2$	0.93	0.96	0.89	0.56	0.80	0.76	0.98	0.99	0.95
D.W.	2.02	2.05	1.88	2.01	2.06	2.08	2.16	2.09	2.13

TABLE CV

LABOR-FORCE PARTICIPATION MODELS -- SEASONALLY ADJUSTED -- FEMALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
K	1.68^{z}	1.04^{z}	0.47^{y}	-0.01	-0.37	0.29	0.38^{z}	0.42^{z}
t	2.62^{z}	2.20^{az}	1.57^{az}	0.89^{ax}	-0.40^{a}	0.93^{ax}	0.88^{az}	1.28^{az}
t^2	0.00^{a}	0.03^{a}	-0.01^{a}	-0.08^{az}	-0.10^{az}	-0.03^{a}	-0.02^{ax}	-0.04^{az}
Z^M_{-1}	-18.33^{y}	-9.92	2.54	0.22	5.53	5.22	1.64	-1.36
Z^Q	24.02^{y}	18.25	-9.96^{x}	6.31	-8.47	-3.87	6.12	4.28
Z^A	-17.57^{y}	-24.79^{z}	0.48	-8.86	8.89	-2.27	-7.81^{y}	-6.87^{y}
Z^A_{-12}	-46.63^{z}	-21.46	-15.16^{x}	-2.14	13.78	-8.80	-13.82^{z}	-13.18^{z}
V/E^M_{-1}	1.92	-2.40	1.78	-2.11	-1.05	-1.60	-0.82	-0.46
V/E^Q	-3.77	-2.29	-2.03	0.74	-1.19	-2.37	-0.64	-0.92
V/E^A	-15.20^{z}	-2.28	-0.99	3.87	4.66	-0.43	-3.39	-0.96

TABLE CV (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
V/E^{A}_{-12}	1.19	-0.50	5.09^{z}	8.52^{z}	4.63^{y}	0.64	2.24^{y}	3.97^{z}
VU/L^{M}_{-1}	0.08	0.08	-0.09	0.12	0.04	0.01	0.02	0.04
VU/L^{Q}	0.05	0.09	0.10	-0.08	-0.09	0.13	0.03	0.00
VU/L^{A}	0.41^{x}	-0.01	-0.09	-0.26^{x}	-0.16	-0.02	0.08	-0.05
VU/L^{A}_{-12}	-0.03	0.09	-0.17^{y}	-0.39^{z}	-0.22^{y}	-0.01	-0.05	-0.14^{z}
VU/V^{M}_{-1}	-0.22	-0.21	0.12	-0.23	-0.04	-0.11	-0.05	-0.11
VU/V^{Q}	-0.17	0.03	-0.14	0.16	0.10	-0.18	-0.10	0.02
VU/V^{A}	-0.94^{x}	-0.35	0.28	0.52	0.57	0.11	-0.06	0.09
VU/V^{A}_{-12}	0.15	-0.22	0.36^{x}	0.81^{z}	0.45^{x}	0.02	0.02	0.33^{y}
$(1/U_{p}^{2})^{M}_{-1}$	0.01	0.05	0.00	0.09^{y}	0.00	-0.03	-0.04	0.01

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
$(1/U_p^2)^Q$	0.10	0.06	0.00	-0.16^z	-0.02	-0.01	-0.01	-0.02
$(1/U_p^2)^A$	0.18	0.24	0.33^z	0.48^z	0.22^x	0.13	0.13^x	0.29^z
$(1/U_p^2)^A_{-12}$	0.45^y	0.09	0.15	0.40^y	0.23^x	0.05	0.09	0.25^z
$(1/U_o^2)^M_{-1}$	0.00	0.01	0.00	0.00	0.00	0.00	0.00	-0.01
$(1/U_o^2)^Q$	0.21	-0.06	0.00	0.00	0.00	0.00	-0.01^y	0.05^x
$(1/U_o^2)^A$	0.12	0.05	0.01	0.01	-0.02^z	0.00	0.01	-0.01
$(1/U_o^2)^A_{-12}$	-0.34^x	0.01	-0.54	0.10	-0.01^y	0.00	0.01	-0.02
DW^M_{-1}	0.08	-0.09	-0.24^y	-0.16	-0.19	-0.13	0.00	-0.10
DW^Q	-0.30	-0.31	0.15	-0.34	-0.73^y	-0.07	-0.02	-0.15

TABLE CV (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
DW^A	0.14	4.93^z	1.91^x	3.06^y	3.19^y	1.43	0.68	1.73^y
DW^A_{-12}	0.17	1.63	0.78	2.29^y	4.13^z	1.25	0.98	1.43^y
DP^M_{-1}	-0.39	-1.04^y	0.16	0.18	0.01	0.37	-0.25	-0.11
DP^Q	1.65^y	0.38	0.00	0.90	1.03^x	-0.07	0.30	0.61
DP^A	1.62	2.96	1.37	-4.18^y	-9.93^z	0.05	0.83	-1.40
DP^A_{-12}	-0.47	-1.09	0.44	-2.48	-7.25^z	-0.68	-0.01	-1.57
P/E_{-1}	-5.31^z	0.45	0.43	0.40	2.71^y	1.31	-0.15	-0.28
S/U_{-1}	-0.12^z	-0.06^y	0.01	-0.03	0.02	0.05^y	0.00	-0.02^y
L/P_{-1}	0.18^y	0.53^z	0.17^x	0.38^z	0.43^z	0.55^z	0.18^y	0.35^z
$\bar{R}^2$	0.76	0.98	0.99	0.99	0.99	0.99	0.78	1.00
D.W.	2.15	2.27	2.02	2.12	2.18	2.10	1.97	2.10

TABLE CVI

LABOR-FORCE PARTICIPATION MODELS -- MINIMUM MONTH -- MALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
K	0.49	0.22	0.66[z]	0.78[z]	0.50[z]	0.45[y]	0.80[z]	0.58[z]	0.38[z]
t	-0.93[a]	-0.64[a]	-0.03[a]	-0.14	-0.62[az]	-0.27[a]	-0.37[a]	-0.63[az]	0.10[a]
t^2	0.08[ax]	-0.04[a]	0.00[a]	0.02[x]	0.00[a]	-0.03[a]	0.04[ax]	0.01[a]	0.00[a]
z^M_{-1}	-12.40	-6.14	-0.41	-3.33[x]	3.09	1.28	-8.46	-3.60	-1.74
z^Q	20.07	1.92	2.34	2.48	-5.91[x]	1.74	13.30[x]	4.49	3.93
z^A	-5.79	13.73	0.24	4.29[x]	10.27[z]	2.97	-4.68	2.27	-1.91
z^A_{-12}	1.98	-3.55	-1.80	-1.37	5.45[y]	2.33	-2.56	3.65	-1.61
V/E^M_{-1}	-3.06	-4.09[y]	-0.14	0.20	0.91	-2.74[y]	0.22	-1.24[y]	-0.91
V/E^Q	-1.85	3.89[x]	0.42	-0.51	-1.39[x]	-0.62	-2.43	-0.19	0.50
V/E^A	-4.36	0.02	-1.51	-4.75[y]	3.14	-1.45	-16.22[z]	-3.34	-2.77
V/E^A_{-12}	-0.48	4.38	0.37	-4.58[y]	-0.14	1.98	-18.64[z]	-1.49	0.79

TABLE CVI (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
VU/L^{M}_{-1}	0.08	0.10^{y}	0.01	-0.01	-0.03	0.06^{x}	-0.03	0.03^{x}	0.03^{x}
VU/L^{Q}	0.04	-0.13^{x}	-0.01	0.01	0.04^{x}	0.01	0.08	0.00	-0.02
VU/L^{A}	0.14	-0.05	0.05	0.18^{y}	-0.09	0.06	0.54^{z}	0.11	0.06
VU/L^{A}_{-12}	0.10	-0.15	0.00	0.16^{y}	0.00	-0.10	0.61^{z}	0.04	-0.02
VU/V^{M}_{-1}	-0.10	-0.12	-0.01	0.02	0.04	-0.07	0.05	-0.04	-0.03
VU/V^{Q}	-0.07	0.18^{x}	0.01	-0.03	-0.08^{y}	-0.01	-0.13	-0.01	0.02
VU/V^{A}	-0.34	0.26	-0.14	-0.21^{y}	0.14	-0.08	0.66^{y}	-0.18	-0.08
VU/V^{A}_{-12}	-0.23	0.17	-0.01	-0.23^{y}	-0.07	0.11	-0.97^{z}	-0.12	-0.04
$(1/U_{p}^{2})^{M}_{-1}$	-0.74^{x}	0.51	-0.26	-0.04	-0.09	0.21	-0.27	-0.03	0.03
$(1/U_{p}^{2})^{O}$	-0.87	-0.33	-0.21	0.01	-0.18	-0.34	0.36	0.54	-0.14
$(1/U_{p}^{2})^{A}$	0.23	-0.83	0.62	0.06	-0.32	-0.56	-0.72	-1.66^{x}	-0.23
$(1/U_{p}^{2})^{M}_{-12}$	-0.38	0.75	-0.05	-0.44	0.25	-0.24	-1.83^{z}	-2.41^{y}	-0.88

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
$(1/U_o^2)^M_{-1}$	3.14	-0.04	0.08	0.04	0.08	0.05	-0.10	-0.12	-0.11
$(1/U_o^2)^Q$	1.32	-0.28	0.29	0.11	0.04	-0.14	-0.10	-1.12	0.11
$(1/U_o^2)^A$	-2.60	2.19	-0.66^x	-0.70^z	0.06	0.20	0.11	2.25	0.38
$(1/U_o^2)^A_{-12}$	0.31	-1.52	0.12	-0.07	-0.70^x	0.86^y	0.41^y	3.14^y	1.03
DW^M_{-1}	-0.03	0.04	-0.01	0.00	0.00	-0.04	-0.03	0.00	0.00
DW^Q	0.10	0.01	-0.06	-0.02	0.03	0.07	0.27^y	0.03	-0.01
DW^A	4.95^y	-1.88	-0.17	0.03	0.01	2.34^y	2.27^x	1.25^y	1.00^y
DW^A_{-12}	4.35^y	0.05	0.10	-0.03	0.05	-0.75	1.83^x	0.48	0.95^y
DP^M_{-1}	0.50	-0.30	-0.06	-0.11	0.28	-0.19	0.63^x	0.07	0.03
DP^Q	1.03	1.31^x	-0.06	0.28	-0.12	-0.20	-0.13	0.38	0.17
DP^A	-4.13	-5.51^y	0.47	-1.17^x	0.80	-2.19	-1.35	-2.17^z	-0.77

TABLE CVI (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65+	All Males	Total
DP^{A}_{-12}	-1.45	2.09	0.16	0.42	0.88	-1.82	0.62	0.08	0.45
P/E_{-1}	-0.20	1.35	-1.07	0.33	-0.63	1.89	1.46	0.10	0.06
S/U_{-1}	-0.06	-0.06^{x}	0.01	-0.01	-0.01	-0.01	0.03	-0.01	0.00
L/P_{-1}	0.09	0.52^{z}	0.37^{z}	0.31^{z}	0.24^{z}	0.33^{z}	0.30^{z}	0.26^{z}	0.42^{z}
$\bar{R}^2$	0.95	0.97	0.88	0.48	0.69	0.69	0.98	0.99	0.91
D.W.	1.91	2.11	1.88	2.04	2.06	2.07	2.13	2.14	2.20

TABLE CVII

LABOR-FORCE PARTICIPATION MODELS -- MINIMUM MONTH -- FEMALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
K	0.40	0.68^{z}	0.51^{z}	0.44^{y}	-0.04	-0.02	0.43^{z}	0.44^{z}
t	0.49^{a}	1.10^{ay}	1.54^{az}	1.10^{az}	0.30^{a}	0.52^{a}	-0.69^{az}	1.29^{az}
t^2	-0.05^{a}	0.05^{a}	0.00^{a}	0.00^{a}	-0.09^{az}	-0.06^{az}	0.00^{a}	-0.03^{ay}
z^{M}_{-1}	-10.29	-1.03	-1.35	1.89	3.94	7.70	-0.99	-0.07
z^{Q}	15.23	11.23	-3.04	5.30	-6.27	-6.78	7.89^{y}	5.54
z^{A}	-8.95	-22.88^{y}	-3.16	-14.78^{y}	5.59	6.29	10.11^{z}	-10.14^{z}
z^{A}_{-12}	-9.48	-3.41	-15.95^{z}	-2.58	3.37	-11.63^{y}	9.39^{z}	-11.04^{z}
V/E^{M}_{-1}	-1.44	-1.30	0.11	-0.10	1.04	-0.88	1.02	-0.22
V/E^{Q}	5.83^{y}	3.42	0.06	1.57	-1.63	0.05	-0.75	0.97
V/E^{A}	-0.74	5.64	-4.63	-5.30	-0.07	1.97	9.77^{z}	-3.42

TABLE CVII (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
V/E^A_{-12}	4.17	-12.21^x	7.47^x	1.65	4.83	5.66	0.66	4.18
VU/L^M_{-1}	0.09^x	0.05	-0.01	0.04	-0.04	0.02	-0.02	0.02
VU/L^Q	-0.17^y	-0.11	0.00	-0.06	0.04	0.00	0.02	-0.03
VU/L^A	-0.14	-0.22	0.03	0.09	-0.10	-0.14	0.24^y	0.01
VU/L^A_{-12}	-0.22	0.47^y	-0.22	-0.04	-0.18	-0.21	0.03	-0.15^x
VU/V^M_{-1}	-0.15^x	-0.08	0.02	-0.09	0.07	-0.02	0.01	-0.03
VU/V^Q	0.26^y	0.20^x	0.00	0.07	-0.08	0.00	-0.03	0.05
VU/V^A	0.12	0.10	0.10	-0.10	0.37	0.37	-0.35^y	-0.01
VU/V^A_{-12}	0.18	-0.91^y	0.26	-0.08	0.19	0.26	-0.12	0.10
$(1/U_p^{\,2})^M_{-1}$	-0.14	0.26	-0.03	0.40^x	0.03	-0.03	-0.27^y	0.09

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
$(1/U_p^2)^Q$	0.39	-0.15	0.15	-0.66[x]	-0.28	-0.10	0.16	-0.24
$(1/U_p^2)^A$	0.62	0.52	0.99[x]	1.31[x]	1.04	0.84	0.36	0.85[y]
$(1/U_p^2)^A_{-12}$	2.19[y]	-0.30	0.48	-0.30	1.08[x]	1.27[y]	0.03	0.60[y]
$(1/U_o^2)^M_{-1}$	0.00	0.01	0.00	0.00	0.00	-0.02[a]	0.00[a]	0.00
$(1/U_o^2)^Q$	0.04	-0.05	0.00	-0.01	0.00	0.04[a]	0.00[a]	0.03
$(1/U_o^2)^A$	0.23[y]	0.11	0.01	-0.01	-0.05[z]	-0.22	0.01[a]	0.05
$(1/U_o^2)^A_{-12}$	-0.01	-0.06	0.00	0.01	-0.05[z]	-0.35	0.00[a]	0.10[z]
DW^M_{-1}	0.03	-0.02	-0.03	-0.01	0.01	0.01	-0.04	0.00
DW^Q	-0.16	-0.18	-0.03	-0.16	-0.01	0.06	-0.00	-0.04
DW^A	-2.40	1.12	1.36	1.60	0.34	-0.01	0.68	0.87

TABLE CVII (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
DW^{A}_{-12}	-1.00	0.29	0.64	1.31	4.60^{z}	0.21	0.01	0.75
DP^{M}_{-1}	-0.04	-0.73	0.23	0.47	0.06	0.22	-0.07	0.00
DP^{Q}	1.13	-0.20	-0.31	0.17	0.59	0.08	0.02	0.21
DP^{A}	0.47	7.69^{z}	2.07	0.31	-7.85^{z}	-0.97	0.95	-0.37
DP^{A}_{-12}	2.48	4.83^{y}	2.11	0.32	-6.96^{z}	0.45	-0.15	0.71
P/E_{-1}	-4.10^{x}	-0.61	0.04	-2.62	0.37	0.41	-1.16	-0.99
S/U_{-1}	-0.05^{x}	-0.01	0.00	0.00	0.00	0.04	0.01	-0.01
L/P_{-1}	0.26^{z}	0.55^{z}	0.25^{z}	0.37^{z}	0.43^{z}	0.56^{z}	0.20^{y}	0.37^{z}
$\bar{R}^2$	0.85	0.98	0.99	0.99	0.99	0.99	0.75	0.99
D.W.	2.10	2.36	2.06	2.06	2.11	2.13	2.00	2.11

TABLE CVIII

FINAL LABOR-FORCE PARTICIPATION MODELS -- SEASONALLY ADJUSTED -- MALES

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
K	0.23^{y}	0.72^{z}	0.37^{z}	0.64^{z}	0.56^{z}	0.61^{z}	1.11	0.57^{z}	0.39^{z}
t	-1.01^{az}	-	1.15^{az}	-	-0.64^{az}	-	1.11^{az}	-0.23^{az}	0.23^{ay}
t^2	0.05^{az}	-	-0.03^{az}	-	-0.01^{ay}	-	0.04^{az}	-	-0.01^{ax}
z^{M}_{-1}	-	-5.46^{z}	-	-	3.77^{x}	-	-	-	-
z^{Q}	-	-	-	-	-4.72^{x}	-	-	-	-
z^{A}	8.28^{x}	-	-3.04	2.53^{z}	5.81^{z}	4.89^{z}	-1.05	2.36^{x}	0.54
z^{A}_{-12}	-	-	-10.66^{z}	-2.22^{z}	8.49^{z}	-	-32.53^{z}	-	2.53^{x}
$(V/E)^{M}_{-1}$	5.17^{z}	-	-	-	-	-	-	1.10^{z}	-
V/E^{Q}	-4.32^{z}	-	-0.95^{y}	-	-2.70^{z}	-	-	-0.63^{x}	-

TABLE CVIII (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
V/E^A	-	-0.79	-1.02	-0.78^y	4.10^z	-5.35^z	-16.50^z	-2.38^z	-1.68^z
V/E^A_{-12}	-	-2.25^x	3.19^z	-	-	-	-	-0.68^y	0.51^y
VU/L^M_{-1}	-	-	0.03^y	-0.39^{ax}	-	-	-0.03^z	-	-
VU/L^Q	-0.09^z	-	-	-	0.09^z	-	-	-0.03^z	-
VU/L^A	0.06^z	0.01	-0.05	2.52^{ay}	-0.15^z	0.20^z	0.62^z	0.08^z	0.89^a
VU/L^A_{-12}	-	0.14^z	-0.12^y	0.72^{az}	0.02^z	-	0.09^z	-	-2.09^{ay}
VU/V^M_{-1}	-	-0.09^z	-0.06^y	-	-	-	-	-	-0.03^z
VU/V^Q	-	-	-	-	-0.25^z	-	-	-	-
VU/V^A	-	0.02	0.10	-0.06^z	0.38^z	-0.50^z	-1.33^z	-0.16^y	-
VU/V^A_{-12}	-	-0.30^z	0.25^y	-0.03^z	-0.05^y	-0.13^z	-0.18^z	-0.11^z	-
$(1/U_p^2)^M_{-1}$	-	0.13^z	-	-	-	-	-	-	-

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
$(1/U_p^2)^Q$	-0.14^y	-	-	-	-3.64^{az}	-	-	-	-
$(1/U_p^2)^A$	-	0.02	0.24^z	-	-	-0.21^z	-0.10^x	-0.21^y	-
$(1/U_p^2)^A_{-12}$	-	-0.30^z	0.21^z	-	-	-0.13^z	-	-0.31^z	-
$(1/U_o^2)^M_{-1}$	1.57^z	-	-	-	2.11^{ay}	-	-	-	-
$(1/U_o^2)^Q$	-	-	0.04^z	-	-	-	-	-	-
$(1/U_o^2)^A$	-	-	-	-	-	0.29^y	-	0.54^x	0.21^z
$(1/U_o^2)^A_{-12}$	-	-	-	-	-	0.39^z	-	0.80^z	0.14^y
DW^M_{-1}	-	-	-0.11^x	-	-	-	-	-	-
DW^A	-	-	1.15^x	-	-	1.46^y	4.09^z	-	-
DW^A_{-12}	-	-	1.04^y	-	-	-	1.84^y	-	-

TABLE CVIII (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
DP^M_{-1}	-	-	-	-	0.29^z	-	0.72^z	-	-
DP^Q	2.21^z	-	0.45^y	-	-	-	-	0.51^y	0.30^x
DP^A	-4.73^y	-2.54^y	-1.24	-	-	-0.51	-	-1.60^z	-0.79^x
DP^A_{-12}	-	-	-1.58^y	-	-	-2.37^y	-	-	-0.94^x
P/E_{-1}	-3.48^y	-2.47^z	-	-	-	-	-	-0.99^y	-
S/U_{-1}	-0.07^y	-0.06^z	-0.02^y	-	-	-	-	-0.02^y	-0.02^z
L/P_{-1}	0.24^z	0.45^z	0.36^z	0.37^z	0.18^y	0.38^z	0.36^z	0.36^z	0.41^z
$\bar{R}^2$	0.94	0.96	1.00	0.59	0.81	0.78	0.98	0.99	0.95
D.W.	2.00	1.95	2.05	1.99	2.04	2.05	2.26	2.13	2.00

TABLE CIX

FINAL LABOR-FORCE PARTICIPATION MODELS -- SEASONALLY ADJUSTED -- FEMALE

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
K	1.59^{z}	0.26^{z}	0.16^{z}	-0.06	0.13^{z}	0.05^{z}	0.19^{z}	0.37^{z}
t	2.55^{az}	0.67^{z}	0.76^{az}	0.61^{az}	0.55^{az}	0.35^{az}	0.45^{az}	1.15^{az}
t^2	-	-	-	-0.08^{az}	-0.04^{az}	-0.03^{az}	-0.02^{az}	-0.03^{az}
z^{M}_{-1}	-16.24^{y}	-	-	-	-	-	-	-
z^{Q}	23.17^{z}	8.47^{y}	-5.75^{z}	-	-	-	2.53^{x}	-
z^{A}	-20.77^{z}	-17.48^{z}	-	-	-	-	-4.40^{y}	-3.04
z^{A}_{-12}	-41.15^{z}	-	-	-	-	-	-5.73^{z}	-10.66^{z}
V/E^{M}_{-1}	-	-	0.82^{z}	-	-	-	-	-
V/E^{Q}	-2.98^{z}	-1.59^{y}	-	-	-	-	-	-0.95^{x}
V/E^{A}	-13.14^{z}	3.92^{z}	2.06^{y}	3.87^{y}	-	-	-2.56^{z}	-1.02

TABLE CIX (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
V/E^{A}_{-12}	-	-	2.39^{z}	5.91^{z}	-	-	1.67^{z}	3.19^{z}
VU/L^{M}_{-1}	0.12^{z}	-	-0.02^{x}	-	-	-	-	-0.03^{y}
VU/L^{Q}	-	0.05^{z}	-	-	-6.35^{az}	-	-	-
VU/L^{A}	0.40^{z}	-0.18^{z}	-0.16^{z}	-0.25^{z}	4.67^{az}	-	5.55^{az}	-0.05
VU/L^{A}_{-12}	-	0.03^{z}	-0.08^{z}	-0.28^{z}	-	-	-2.57^{az}	-0.12^{y}
VU/V^{M}_{-1}	-0.37^{z}	-	-	-	-	-	-	-0.06^{y}
VU/V^{Q}	-	-	-	-	0.14^{z}	-	-0.05^{z}	-
VU/V^{A}	-0.86^{z}	0.21^{y}	0.56^{z}	0.58^{z}	-	0.12^{z}	-	0.10
VU/V^{A}_{-12}	-	-	0.16^{z}	0.67^{z}	-	-	-	0.25^{z}
$(1/U_{p}^{2})^{M}_{-1}$	-	-	-	0.11^{z}	-	-	-2.60^{ay}	-

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
$(1/U_p{}^2)^Q$	0.10^y	-	-	-0.14^z	-	-	9.71^{az}	-
$(1/U_p{}^2)^A$	0.19^x	0.29^z	0.23^z	0.36^z	8.87^{ay}	-	-	0.24^z
$(1/U_p{}^2)^A_{-12}$	0.36^z	-	-	0.30^z	-	-	-	0.21^z
$(1/U_o{}^2)^Q$	0.21^y	-	-	-	-	-	-1.49^{az}	0.04^z
$(1/U_o{}^2)^A$	-	-	-	-	-1.00^{az}	-	-	-
DW^M_{-1}	-	-	-0.18^y	-	-	-	-	-0.11^x
DW^Q	-	-	-	-	-0.46^x	-	-	-
DW^A	-	2.41^y	-	-	1.68^y	-	-	1.15^x
DW^A_{-12}	-	-	-	-	2.72^z	-	-	1.05^y
DP^Q	1.52^z	-	-	0.86^y	-	-	-	0.45^y

TABLE CIX (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
DP^A	-	-	-	-3.65^z	-5.28^z	-	-	-1.24
DP^A_{-12}	-	-	-	-1.92^x	-2.32^z	-	-	-1.58^y
P/E_{-1}	-4.17^z	-	-	-	-	-	-	-
S/U_{-1}	0.11^z	-	-	-0.04^y	-	0.04^z	-	-0.02^y
L/P_{-1}	0.24^z	0.65^z	0.23^z	0.40^z	0.52	0.63^z	0.24^z	0.36^z
$\overline{R}^2$	0.77	0.98	0.99	0.99	0.99	0.99	0.79	1.00
D.W.	2.19	2.20	1.93	2.08	2.10	2.10	1.90	2.05

TABLE CX

FINAL LABOR-FORCE PARTICIPATION MODELS -- MINIMUM MONTH -- MALE

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
K	0.26^{z}	0.24^{z}	0.45^{z}	0.59^{z}	0.45^{z}	0.45^{az}	0.61^{z}	0.31^{z}	0.10^{z}
t	-0.66^{az}	-0.60^{az}	-0.16^{z}	-0.14^{y}	-0.43^{az}	-0.22^{az}	-0.38^{az}	-0.40^{az}	-
t^2	0.02^{az}	-0.01^{ax}	-	-	-	-0.03^{az}	0.04^{ay}	-	-
z^M_{-1}	-	5.78^{y}	-	-1.13^{x}	-	-	-	-	-
z^Q	-	-	-	-	-2.79^{y}	4.52^{z}	-	-	-
z^A	-	13.31^{z}	3.30^{z}	3.79^{y}	8.57^{z}	-	-	3.57^{z}	-
z^A_{-12}	-	-	-	-	3.26^{z}	-	-	-	-
V/E^M_{-1}	-0.58^{y}	-3.72^{y}	-	-	-	-1.67^{y}	-	-1.13^{z}	-0.15^{z}
V/E^Q	-	4.50^{y}	-	-	-	-	-	-	-
V/E^A	-	-	0.56^{z}	-0.99	-	-	-11.67^{z}	-	-

TABLE CX (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
V/E^{A}_{-12}	-	-	-	-1.99^{y}	-	-	-17.12^{z}	-	-
VU/L^{M}_{-1}	-	0.10^{y}	-	-	-	4.34^{ay}	-	-0.03^{y}	-
VU/L^{Q}	-	-0.15^{y}	-	-	-	-	-	-	-
VU/L^{A}	-	-	-	0.04	-	0.97^{a}	0.37^{y}	-	-
VU/L^{A}_{-12}	-	-	-	0.06^{y}	-	-2.65^{az}	0.56^{z}	-	-
VU/V^{M}_{-1}	-	-0.13^{y}	-	-	-	-0.06^{x}	-	-0.04^{y}	-
VU/V^{Q}	-	0.20^{y}	-	-	-	-	-	-	-
VU/V^{A}	-	-	-0.04^{z}	-0.03	-	-	-0.47^{y}	-	-
VU/V^{A}_{-12}	-	-	-	-0.08^{x}	-	-	-0.87^{z}	-	-
$(1/U_p{}^2)^{M}_{-1}$	-0.91^{z}	0.30^{x}	-0.19^{z}	-	-0.11^{y}	-	-	-	-

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
$(1/U_p^2)^A$	-	-0.70^y	-0.02	-0.02	-0.22	-0.28^y	-0.40	-	0.05^x
$(1/U_p^2)^A_{-12}$	-	-	0.14^x	-0.22^y	0.38^y	-	-1.69^z	-	-
$(1/U_o^2)^M_{-1}$	4.73^z	-	-	-	-	-	-	-	-
$(1/U_o^2)^Q$	-	-	-	-	-	-	-	-0.35^z	-
$(1/U_o^2)^A$	-	-	-0.22^x	-0.23^y	0.07	-0.12	0.10	-	-
$(1/U_o^2)^A_{-12}$	-	-	-	-	-0.80^z	0.35^z	0.37^y	-	-
DW^Q	-	-	-0.08^y	-	-	-	-	-	-
DW^A	2.15^x	-1.32^x	-	-	-	1.89^z	1.94^y	1.10^z	0.39^x
DW^A_{-12}	2.86^z	-	-	-	-	-	-	-	-
DP^M_{-1}	-	-	-	-	0.20^x	-	0.47^x	-	-

TABLE CX (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Males	Total
DP^A	-	-2.29^y	-	-0.74^x	-	-	-	-0.80^y	-
P/E_{-1}	-	-	-0.70^z	-	-	-	-	-	-
S/U_{-1}	-0.05^z	-	-	-	-	-	0.03^x	-	-
L/P_{-1}	0.29^z	0.58^z	0.49^z	0.39^z	0.37^z	0.41^z	0.44^z	0.54^z	0.81^z
$\bar{R}^2$	0.95	0.97	0.88	0.50	0.69	0.70	0.98	0.99	0.90
D.W.	1.97	2.07	1.88	2.03	2.02	2.06	2.15	2.13	2.38

TABLE CXI

FINAL LABOR-FORCE PARTICIPATION MODELS -- MINIMUM MONTH -- FEMALE

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
K	0.24^{z}	0.43^{z}	0.55^{az}	0.18^{z}	0.22^{z}	0.18^{y}	0.03^{z}	0.38^{z}
t	-0.05^{a}	0.71^{z}	1.48^{az}	0.52^{z}	0.62^{az}	0.73^{az}	0.04^{az}	1.02^{az}
t^2	-0.02^{az}	0.04^{z}	-	-	-0.06^{az}	-0.04^{az}	-0.01^{az}	-0.02^{az}
z^Q	-	16.30^{z}	-3.29^{x}	-	-	-	-	4.05^{z}
z^A	-	-22.96^{z}	-2.25	-	-	2.22	-	-8.10^{z}
z^A_{-12}	-	-	-17.14^{z}	-	-	-11.79^{z}	-	-7.44^{z}
V/E^Q	4.33^{y}	-	-	-	-	-	-	-
V/E^A	-	6.36^{x}	-6.88^{y}	-0.76^{z}	-5.93^{z}	-	-	-3.10^{z}
V/E^A_{-12}	-	-6.14^{y}	6.01^{z}	-	-	-	-	1.98^{z}
VU/L^{Mb}_{-1}	0.05^{y}	-	-	2.10^{ay}	-	-	-	-

TABLE CXI (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
VU/L^Q	-0.11^y	-	-	-	-	-	-	-
VU/L^A	-0.11^z	-0.25^y	0.10	-	0.12^z	-0.06^z	-	0.01
VU/L^A_{-12}	-0.08^z	0.26^z	-0.18^z	-	-0.02^x	-	-	-0.07^z
VU/V^M_{-1}	-0.09^y	-	-	-0.05^y	-	-	-	-
VU/V^Q	0.19^y	0.03^y	-	-	-	-	-	-
VU/V^A	-	0.13	0.02	-	-	0.25^z	-	-
VU/V^A_{-12}	-	-0.62^z	0.21^y	-	-	-	-	-
$(1/U_p{}^2)^Q$	0.47^y	-	-	-0.19^x	-	-	-	-
$(1/U_p{}^2)^A$	-0.47	-	0.97^z	0.50^z	0.37^y	0.96^z	-	0.66^z
$(1/U_p{}^2)^A_{-12}$	1.57^z	-	0.49^x	-0.21^y	0.66^z	0.69^z	-	0.39^z

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
$(1/U_o^2)^M_{-1}$	-	-	-	-	-	-	0.02^{az}	-
$(1/U_o^2)^Q$	-	-	-	-1.19^{ax}	-	-	-	-
$(1/U_o^2)^A$	0.26^{z}	0.26^{z}	1.32^{az}	-	-0.04^{z}	-0.35^{ay}	-	0.05^{z}
$(1/U_o^2)^A_{-12}$	-	-	-	-	-0.03^{z}	-0.43^{az}	-	0.06^{z}
DW^M_{-1}	-	-	-	-	-	-	-0.04^{x}	-
DW^A	-2.24^{x}	-	-	-	4.44^{z}	-	-	0.79^{x}
DP^M_{-1}	-	-0.56^{y}	-	0.51^{y}	-	-	-	-
DP^Q	0.92^{x}	-	-	-	-	-	-	-
DP^A	-	5.46^{z}	2.29^{y}	-	-5.47^{z}	-	-	-
DP^A_{-12}	-	3.97^{y}	2.66^{z}	-	-5.10^{z}	-	-	-
P/E_{-1}	-4.06^{y}	-	-	-1.33^{x}	-	-	-0.30^{x}	-

TABLE CXI (Continued)

Variable	14-19	20-24	25-34	35-44	45-54	55-64	65 +	All Females
S/U_{-1}	-0.05^{y}	-	-	-	-	0.04^{z}	-	-
L/P_{-1}	0.33^{z}	0.59^{z}	0.28^{z}	0.49^{z}	0.47^{z}	0.58^{z}	0.56^{z}	0.41^{z}
$\overline{R}^2$	0.86	0.98	0.99	0.99	0.99	0.99	0.71	0.99
D.W.	2.06	2.31	2.00	2.09	2.08	2.11	2.13	2.06

chapter nine

WAGE CHANGES

Introduction

The previous three chapters have been concerned with levels and changes in unemployment and various quantities which enter into the unemployment rate and with the effect of wage changes on these variables. We now turn to look at wage or earnings changes themselves.

Wage changes might be expected to receive different treatment from the other variables investigated in this study. This is not because they are necessarily more important than the other quantities, but rather because they have received much more extensive attention in other studies than have the labor-flow variables. This attention has centered on the Phillips curve, which is to a large extent the approach taken here. However, the specification used, which is based on those of the previous chapters, is both more extensive than the standard Phillips curve formulation and also does not contain contemporaneous variables.

The Phillips curve is usually regarded to be the relationship going from the unemployment rate to the rate of change of money wages. The standard justification for the relationship, expounded by Lipsey (1960), is the belief that prices rise when there is excess demand in a market and fall where there is excess supply while money wages are simply the price of labor. As we noted in chapter two, there is reason to question how adequate is this view as a representation of labor markets.

The second string to the argument lying behind the Phillips curve is the proposition that the unemployment rate is a good surrogate variable for excess demand in the labor market. The main differences in specification used in this study from others is the attempt to represent "tightness" in the labor market by a set of variables based on vacancies and productivity as well as unemployment.[1] It is quite possible, however, for the relationship to arise from different foundations than excess demand for labor being the driving force or from the type of analysis discussed in chapter two. For example, unemployment or our own variables could actually be representing bargaining strength as Kaldor (1959) suggested; and as chapters two and three indicated, it is a very long way from individual market behavior to the aggregate Phillips curve. It was also suggested there that, except insofar as shifts in the distribution of employment among occupations and employees are reflected in the data, the determination of wages rests on perceived rather than actual conditions and that the contrary view runs the danger of finding associations coming from the quantity - rather than the price-determination - aspects of labor markets. It may then be doubtful if comparison with more usual specifications for the Phillips curve would settle the issue of the appropriate relationship.

Even in Phillips' (1958) formulation other variables entered the relationship and subsequent investigators have introduced still more. These variables may enter because wages actually do depend on other things or because these other variables help to capture excess demand, possibly because those variables which might appear to be more directly relevant are deficient in conception or execution. Probably an exhaustive list of the types of variables used would not exceed 15 or 20, but the particular forms and definitions for them make the list much longer. Since other questions surrounding the Phillips curve concern the form and timing of the relationship, there are literally millions of possible permutations and combinations which might be explored. It is not feasible to examine all possibilities or, by placing them on a comparable

---

[1] Of course examples of this exist within the Phillips curve literature. Cf. eg. Vanderkamp (1970).

footing, evaluate the statistical evidence in favor of each. Unfortunately then, the present study proceeds largely on the basis only of its own specification, though the goodness of fit achieved, even with monthly and quarterly rates of change, makes one suspect that they are stronger than many which have been fitted to different sets of data, different periods of time and different specifications.

There are a number of issues surrounding the Phillips-curve area. Among these issues are:

(1) To what extent the unemployment rate is an adequate measure of excess demand or labor-market tightness and do other labor-market variables give a more complete picture?

(2) If other variables do enter the relationship, do they alter or simply reinforce the picture given by the simpler types of equations?

(3) What role do price and wage expectations, or, in practice, past changes in these variables play?

(4) More generally, what sorts of lags are involved in the process?

Unfortunately, the answers to these questions are largely a matter of interpretation of statistical results whose meaning in the best of circumstances is not clear. As Eckstein (1968) has pointed out, almost any sensible account of aggregate wage changes is likely to use members of a closely related family of variables. The problems for interpretation that this consideration raises are compounded by econometric difficulties which further obscure the meaning and nature of the statistical results obtained. Indeed, the results which follow may illustrate this point as much as they illuminate the process of wage change.

These problems are rendered yet more difficult by the nature of the data on wages available in Canada, together with some uncertainties about the quantities which are actually relevant. The quantities which can be determined by employers, possibly in conjunction with their employees or labor unions, are presumably wage rates, together with fringe benefits and other conditions of employment which were not explored in chapter two. For the effects of these decisions on labor flows, it may well not be the formal rate so much as the earnings figure implied by these decisions which matters; but presumably it is the earnings figure that can be expected on a longer-term basis, not the actually recorded figure affected by random variations in the work week, which are involved. As we noted in chapter three, only earnings measures are available on a monthly basis and these do reflect the vagaries mentioned. This fact may account, through the errors-in-variables problem, for some of the weak or strange results which have been found in the preceeding chapters. Quarterly it is possible to develop series for the rates of change of base rates in large collective bargains for all industries, though the coverage of these data is different from those of others used and it is likely that they are an imperfect representation of the wages determined in collective bargaining. For subsegments of the economy, the occurrence of settlements in large contracts is a sufficiently rare occurrence that only annual figures can be calculated. It is also only at this level that wage indexes are available. Needless to say, differences between what is available and the quantities to which theoretical wage-models apply or the length of the period of time over which aggregation is performed may easily produce difficulties for the formulation and interpretation of models.

All three levels of aggregation over time are explored in this chapter. First, quarterly data for the industrial composite or the widest aggregates available are examined, in section two. Section three then extends this investigation to monthly and annual data. Section four considers some extensions to the specifications. Section five examines monthly earnings models for the major divisions of the industrial composite. Section six summarizes the findings.

Models for Total Aggregates - Quarterly Versions

Models for the totals were fitted on a quarterly basis to Average Weekly Wages and Salaries in the Industrial Composite (AWWS), Average Hourly Earnings in Mining, Manufacturing and Construction (AHE) and to the rate of change of Base Rates in major aggrements (DWS - the series will often be referred to as wage settlements) described in section three of chapter three. Four specifications were investigated. They followed the practices described in chapter six. Using the notation of Table LVI and equation (2.2) of chapter six, these specifications were:

$$DW = \beta_1 + \beta_2 t + \beta_3 t^2 + L(Z_2) + L(V/ER) + L(VU/L) + L(VU/V) + L(1/U^2) + L(DW) + L(DP) + \beta_4 (P/ER)_{-1} \quad (2.1),$$

$$DW = \beta_1 + \beta_2 t + \beta_3 t^2 + L(Z_2) + L(V/U) + L(VU/V) + (L^1/U^2) + L(DW) + L(DP) + \beta_4 (P/ER)_{-1} \quad (2.2),$$

$$DW = \beta_1 + \beta_2 t + \beta_3 t^2 + L(V/ER) + L(VU/L) + L(VU/V) + L(^1/U^2) \quad (2.3),$$

$$DW = \beta_1 + \beta_2 t + \beta_3 t^2 + L(V/U) + L(VU/V) + L(^1/U^2) \quad (2.4).$$

Forms (2.1) and (2.2) are the full versions of the models of chapter six, using the alternative forms of the labor-market tightness variables and other influences considered. Forms (2.3) and (2.4) involve only the "tightness" variables and represent the hypothesis that this is all that affects wage changes. It will be noted that all specifications involve only lagged values of the variables. Forms (2.1) and (2.2) were also tried using third-degree Almon lags distributed over the previous eight quarters for the "L" terms in the equations.

The dependent variable used for Average Weekly Wages and Salaries and Average Hourly Earnings (DAWWS and DAHE) was of the form

$$DW_t = (W_t - W_{t-1})/W_{t-1} \quad (2.5);$$

that is, the quarterly rate of change. The base-rate settlements series was already expressed as the annual rate of change involved in contracts signed in the quarter. It was not converted to a quarterly rate and so there is a scale difference between the regression coefficients when this variable is used from those for the earnings series. The period used was from the first quarter of 1956 to the third quarter of 1970 for Average Weekly Wages and Salaries and Average

Hourly Earnings and ended with the last quarter of 1968 in the case of base-rate settlements.

The models were fitted to the seasonally-adjusted values of the variables and to these values adjusted to the minimum months as described in chapter four. In the case of wage settlements, no adjustment was performed, but both types of independent variable were used. Both the total unemployment rate, U, and that for males 25-44, U_p, were used.

The results for these various average specifications are summarized in Table CXII, in terms of the standard errors of estimate. (Posterior probabilities would indicate much the same things.) Specifications using T_1^2 - (2.1) or (2.3) - were superior to those employing T_2^2 - (2.2) or (2.4). The Almon-lag form was in some cases superior, in others inferior, to the average form. Qualitatively it did not lead to different conclusions and will not be pursued. No clear superiority of U or U_p was evident. Significantly stronger results were often obtained with the wider forms, (2.1) or (2.2), than with the restricted versions (2.3) or (2.4).

The equations yielding the lowest standard errors of estimate in the average form are shown in Table CXIII. Since use of seasonally-adjusted independent variables gave better results for the base-rate settlements than did minimum-month data, this version is presented rather than the one using minimum-month figures. This finding might suggest that the seasonally-adjusted figures are a better indicator of conditions in the labor markets. However, at least in the case of the unemployment rate, it can be argued that bargainers are basing their perceptions on the available figures which are seasonally adjusted and the finding arises from this reason rather than because it is truly a better indicator of actual tightness.

Several things are of interest in the results of Table CXIII. The first is the remarkably high values of $\bar{R}^2$ achieved. Except for seasonally-adjusted DAWWS, they are well above 0.6. It is, however, almost fair to say that satisfaction with the equations ends there. We noted in chapter two that there was no presumption about the signs of the effects for the set of variables representing labor-market tightness. However, what is evident from perusal of Table CXIII is that the effects tend to be different for the earnings series and for the wage-settlements series. On the other hand, there is quite a bit of similarity between the seasonally-adjusted and minimum-month equations, though the qualitative conclusions might not all be the same.

A feature common to all forms is the very strong, negative influence of past wage changes on wage changes. In some cases, this effect is partly balanced by the terms for the rate of change of prices but this is not the case with Average Weekly Wages and Salaries. The price effect would not fully offset the lagged wage-change effect except in the case of wage settlements, at least in the sense that the sum of the coefficients tends to be negative rather than positive. Unfortunately, the settlements series are the changes where it is least plausible to argue that price changes which have already been balanced by wage changes should not lead to further wage changes, for the wages involved are not usually ones whose change was recorded in recent observations of the series. Negative lagged wage-change terms have been a feature of some other Canadian studies, such as Bodkin, Bond, Reuber and Robinson (1967), but not to the extent present in these results.

The Durbin-Watson statistics suggest in all cases the presence of at least mild negative auto-correlation of the residuals. In the presence of lagged values of the dependent variables, this aspect of the data may be producing serious bias. At the same time, the clear inaccuracy of the dependent variable in measuring wage changes may mean that there is a serious errors-in-variables problem, especially with respect to the lagged values of the dependent variable. It may be noted that the negative auto-correlation was also a feature of the Almon-lag regressions as was the strong negative effect of past wage changes. In fact, both features were more pronounced in those regressions than in the "average" ones.

Four things were tried to see if they would help to alleviate the problems. First, the Hildreth-Lu technique to deal with auto-correlation of residuals was used. Second, using this technique, lagged values of DWS were substituted for the lagged values of DAWWS and DAHE and, conversely, lagged values of DAWWS were substituted for DWS. This substitution should help to remove some of the effects of using the lagged dependent variable, but it implies the hypothesis that general wages respond to contract settlements and conversely that contract settlements respond to general wages. Third, these variables were used as instrumental variables. The Hildreth-

Lu technique or other methods of dealing with auto-correlation were not employed in this instance. Finally, only the lagged annual value of the dependent variable and the two lagged annual values for the price-change variable were used. This variation did not lead to different results in qualitative terms from those obtained with the more extensive model, the wage term continuing to be strongly negative and, at best, only partly offset by the price-change terms. The instrumental-variables regressions also yielded the same patterns of results. They were characterized by a lack of significance of all coefficients individually and since they also did not allow for serial correlation of residuals, these instrumental-variable equations will not be considered further.

The results of the first two attempts are summarized in Table CXIV. By and large, the use of the Hildreth-Lu technique did not change the signs, magnitudes, or significance of the coefficients radically. The peculiar results with respect to the lagged wage-change variable remained. The use of the alternative specification involving negotiated wage changes did little to alter the equations, even though of necessity the number of observations that could be used was reduced when this was done because the available wage-settlements series ended in 1968. The wage-settlements series is in annual rather than quarterly rates of change. A coefficient for it of one fourth the magnitude is thus roughly comparable with coefficients for the other wage-change variables. Given this fact, its use did little to improve the lagged wage-change terms in the seasonally-adjusted equations for DAWWS and DAHE, while the puzzles in the minimum-month equations became only slightly less evident or serious. Though retaining the peculiar signs, the use of DAWWS did reduce the size of the peculiarity in the DWS equation.

One suspects that the problems may be due to the use of too complicated a lag structure; to the attempt to estimate too many coefficients; and, particularly, to the very dubious way in which wages are being measured. However, one cannot help wondering what has happened to the Canadian Phillips curve, especially since the unemployment variable rather consistently has the "wrong" sign, except in the case of the wage-settlements equations.

The specifications were simplified in two ways. First, the lags were shortened and simplified by dropping the annual values lagged one year and by using only the lagged quarterly rates of change of wages. Second, the quarterly values were dropped and the annual value of the dependent variable lagged one year was omitted. The lagged placements to employees-reported ratio, whose a priori role is possibly the most dubious, was also omitted.[2] In both types of specifications insignificant coefficients were then eliminated successively on the basis of their t-ratios until all were significant at the 0.10 level, with the exception that annual values remained unless the lagged annual value was dropped and the trend remained whenever its square had significance. The Hildreth-Lu technique was used throughout.

It turned out that the first of the two ways of simplifying the models, by dropping lagged annual values, was distinctly superior to the second way for the minimum-month equations. Exactly the reverse was the case for the seasonally-adjusted equations, and we present the results only for the stronger versions, in Table CXV. Even so, the standard errors of estimate of these equations, before the elimination of coefficients, were larger than those of Table CXIV. The negative coefficients for the lagged wage terms continued to be a feature of the results, except in the case of DAWWS minimum month, but there it is more than offset by the negative coefficient for price changes. Only for the wage settlements did this feature drop out of the models by the elimination of past wage and price changes.

Turning to other aspects of the equations, it was noticeable that the reciprocal of the unemployment rate tended to have a negative influence on the seasonally-adjusted earnings series in both Tables CXIV and CXV. The coefficients indicated a positive effect for the base-rate settlements. The coefficients also suggest a positive effect in the case of the minimum-month equations except for the results for DAHE in Table CXIV using the wage settlements lagged as independent variables and in Table CXV.

The other labor-market tightness variables did not paint a very clear picture. To a lesser extent than in chapter six were the results characterized by changes of signs among significant appearances of a variable within particular equa-

---

[2] $1/U^2$ was also used throughout this second set with $1/U_p^2$ ignored.

tions, though this was still a feature. Among the equations of Table CXIV, the most noticeable difference was the tendency for V/ER, VU/L and VU/V to show one pattern for wage settlements and the opposite one for Average Weekly Wages and Salaries and Average Hourly Earnings. For all cases, the interpretation that some form of labor-market tightness has a positive effect on wages is possible, but it is certainly not an unambiguous feature of the results. Partly it is sustained by the productivity variable, Z^2, but it is a noticeable feature of the seasonally-adjusted results in Table CXIV that its coefficient for the lagged quarterly values is negative and not negligible, though the reverse is the case for the minimum-month ones. This sort of surprise seems likely to confront any simple and direct interpretation of the coefficients variable by variable.

To investigate what has happened to the Canadian Phillips curve, Table CXVI looks at two versions of the model coming closest to a simple Phillips curve within our specifications. In the first panel, the specification involves only the quarterly and annual values of the reciprocal of the unemployment rate, the lagged quarterly values of the dependent variable and the quarterly and annual value of the price-change variable. The results in terms of the standard errors of estimate are all a good deal (and significantly) weaker than those in Table CXIV. The point estimates do display the more conventional story. While in most cases a negative coefficient for the lagged wage-term occurred, it was more than offset by positive values for the price-change coefficient. The two coefficients for the reciprocal of the unemployment rate summed to a positive value. When negative coefficients occurred, they would support there being an additional, negative effect on wage changes from the change in the unemployment rate, except in the case of wage settlements. There the interpretation that the most recent quarter's unemployment experience is not fully reflected in the bargains would be supported by the point estimates, a not surprising notion when it is recalled that the contracts signed often reflect a prolonged period of bargaining.

In the second panel of Table CXVI the simple model using only annual values and these values lagged a year for $1/U^2$ and DP are presented.[3] The results are weaker than those in

---

[3] As in the "annual" models in Table CXV, $1/U_p^2$ was not used in these regressions.

the first panel, with an interpretation that first differences play a role appearing for wage settlements. It may be remarked that using the standard overlapping four-quarter rates of change version of the dependent variable would have reintroduced problems here in connection with the parameter ρ which tended to go outside the limits $- 1.0 \leq \rho \leq 1.0$.

The answer to the question of what has happened to the Canadian Phillips curve then is that it is alive and feeble and thoroughly misspecified. The weakness of the results and the fact that several coefficients were not significant stems from using a quarterly form for the dependent variable and may also arise from failing to include the current unemployment rate or some of the usual, judiciously selected "intruders". The conclusion about misspecification stems from the much stronger results obtained with the full regression. Insofar as the unemployment rate is taken as a prime measure of labor-market tightness, the results for the simple curve support the notion that tightness promotes more rapidly rising money wage rates, and might suggest that the more extensive results, which are difficult to interpret directly, are pointing in the same direction. The fact remains, however, that the stronger results did not support a clear-cut picture.

Models for Total Aggregates - Monthly and Annual Versions

The extent to which the use of time-periods other than a quarter would alter the results was examined by exploration of monthly and annual forms of the models. Of necessity, the monthly forms looked only at Average Hourly Earnings and Average Weekly Wages and Salaries. The annual models have the advantage that the Department of Labour Wage Index could be examined. The problem with the annual model is that the conditions affecting wage changes may well occur within the same year so that models using only lagged values of the independent variables may miss the forces at work, while models using current values run the dangers of the identification problems which were discussed earlier. The same argument might be raised about quarterly models, which provides a reason to attempt monthly equations. Another disadvantage of annual models is the small number of observations available. Again, monthly models appear strongest in this respect, though use of monthly data also presumably maximizes the amount of "noise" in the equations.

The monthly models fitted are shown in Table CXVII. Variables with an "L" specification in equation (2.1) are represented by their values lagged one month, their averages over the preceeding three months, their averages over the preceeding year and this average lagged one year. The T_1 form of labor-market tightness produced the strongest fits and the use of $1/U^2$ was usually stronger than $1/U_p{}^2$, while the stantive results were the same, so only these versions are presented. The equations used the Hildreth-Lu technique to deal with auto-correlation.

The results are quite similar to those obtained for the quarterly models. As might be expected, the values of $\overline{R}^2$ are considerably smaller than those of Table CXIV; but they are significant and, indeed surprisingly strong when the weakness of the data and the use of monthly rates of change are remembered.

The lagged wage-change terms have strongly negative coefficients which are not fully offset by the price-change terms. Similarly, the overall effect of the reciprocal of the unemployment rate is negative. This also is the case for the labor-market tightness variables V/ER and VU/V. The "tightness" variable supporting a positive effect is primarily the ratio of unfilled vacancies to the labor-force, VU/L. On balance, the productivity variable Z_2 also has a positive effect, though not for DAWWS minimum month. That is also the only case where the point estimates do not suggest rather strongly that recent changes in productivity have a strong negative effect on wage changes. These results are basically the same as those shown in Table CXIV for DAWWS and DAHE in the seasonally-adjusted version of the quarterly models.

The models in Table CXVII are, of course, characterized by the insignificance of many of the individual coefficients and the associated imprecision of the point estimates. Successive elimination of the insignificant coefficients to produce ones with only significant coefficients does not, however, alter the conclusions, except insofar as some variables are eliminated completely. The coefficients that result are shown in Table CXVIII and basically tell the same story as those in Table CXVII.

The annual models used the annual averages of the variables as independent variables. The equations were fitted separately using current values of these variables (except lagged wages) and their values lagged one year. The changes in Average Weekly Wages and Salaries and Average Hourly Earnings were calculated as the rate of change which occurred from fourth quarter (average) to fourth quarter. The wage settlements refer to the average rate of change in contracts signed in the calendar year, weighted by the number of employees involved. The wage index refers to the end of the third quarter and the annual averages used in the regressions for it included the last quarter of the preceeding year and the first three quarters of the current year. The last observation on the wage index was 1969, which was also the last observation used for DAWWS and DAHE. The wage settlements series terminated in 1968. The first observation used was 1955. The t^2 term was not used in these models.

Both T_1 and T_2 were tried as tightness representations. T_1 gave the stronger results in almost all cases, and only results for it are presented. Similarly, the use of $1/U_p{}^2$ instead of $1/U^2$ was found to have little effect and only the results for $1/U^2$ were pursued. Both seasonally-adjusted and minimum-month versions were fitted. In the case of DWS and DWI (the rate of change of the wage index) only the independent variables were altered, neither of the dependent variables being seasonally adjusted. The t^2 term was dropped from the specification in view of the small number of observations while the Hildreth-Lu technique was used to deal with autocorrelation of residuals.

The results for the annual models are shown in Table CXIX. In view of the earlier results, it is not surprising that the values of $\bar{R}^2$ are generally very high. It is also not surprising in view of the paucity of observations that few of the individual coefficients are significant. To help to focus on the results, the versions of the equations which result when insignificant coefficients are eliminated are shown in Table CXX. Needless to say, these equations present difficulties in comparing them because of the differences among the equations in the variables which they include.

The annual models present fewer serious peculiarities than did the quarterly and monthly ones examined earlier. While negative lagged wage coefficients occur in many of the equations, it is comparatively rare for them to exceed unity in absolute value and this is also true of the sum of the coefficients for price changes and wage changes. In several instances the squared reciprocal of the unemployment rate has a positive rather than a negative coefficient. All these coefficients are eliminated in the seasonally-adjusted equations; in the minimum-month ones only the positive ones for DAHE and DWI remain. For other "tightness" variables a variety of signs among the equations occurs and it is certainly not the case that every variable that might be taken to indicate tightness tends to increase the rate of wage changes. The productivity variable, Z_2, tends to have a positive effect on wage changes in the seasonally-adjusted equations; but, especially where significant, its effect is usually negative with the minimum-month data.

The use of minimum-month data always produced a smaller standard error of estimate for DWS and DWI in the full models, the two dependent variables which are not changed when the different types of data are used.[4] (For DWS this was not the case for the quarterly models). The "current" model produced lower standard errors than the "lagged" one in all instances. Unfortunately, this finding cannot necessarily be taken to indicate that it is a more adequate representation of wage changes: it may reflect the identification difficulties raised in chapter two.

The most interesting of the annual models may be the ones for the wage index, a variable which cannot be investigated at more frequent intervals and which would seem to be the best measure of general wage-rate levels available. Unfortunately, none of the coefficients in the stronger, minimum-month models are significant while those resulting from eliminating coefficients are somewhat arbitrary. It is notable that $1/U^2$ gets a positive coefficient which remains in the final versions of the minimum-month models. The wage and price-change terms tend to have coefficients that are of opposite sign and which are eliminated. On the whole, however, the lack of observations hinders much emerging from these annual models and the only conclusion is that the set of annual models does not lend any clear support to various hypotheses.

---

[4] Values of $\bar{R}^2$ are not comparable since they refer to the variance after the lag-ρ transform and the values of ρ differ among the equations.

Additional Variables

One possible reason for the odd and disappointing results which we have been obtaining is that some important variables have been omitted. Three such variables seemed likely to be particularly promising. In this section, we investigate what effects they have on the quarterly and monthly models.[5]

The first variable explored was U.S. wages. The most promising of several possible forms appeared to be the ratio of average hourly earnings in manufacturing in the United States to those in Canada (W_c/W_{us}). The second variable was the ratio of time (man-days) lost in industrial disputes, collected by the Canada Department of Labour, to employees reported (TLS). Such a variable was used by Sylos-Labini (1971) and Swidinsky (1971). The final variable tried was the interregional variance of the unemployment rates, a variable of the sort suggested by Archibald (1967) to capture unevenness of demand pressures in different labor markets. Because there have been persistent regional differences in the unemployment rate, the regional means of the unemployment rate over the period 1953-1970 were first subtracted from the data. The weighted variances among the five regions of these deviations about the weighted average for each observation were then calculated, (RVAR). The weights used were the proportions of the labor force in each region.

Each of these variables was introduced separately into each of the quarterly wage models of Table CXIII in the form of the lagged quarterly value, the average over the preceeding four quarters and this variable lagged one year. They were also all used together. They were introduced into the monthly models of Table CXVII in the form of the lagged monthly value, the quarterly value, the annual average and this average lagged one year. It was unfeasible to introduce them all simultaneously into the monthly models and the Hildreth-Lu transform was not used in order to save time.

The results for the quarterly models are summarized in Table CXXI, while Table CXXII summarizes the results for the monthly models. The summaries concentrate on whether the coefficients

---

[5] The annual models are not discussed; the lack of observations prevented any useful results being obtained.

for these additional variables are significantly different from zero, what their estimated coefficients are, and whether their inclusion alters the peculiar features with respect to the lagged wage and price-change terms which have been such a prominent feature of the models. The latter aspect is reported in terms of the sums of the coefficients for the wage and price-change variables, the first in terms of the values of F for the hypothesis that the coefficients are all zero.

The evidence in favor of inclusion of the additional variables is not strong, though there is some indication that they play a role. Overall in the quarterly models, the F-statistic is significant for DAWWS seasonally-adjusted and DAHE minimum-month. In the first case this significance is produced by the time-lost and the regional-variance variables, whose coefficients are quite similar in the full model to those shown in Table CXXI. It is noticeable that the significance arises primarily from the annual values and those values lagged a year. In the second case, all three variables contribute to the significance even though each is insignificant when introduced separately. Again it is the annual values that have significance and the signs are those shown in Table CXXI. The only other case showing signs of strength is time lost in the minimum-month equation for DAWWS.

The only cases where the additional variables showed significant strength in the monthly models was time lost in the seasonally-adjusted version of DAHE and the regional variance in the seasonally-adjusted equation for DAWWS.

The signs of the overall effects of the additional variables was the same in most of the equations, the most noticeable exception being the signs of W_c/W_{us} and of TLS in the equations for wage settlements. The wage relative to the US had negative coefficients as might be expected. The effects of strikes was positive, with quite a long lag indicated by the strength of the annual average. It must, of course, be remembered that the dependent variables are earnings figures. The regional variance effects tended to be positive, but there was less uniformity about their effect than in the other cases.

In only two cases did the inclusion of the additional variables improve substantially the situation with respect to the coefficients for the lagged wage and price-change coefficients. Both involved the quarterly minimum-month equations when all the additional variables were used. For DAWWS this led to a positive sum of coefficients which was larger than the negative coefficients for price change. It is noteworthy, however, that the only one of these coefficients which was significant occurred for the lagged quarterly wage-change and its value was -0.833. For DAHE minimum month, the wage coefficients summed to -2.5 while the price coefficients summed to 3.9. While still not very satisfactory, this was more acceptable than the usual story of very strong total negative effects. That story remained in force in the other cases.

Clearly, the use of the additional variables suggests some interesting possibilities. Equally clearly, the general impression to be gained is that the models remain unsatisfactory. Time constraints prevented pushing the investigation any further.

Sectoral Models

It proved to be feasible only to extend the wage models to the various sectors on a monthly basis for purposes of the present study. The dependent variables were the monthly rates of change of Average Weekly Wages and Salaries and of Average Hourly Earnings for the eight divisions investigated in chapter seven.

The findings of chapter seven indicated that quite possibly variables for both the sector and for the industrial composite would play a role. At the same time, the results of earlier parts of this chapter suggested that use of all the values in the standard "average" lag specification was not likely to yield intelligible results and, in any case, it was not feasible to estimate as many coefficients as would be involved using that specification with both industry and industrial-composite variables.

The specification adopted involved use of only quarterly and annual averages for the variables, both averages involving the months up to but not including the current one. The specification used the labor-market-tightness definition involving the ratios of vacancies available to employees reported, unfilled vacancies to the labor force and unfilled vacancies to vacancies available. This tended to produce somewhat stronger results than the use of the alternative specification using the ratios of vacancies available to unemployment and of unfilled vacancies to vacancies available.

Relative wages (W_i/W) were included as the ratio of those in the sector to those for the industrial composite for Average Weekly Wages and Salaries or to those in the aggregate for mining, manufacturing and construction when Average Hourly Earnings were used. The ratio of Average Hourly Earnings in Canadian manufacturing to those in U.S. manufacturing (W_c/W_{us}) was also used as was the ratio of man days lost in industrial dispute to employees reported in the division (TLS_i). Only the quarterly value of this variable was used.[6] The monthly ratio of placements to employees reported and the trend and its square were also used. The Hildreth-Lu procedure was adopted only when the Durbin-Watson statistic indicated that substantial auto-correlation of residuals was present.

The results for this specification are shown in Table CXXIII, an "i" subscript indicating that the variable is specific to the industry. The most noticeable feature of the results is that the goodness of fit of the equations is generally quite modest. The equations, without exception, are significant at the 0.10 level and almost all are significant beyond the 0.01 level. Associated with this feature is a lack of precision in the estimates that renders most insignificantly different from zero, a property which makes difficult comparison among the various equations. To a considerable extent this difficulty remains when insignificant coefficients are eliminated progressively for then the forms differ among the various equations. The results of this exercise[7] are shown in Table CXXIV.

Although not universally the case, a great many of the equations had coefficients for the lagged wage-change terms which were negative and their sum was less than minus unity. This was, particularly, the case of almost all the wage-change coefficients which survived the elimination of insignificant variables. Though sometimes this effect was largely offset by positive coefficients for the rate of change of the Consumer Price Index, in many other cases this effect was extremely mild or else this variable actually reinforced the effects ascribed to the lagged rates of change of wages. Thus

---

[6] This specification had to be adopted before the results reported in the previous section were available.

[7] By inadvertance in some instance t was eliminated while t^2 remained significant and such results are presented.

a major peculiarity of the models for the industrial composite carries over to those for the industrial divisions.

In these models, there are two possible, additional lagged-wage offsets to the indications provided by the rate of change of wages. The first is the relative wage terms, W_i/W. The coefficients for this variable were almost always negative, at least in the sum of the coefficients for the quarterly and annual versions. This was, in particular, true for all cases where these coefficients survived elimination. This set of coefficients thus tends to reinforce the effects coming from DW_i. The other, less directly related, offset in the ratio of Canadian to U.S. wages. As often as not, this variable has a positive total effect, though it is noticeable that this was not the case for the minimum-month manufacturing equation for DAHE. Since the relative wage term is based on average hourly earnings in manufacturing it is of most relevance in this case. If perception of going wages were based on those in the economy as a whole or on those in the U.S., negative coefficients for these variables might be expected.

The puzzle of the negative wage-change offsets thus remains in most of these equations. The other main puzzling feature is the lack of any clear story about the effects of other variables. This characteristic, of course, comes as no surprise in light of the findings of chapter seven. It does mean that no strong or direct interpretation of the effects of the various aspects of labor-market tightness emerges. For example, in some cases the reciprocals of the squared unemployment rates tend to have positive coefficients; in others, negative ones. This is true both in the full equations and when account is taken only of those instances where the unemployment rate variables survive. The same sorts of differences also arise with respect to the various variables involving vacancies. Furthermore, in some cases the coefficients for the quarterly and annual forms suggest a difference interpretation in the sense that the operative effect seems to be in terms of the differences between the quarter and the year. Of course, this does not hold when only one of the two survives. In the same vein, sometimes the industrial-composite variables appear to reinforce those for the division while in others they are offsetting. It is noteworthy that both forms of a particular type of variable survive the elimination process quite frequently.

It is doubtful if it would be worth examining these results further; the tables largely speak for themselves. Clearly, no very satisfactory pattern of wage determination emerges. Whether use of other wage variables[8] or different forms would improve the situation remains an open question, but the results obtained here and elsewhere in this study may well make one doubtful.

Conclusion

The theoretical investigation of chapter two and the econometric problems of chapter three suggested that the nature of the wage-determination process was largely unknown and might not be revealed from investigations of the types of data available to us. To a very large extent the findings of this chapter simply go to validate the seriousness of this possibility.

The answers that are suggested from the results to the four questions raised in the introduction to this chapter are as follows:

(1) The unemployment rate is not a fully adequate representation of conditions in labor markets and other variables related to vacancies and productivity appear to matter. The study, of course, has been based largely on the use of the reciprocal of the square of the unemployment rate, but partial investigations carried on along with the main estimations indicated that this form produced the strongest results while others would not eliminate the role of other variables.

(2) The other variables do not appear simply to reinforce the impressions to be gained from the simpler equations. The unemployment rate often gets the "wrong" sign. While the equations may show in actuality that labor-market tightness increases the rate of change of wages, this is not transparent in the equations. Probably only a

[8] Lack of time prevented investigation of annual models.

simulation exercise would reveal whether this was the case - an exercise beyond the scope of this study and one which would be of dubious validity in view of the *ad hoc* nature of the specification.

(3) Whatever role wage and price expectations play in the model are probably not brought out in our results - or else it is a very strange role. Probably the reason is two-fold - the weakness of data and the chance that in forming perceptions about labor-market tightness on the basis of past experience account may well be taken of the wage-change conditions which accompanied them. Econometrically, such behavior would enter the past wage-change or price-change coefficients and change their meaning so that the effect of wage or price expectations on wage changes would not be revealed.

(4) Lags of substantial length appear to be at work. The estimates suggest no very simple pattern for these lags.

These findings, accompanied by the variations in results obtained from the investigation of different types of wage-change variables and ways of handling seasonality suggest that the basis of the wage-determination process is not to be revealed easily by empirical investigation of aggregate wage figures. They also render one suspicious of the validity of results obtained when simple *a priori* forms are effectively imposed on the data.

TABLE CXII

WAGE MODELS -- INDUSTRIAL COMPOSITE -- QUARTERLY

STANDARD ERRORS OF ESTIMATE FOR VARIOUS SPECIFICATIONS [a]

	Seasonally Adjusted		Minimum Month	
	(2.1) or (2.3)	(2.2) or (2.4)	(2.1) or (2.3)	(2.2) or (2.4)
A. Average Weekly Wages and Salaries				
(2.1) or (2.2) with U	0.432	0.473	0.601	0.670
(2.1) or (2.2) with UP	0.436	0.473	0.602	0.674
(2.3) or (2.4) with U	0.496	0.470	0.837	0.877
(2.3) or (2.4) with UP	0.497	0.468	0.825	0.836
B. Average Hourly Earnings				
(2.1) or (2.2) with U	0.327	0.337	0.429	0.667
(2.1) or (2.2) with UP	0.306	0.355	0.436	0.684
(2.3) or (2.4) with U	0.402	0.373	0.643	0.721
(2.3) or (2.4) with UP	0.397	0.376	0.642	0.720

C. Wage Settlements

	Seasonally Adjusted		Minimum Month	
(2.1) or (2.2) with U	0.881	1.121	0.983	1.180
(2.1) or (2.2) with UP	0.779	1.108	0.955	1.163
(2.3) or (2.4) with U	1.083	1.212	1.043	1.160
(2.3) or (2.4) with UP	1.038	1.132	1.198	1.053

[a] All standard errors multiplied by 100, expressing the dependent variable in percentage terms.

TABLE CXIII

WAGE MODELS -- INDUSTRIAL COMPOSITE -- QUARTERLY

ESTIMATES IN SPECIFICATION ORIGINALLY CHOSEN

	Seasonally Adjusted			Minimum Month	
Variable	Average Weekly Wages & Salaries	Average Hourly Earnings	Wage Settlements	Average Weekly Wages & Salaries	Average Hourly Earnings
K	4.533[a]	0.309[a]	-0.120	0.127	-0.168
t	-0.805[a]	0.082[a]	-2.164[a]	-0.215[a]	-0.907[ax]
t^2	0.065[ax]	0.075[az]	-0.079[a]	0.091[ay]	0.092[az]
Z_{-1}	-4.826[x]	-2.094	-13.278[y]	5.381[z]	3.604[z]
$\overline{Z}$	8.317[y]	1.303	9.208	-5.537	3.661
$\overline{Z}_{-4}$	2.226	0.460	22.884	1.215[x]	0.795
V/ER_{-1} or V/U_{-1}	-0.658[b]	0.648[b]	1.706	2.786[x]	-3.302[y]
$\overline{V/ER}$ or $\overline{V/U}$	-3.950[x]	-3.971[y]	3.901	-1.313	2.188

	Seasonally Adjusted			Minimum Month	
Variable	Average Weekly Wages & Salaries	Average Hourly Earnings	Wage Settlements	Average Weekly Wages & Salaries	Average Hourly Earnings
$\overline{V/ER}_{-4}$ or $\overline{V/U}_{-4}$	-3.117^{x}	-3.675^{z}	-2.488	-3.438	-3.931^{y}
VU/L^{e}_{-1}	-0.048	-0.059	-0.187	-0.067	0.135^{z}
$\overline{VU/L}$	0.476^{y}	0.371^{y}	-0.575	0.146	-0.098
$\overline{VU/L}_{-4}$	0.300	0.339^{y}	-0.704	0.368	0.404^{x}
VU/V_{-1}	0.078	0.031	0.217	0.044	-0.169^{y}
$\overline{VU/V}$	-0.481	-0.425	1.701	-0.121	0.318
$\overline{VU/V}_{-4}$	-0.535^{x}	-0.676^{y}	1.774^{x}	-0.346	-0.611^{y}
$1/U^2_{-1}$	0.005	-0.023^{e}	-0.258^{ex}	0.364	0.209
$\overline{1/U^2}$	-0.116^{y}	-0.183	1.456^{z}	-1.254	-0.101
$\overline{1/U^2}_{-4}$	-0.040	-0.482^{y}	1.757^{z}	-1.264	-0.873

TABLE CXIII (Continued)

	Seasonally Adjusted			Minimum Month	
Variable	Average Weekly Wages & Salaries	Average Hourly Earnings	Wage Settlements	Average Weekly Wages & Salaries	Average Hourly Earnings
DW_{-1}	-0.151	-0.219	-0.228	-0.392	-0.678[z]
$\overline{DW}$	-1.621[y]	-1.775[z]	-1.969[z]	-1.895[x]	-2.058[z]
$\overline{DW}_{-4}$	-0.282	-0.091	-1.113[z]	-0.728	-0.311
DP_{-1}	0.141	0.161	0.839	0.119	-0.075
$\overline{DP}$	-0.320	0.868	2.849	-0.399	0.693
$\overline{DP}_{-4}$	-0.016	-0.321	1.685	-1.224	-0.151
P/ER_{-1}	3.227[y]	0.234	10.079[z]	-6.087[z]	2.913
$\bar{R}^2$	0.466	0.781	0.860	0.663	0.802
S.E.E.	0.432[a]	0.306[a]	0.779[a]	0.601[a]	0.429
D.W.	2.921	2.566	2.894	2.607	2.264

[a] Multiplied by 100
[b] V/ER used
[c] Multiplied by 0.1
[d] V/U used
[e] $1/UP^2$ used
[f] Coefficients divided by 100
[x] Significant at 0.10 level
[y] Significant at 0.05 level
[z] Significant at 0.01 level

TABLE CXIV

WAGE MODELS -- INDUSTRIAL COMPOSITE -- QUARTERLY

MODELS ALLOWING FOR AUTO-CORRELATION AND DIFFERENT TREATMENT OF LAGGED WAGES

ESTIMATES OF EQUATIONS

A. Seasonally Adjusted

Variable	DAWWS		DAHE		DWS	
	H.L.[a]	Using DWS	H.L.[a]	Using DWS	H.L.[a]	Using DAWWS
K	0.139	0.314	0.260	0.562	-1.467	-3.017[z]
t	-0.433[b]	0.385[b]	-0.010	0.461[b]	-2.636[bx]	-5.246[bz]
t^2	0.056[bx]	0.047[b]	0.076[bz]	0.130[by]	-0.072[b]	-0.370[bz]
z^2_{-1}	-3.672	-6.675	-2.986[x]	-0.580	-15.725[y]	1.112
$\overline{z^2}$	5.931[x]	7.482	3.917	-0.272	14.298[x]	27.243[z]
$\overline{z^2}_{-4}$	0.063	-4.575	-0.027	-1.673	25.179[y]	18.868[y]
V/ER_{-1}	-1.489	-1.675	1.285	3.127[z]	-3.664	-5.889[x]
$\overline{V/ER}$	-3.065	-3.848	-4.420[z]	-5.998[y]	4.113	16.852[z]
$\overline{V/ER}_{-4}$	-2.430	-0.629	-3.300[z]	-4.549[z]	4.775	10.036[y]

TABLE CXIV (Continued)

Variable	DAWWS		DAHE		DWS	
	H.L.[a]	Using DWS	H.L.[a]	Using DWS	H.L.[a]	Using DAWWS
VU/L_{-1}	0.015	0.021	-0.089	-0.147[x]	-0.132	0.157
$\overline{VU/L}$	0.392[y]	0.403	0.402[z]	0.528[y]	-0.581	-1.816[z]
$\overline{VU/L}_{-4}$	0.231	0.038	0.312[z]	0.445[y]	-0.916[y]	-1.237[z]
VU/V_{-1}	-0.038	-0.052	0.011	0.142	0.181	0.001
$\overline{VU/V}$	-0.383	0.489	-0.550[y]	-0.991[y]	1.679[x]	3.810[z]
$\overline{VU/V}_{-4}$	-0.415	-0.069	-0.643[z]	-0.816[y]	2.122[z]	2.364[z]
$1/U^2_{-1}$	-0.005	-0.033	-0.027[d]	-0.046[d]	-0.250[dz]	-0.341[dz]
$\overline{1/U^2}$	-0.940[x]	-0.718	-0.209[x]	-0.164	1.330[z]	2.091[z]
$\overline{1/U^2}_{-4}$	-0.321	0.063	-0.425[z]	-0.575[y]	1.948[z]	2.706[z]
DW_{-1}	0.070	-0.025	0.002	-0.087	-0.076	0.131
$\overline{DW}$	-1.556[x]	-0.167	-1.590[z]	-0.356[x]	-1.956[z]	-0.546

Variable	DAWWS		DAHE		DWS	
	H.L.[a]	Using DWS	H.L.[a]	Using DWS	H.L.[a]	Using DAWWS
$\overline{DW}_{-4}$	-0.408	-0.180	0.069	0.092	-1.191[z]	-2.941[y]
DP_{-1}	-0.004	0.028	0.247	0.150	1.293[z]	1.464[y]
$\overline{DP}$	-0.223	-0.265	0.518	-0.745	2.897[x]	-0.765
$\overline{DP}_{-4}$	0.329	0.275	-0.530	-2.241[y]	2.740	0.566
P/ER_{-1}	2.961[y]	3.365	0.114	-4.110[y]	13.463[z]	10.890[z]
S.E.E.	0.410[b]	0.461[b]	0.277[b]	0.318[b]	0.651[b]	0.812[b]
$\bar{R}^2$ [c]	0.667	0.547	0.906	0.875	0.958	0.938
ρ	-0.456	-0.493	-0.543	-0.713	-0.614	-0.658

[a] H.L. - Hildreth-Lu [b] Multiplied by 100 [c] Calculated with lag-p transforms

[d] $1/UP^2$ used [e] Coefficients divided by 100

[x] Significant at 0.10 level [y] Significant at 0.05 level [z] Significant at 0.01 level

TABLE CXIV (Continued)

B. Minimum Month

Variable	DAWWS		DAHE	
	H.L.[a]	Using DWS	H.L.	Using DWS
K	-0.005	0.195	-0.149	-0.020
t	-0.547[b]	0.054[b]	-0.759[bx]	-0.279[b]
t^2	0.070[z]	0.108[bx]	0.073[bz]	-0.007[b]
z^2_{-1}	4.835[z]	3.197[z]	3.684[z]	6.089[z]
$\overline{z^2}$	-1.944	-3.238	2.137	-2.925
$\overline{z^2}_{-4}$	1.013[z]	0.591	0.591	-0.501
V/ER_{-1}	-2.778[z]	-0.631	-3.196[z]	-0.389
$\overline{V/ER}$	-0.124	-3.260[y]	1.107	-1.468
$\overline{V/ER}_{-4}$	-2.932	-1.301	-2.823[x]	-2.602
VU/L^e_{-1}	0.117[z]	0.024	0.121[z]	0.031

Variable	DAWWS		DAHE	
	H.L.[a]	Using DWS	H.L.	Using DWS
$\overline{VU/L}$	0.146	0.383^{y}	0.027	0.075
$\overline{VU/L}_{-4}$	0.238	0.090	0.247	0.108
VU/V_{-1}	-0.225^{z}	-0.141^{y}	-0.194^{z}	-0.154^{y}
$\overline{VU/V}$	0.164	-0.421^{y}	0.296^{x}	0.254
$\overline{VU/V}_{-4}$	-0.294	-0.071	-0.426^{z}	-0.137
$1/U^2_{-1}$	-0.035	-0.927^{y}	-0.304	-1.045^{y}
$\overline{1/U^2}$	-1.293^{x}	0.028	-0.007	0.800
$\overline{1/U^2}_{-4}$	0.009	-0.049	-0.266	1.272^{x}
DW_{-1}	0.282^{y}	-0.040	-0.337^{y}	-0.086
$\overline{DW}$	-2.813^{z}	-0.550^{x}	-2.478^{z}	-0.591^{x}
$\overline{DW}_{-4}$	-1.794^{z}	-0.002	-0.080	0.089

TABLE CXIV (Continued)

Variable	DAWWS		DAHE	
	H.L.[a]	Using DWS	H.L.	Using DWS
DP_{-1}	0.018	-0.209	-0.105	0.236
$\overline{DP}$	-0.324	-1.537[y]	0.384	-0.144
$\overline{DP}_{-4}$	0.051	-0.830	0.251	-1.589[x]
P/ER_{-1}	2.648[x]	0.927	3.999[y]	1.625
S.E.E.	0.377[b]	0.434[b]	0.403[b]	0.417[b]
$\bar{R}^2$[c]	0.906	0.887	0.882	0.887
ρ	-0.753	-0.902	-0.665	-0.924

TABLE CXV

WAGE MODELS -- INDUSTRIAL COMPOSITE -- QUARTERLY

ESTIMATES IN SIMPLER SPECIFICATIONS

A. Seasonally Adjusted

Variable	DAWWS		DAHE		DWS	
K	0.208	0.181[y]	6.428[a]	3.111[az]	-0.644	7.046[z]
t	0.123[a]	0.275[a]	-0.116[a]	-0.043[az]	1.067[a]	-
t^2	0.036[a]	0.017[ay]	0.033[ay]	0.016[az]	-0.091[a]	-
$\overline{z^2}$	0.915	0.807	1.064	-	-6.666	-4.581[x]
$\overline{z^2}_{-4}$	-2.774	-3.552[y]	-0.450	-	20.990[x]	5.896[y]
$\overline{V/ER}$	-2.266[y]	-1.830[z]	-1.134	-0.696[z]	5.039	-1.686[z]
$\overline{V/ER}_{-4}$	-1.272	-0.199[x]	-1.096	-0.452[z]	-1.583	-0.852[z]
$\overline{VU/L}$	0.236[y]	0.148[z]	0.108	0.755[z]	-0.758[y]	-
$\overline{VU/L}_{-4}$	0.117	-	0.093	-	-0.168	-
$\overline{VU/V}$	-0.314	-0.203[x]	-0.098	-	1.487[y]	-

TABLE CXV (Continued)

Variable	DAWWS		DAHE		DWS	
$\overline{1/U^2}$	-0.356	-	-0.008	-	2.545[z]	1.131[z]
$\overline{1/U^2}_{-4}$	-0.261	-	-0.277	-	1.529	-
$\overline{DW}$	-1.245[z]	-1.074[z]	-1.284[z]	-1.237[z]	-0.946[x]	-
$\overline{DP}$	0.002	-	0.852[y]	0.758[z]	0.271	-
$\overline{DP}_{-4}$	0.027	-	-0.060	-	-0.978	-
ρ	-0.414	-0.388	-0.433	-0.369	-0.291	-0.266
$\bar{R}^2$	0.646	0.664	0.882	0.875	0.850	0.849
S.E.E.	0.413[a]	0.398[a]	0.291[a]	0.287[a]	0.989[a]	0.977

B. Minimum Month

Variable	DAWWS		DAHE	
K	0.277^{z}	0.226^{z}	0.016	0.016
t	0.459^{az}	0.376^{az}	-0.045^{a}	-0.067^{a}
t^2	0.032^{az}	0.030^{az}	0.023^{ax}	0.023^{az}
z^2_{-1}	4.345^{z}	4.991^{z}	4.494^{z}	5.789^{z}
$\overline{z^2}$	-8.884^{z}	-8.622^{z}	-4.508	-5.635^{z}
V/ER_{-1}	-2.131^{y}	-0.627^{z}	2.703^{y}	-1.044^{z}
$\overline{V/ER}$	-1.850^{y}	-2.188^{z}	0.950	-
VU/L_{-1}	0.093^{by}	-	0.186^{by}	0.572^{z}
$\overline{VU/L}$	0.291^{bz}	0.295^{bz}	-0.039	-
VU/V_{-1}	-0.121^{y}	-	-0.084	-
$\overline{VU/V}$	-0.274^{z}	-0.321^{z}	0.077	-

TABLE CXV (Continued)

Variable	DAWWS		DAHE	
$1/U^2_{-1}$	-0.156	-	0.217	0.312[y]
$\overline{1/U^2}$	-0.986[y]	-0.858[y]	0.098	-
DW_{-1}	0.091	-	-0.762[z]	-0.815[z]
DP_{-1}	-0.274	-	0.118	-
$\overline{DP}$	-0.933[y]	-0.921[z]	-0.295	-
P/ER_{-1}	1.044	-	1.925	-
ρ	-0.815	-0.722	0.083	0.069
$\overline{R}^2$	0.878	0.859	0.762	0.777
S.E.E.	0.443[a]	0.454[a]	0.471[a]	0.456[a]

[a] Multiplied by 100

[b] Divided by 100

[x] Significant at 0.10 level

[y] Significant at 0.05 level

[z] Significant at 0.01 level

TABLE CXVI

WAGE MODELS -- INDUSTRIAL COMPOSITE -- QUARTERLY

ESTIMATES OF REGRESSIONS USING ONLY UNEMPLOYMENT, WAGES AND PRICES.

	Seasonally Adjusted			Minimum Month	
Variables	DAWWS		DWS	DAWWS	DAHE
		A. Quarterly and Annual Model			
K	0.268^{y}	0.609^{y}	3.043^{az}	0.474	0.106
$1/U^{2}_{-1}$	0.174^{z}	0.031^{c}	-0.215^{c}	0.411	0.436
$\overline{1/U^{2}}$	-0.120^{x}	0.076	0.743^{z}	-0.122^{c}	-0.057
DW_{-1}	0.310^{y}	-0.453^{z}	-0.363^{z}	-0.167	-0.173
DP_{-1}	-0.502^{y}	0.120	0.403	0.214	0.070
$\overline{DP}$	1.097^{z}	1.081^{y}	1.836	0.870	0.981
$\overline{R}^{2}$	0.523	0.298	0.422	0.065	0.273
ρ	-0.450	0.562	0.532	-0.134	-0.154

TABLE CXVI (Continued)

S.E.E.	0.489[a]	0.461[a]	1.163[a]	0.995[a]	0.834[a]
B. Annual and Annual Lagged					
K	0.364[x]	0.332	0.003[a]	0.217[a]	0.113[a]
$\overline{1/U}^2$	0.139[y]	0.244[z]	0.580[z]	0.236	0.427[x]
$\overline{1/U}^2_{-4}$	-0.065	-0.160[y]	-0.370[z]	0.022	-0.193
$\overline{DW}$	0.040	-0.368	0.594[z]	0.299	0.217
$\overline{DP}$	0.214	1.175[z]	0.726	-0.058	0.511
$\overline{DP}_{-4}$	0.682[x]	0.719[y]	1.871[z]	0.262	0.221
$\overline{R}^2$	0.340	0.417	0.807	0.058	0.307
ρ	-0.196	0.139	-0.235	-0.236	-0.298
S.E.E.	0.511[a]	0.465[a]	1.079[a]	1.006[a]	0.843[a]

[a] Multiplied by 100

[b] End of range considered

[c] $1/UP^2$ used

[d] Dependent variable

[x] Significant at 0.10 level

[y] Significant at 0.05 level

[z] Significant at 0.01 level

TABLE CXVII

WAGE MODELS -- INDUSTRIAL COMPOSITE -- FULL MONTHLY REGRESSIONS

Variable	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
K	0.145	0.203	0.029	0.047[a]
t	-0.188[a]	0.199[a]	-0.166[a]	-0.281[a]
t^2	0.056[ax]	0.043[ax]	0.035[az]	0.045[az]
z^M_{-1}	1.378	5.782[z]	-0.586	-1.230
z^Q	-5.091[y]	-3.942[x]	-0.694	-2.238[y]
z^A	6.133[y]	1.781	3.026[x]	4.047
z^A_{-12}	-0.827	-4.844	0.114	1.813

Variable	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
V/ER^{M}_{-1}	0.445	-0.525	0.705	0.841^{x}
V/ER^{Q}	0.431	0.001	0.549	-2.319^{z}
V/ER^{A}	-2.696^{y}	-3.041	-1.496^{x}	0.752
V/ER^{A}_{-12}	-2.897^{z}	-1.076	-1.164^{x}	-2.955^{z}
VU/L^{M}_{-1}	0.449^{b}	1.538^{by}	0.501^{b}	0.557^{bx}
VU/L^{Q}	-1.044	-1.541^{x}	0.271	0.980^{y}
VU/L^{A}	2.907^{y}	3.548^{x}	1.495^{y}	0.885
VU/L^{A}_{-12}	2.818^{y}	0.941	1.191^{x}	3.106^{z}
VU/V^{M}_{-1}	-0.109	-0.142	0.086	0.114^{z}
VU/V^{Q}	0.168	0.139	-0.077	-0.259^{z}

TABLE CXVII (Continued)

Variable	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
VU/V^{A}	-0.338^{x}	-0.398^{x}	-0.154	0.137
VU/V^{A}_{-12}	-0.456^{y}	-0.149	-0.207^{x}	-0.334^{z}
$(1/U^{2})^{M}_{-1}$	-0.218^{y}	0.369	-0.042	-0.146
$(1/U^{2})^{Q}$	0.165	-1.271	-0.012	0.443
$(1/U^{2})^{A}$	-0.600^{y}	0.052	-0.161	-1.322^{y}
$(1/U^{2})^{A}_{-12}$	-0.517^{x}	-0.433	-0.271	-1.156^{y}
DW^{M}_{-1}	-0.070	-0.124^{x}	0.164^{x}	0.215^{y}
DW^{Q}	-0.553^{y}	-1.460^{z}	-0.413^{y}	-0.289^{x}
DW^{A}	-3.890^{z}	-0.281	-2.549^{z}	-3.638^{z}
DW^{A}_{-12}	-2.719^{z}	-1.702	-0.820	-0.639

Variable	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
DP^{M}_{-1}	-0.119	0.342	-0.110	-0.479^{x}
DP^{Q}	0.823^{x}	0.333	0.311	0.598
DP^{A}	1.609	-0.258	0.915	1.049
DP^{A}_{-12}	0.003	-0.062	-0.053	0.349
P/ER_{-1}	-0.069	0.082	0.446	0.974
ρ	-0.315	-0.399	-0.550	-0.346
$\bar{R}^2$	0.263	0.441	0.379	0.432
S.E.E.	0.531^{a}	1.025^{a}	0.392^{a}	0.513^{a}

[a]Multiplied by 100
[b]Multiplied by 0.1

[x]Significant at 0.10 level
[y]Significant at 0.05 level
[z]Significant at 0.01 level

TABLE CXVIII

WAGE MODELS -- INDUSTRIAL COMPOSITE -- "FINAL" MONTHLY MODELS

Variable[c]	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
K	0.176[z]	-0.052[x]	0.015[z]	0.534[a]
t	-0.205[a]	0.128[ax]	0.000[a]	-0.181[a]
t^2	0.064[az]	0.014[az]	0.011[az]	0.035[az]
z^M_{-1}	-	5.606[z]	-	-
z^Q	-4.522[z]	-4.205[z]	-	-3.358[z]
z^A	5.897[z]	-	-	5.054[z]
V/ER^M_{-1}	0.872[z]	-	-	1.188[z]
V/ER^Q	-	-	-	-1.772[z]
V/ER^A	-2.563[z]	-	-0.466[z]	0.223

Variable[c]	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
V/ER^{A}_{-12}	-3.733[z]	-	-	-2.095[z]
VU/L^{M}_{-1}	-	0.891[bz]	-	-0.486[bx]
VU/L^{Q}	-0.404[bz]	-1.046[z]	-	0.620[x]
VU/L^{A}	2.883[z]	0.284[z]	2.704[by]	1.006
VU/L^{A}_{-12}	3.735[z]	-	-	2.050[z]
VU/V^{M}_{-1}	-	-	-	0.101[y]
VU/V^{Q}	-	-	-	-0.209[z]
VU/V^{A}	-0.268[y]	-	-	0.085
VU/V^{A}_{-12}	-0.598[z]	-	-	-0.230[z]

TABLE CXVIII (Continued)

Variable[c]	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
$(1/U^2)^M_{-1}$	-0.230[y]	-	-	-
$(1/U^2)^Q$	0.216[x]	-	-	-
$(1/U^2)^A$	-0.810[z]	-	0.084	-0.811[x]
$(1/U^2)^A_{-12}$	-0.713[z]	-	-0.065[z]	-0.735[x]
DW^M_{-1}	-	-	0.156[x]	0.185[y]
DW^Q	-0.520[y]	-	-	-0.337[y]
DW^A	-4.253[z]	-1.429[x]	-0.462[z]	-2.913[z]
DW^A_{-12}	-2.309[z]	-	-1.549[z]	-
DP^M_{-1}	-	-	-	-0.492[y]
DP^Q	-	-	-	0.773[y]

Variable[c]	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
DP^A	3.111[z]	-	-	-
ρ	-0.358	-0.455	-0.503	-0.339
$\bar{R}^2$	0.277	0.457	0.377	0.436
S.E.E.	0.523[a]	1.014[a]	0.388[a]	0.510[a]

[a] Multiplied by 100

[b] Multiplied by 0.10

[x] Significant at 0.10 level

[y] Significant at 0.05 level

[z] Significant at 0.01 level

TABLE CXIX

ANNUAL MODELS FOR WAGE CHANGE

A. Seasonally Adjusted

Variable	DAWWS		DAHE		DWS		DWI	
	Current	Lagged	Current	Lagged	Current	Lagged	Current	Lagged
K	-0.294	0.034	-0.058	0.060[x]	-1.025[a]	0.883[a]	-0.034	-0.001
t	-0.013[y]	-0.478[a]	-0.230[a]	0.214[a]	-0.037[a]	-0.059[a]	-0.013[a]	-0.330[a]
Z_2	11.358[x]	3.579	0.355	-1.559	0.435	1.251	1.059	5.313[x]
V/ER	-3.544	-5.613	-0.023	-2.602	1.013[y]	-0.931	-0.539	-3.518
VU/L	0.206	0.491	-0.114	0.149	0.645	0.057	0.328	0.177
VU/V	0.069	-0.130	0.528[y]	0.465	0.007	-0.123	0.272	-0.291
$1/U^2$	-0.259	-0.916	0.537	0.425	-0.019	-0.075	0.416	0.217
DW_{-1}	-0.430	-0.623	-0.882[z]	-0.682	-0.175	0.992	-0.224	0.227
DP	0.160	-0.588	1.602[z]	-1.434[y]	-0.125	-0.356	0.905	-1.893
ρ	-0.700	-0.169	0.352	-0.391	-0.359	-0.698	-0.487	0.900[b]
$\bar{R}^2$	0.914	0.403	0.882	0.821	0.976	0.867	0.919	0.269

Variable	DAWWS Current	DAWWS Lagged	DAHE Current	DAHE Lagged	DWS Current	DWS Lagged	DWI Current	DWI Lagged
S.E.E.	0.795[a]	1.453[a]	0.639[a]	1.245[a]	0.133[a]	0.510[a]	0.769[a]	0.816[a]

B. Minimum Month

Variable	DAWWS Current	DAWWS Lagged	DAHE Current	DAHE Lagged	DWS Current	DWS Lagged	DWI Current	DWI Lagged
K	0.059	0.143[z]	0.512[ay]	0.151[az]	-0.021	0.042	0.209[a]	0.029[x]
t	-0.968[a]	0.022[y]	-0.934[ax]	0.027[y]	0.125[a]	0.795[ax]	-0.128[a]	0.242[a]
Z_2	6.745	-18.813[z]	3.945	-22.987[z]	-1.114	-5.939	0.452	-0.682
V/ER	-0.881	-1.845[y]	-0.222	-2.841[y]	1.530[z]	-1.316	-0.971	-0.836
VU/L	-0.557	1.600[y]	-1.889[z]	1.962[y]	0.173	0.606[x]	0.096	0.030
VU/V	0.531[z]	-0.397	0.702[z]	-0.334	-0.029	-0.246	0.320	0.097
$1/U^2$	0.467	1.044	2.243[y]	2.076[y]	-0.075	0.163	1.714	1.080
DW_{-1}	-0.252	0.091	-0.426	0.014	-0.152	1.104	-0.154	0.308

TABLE CXIX (Continued)

Variable	DAWWS		DAHE		DWS		DWI	
	Current	Lagged	Current	Lagged	Current	Lagged	Current	Lagged
DP	0.062	-0.822[z]	1.553[z]	-1.846[z]	-0.148[z]	-0.516	0.199	-0.404
ρ	-0.750	-0.729	-0.775	-0.900[b]	-0.900[b]	-0.505	-0.412	-0.313
$\bar{R}^2$	0.962	0.943	0.982	0.964	0.998	0.851	0.919	0.891
S.E.E.	0.542[a]	0.649[a]	0.518[a]	0.802[a]	0.081[a]	0.404[a]	0.723[a]	0.776[a]

[a] Multiplied by 100

[b] Limit of range used

[x] Significant at 0.10 level

[y] Significant at 0.05 level

[z] Significant at 0.01 level

TABLE CXX

ANNUAL MODELS FOR WAGE CHANGE

AFTER ELIMINATION OF INSIGNIFICANT COEFFICIENTS.

A. Seasonally Adjusted

Variable	DAWWS		DAHE		DWS		DWI	
	Current	Lagged	Current	Lagged	Current	Lagged	Current	Lagged
K	-0.268^{ax}	0.051^{z}	-0.663^{az}	0.036^{x}	0.661^{az}	0.006	-0.042^{z}	0.030^{x}
t	-0.012^{y}	-	-0.195^{y}	-	-	-	-	-
Z_2	11.454^{z}	-	-	-	-	0.564^{y}	-	0.816^{z}
V/ER	-3.963^{z}	-1.649^{z}	-	-	1.190^{z}	-0.553^{y}	-	-
VU/L	2.017^{z}	13.901^{z}	-	-	-	-	-	-
VU/V	-	-	0.455^{z}	0.166^{z}	-	-	0.343^{z}	-
$1/U^2$	-	-	-	-	-	-	-	-
DW_{-1}	-0.438^{x}	-	-0.598^{z}	-	-0.342^{y}	1.099^{z}	-	-
DP	-	-	1.265^{z}	-0.866^{y}	-	-0.459^{z}	-	-

TABLE CXX (Continued)

Variable	DAWWS		DAHE		DWS		DWI	
	Current	Lagged	Current	Lagged	Current	Lagged	Current	Lagged
ρ	-0.700	-0.520	0.531	0.842	-0.390	-0.602	-0.234	0.910
$\bar{R}^2$	0.940	0.755	0.887	0.345	0.982	0.898	0.926	0.213
S.E.E.	0.676[a]	1.195[a]	0.592[a]	1.437[a]	0.118[a]	0.386[a]	0.601[a]	0.848[a]

B. Minimum Month

Variable	DAWWS		DAHE		DWS		DWI	
	Current	Lagged	Current	Lagged	Current	Lagged	Current	Lagged
K	-0.057	0.113[az]	0.618[az]	0.117[az]	0.566[a]	0.025[y]	-0.073	0.045[z]
t	-0.893[ay]	0.015[z]	-0.499[az]	0.018[z]	0.071[ax]	-	-	0.324[z]
Z_2	5.999[x]	-13.501[z]	-	-16.294[z]	-0.727[x]	-	-	-0.927[z]
V/ER	-	-0.713[x]	-	-1.933[y]	1.562[z]	-	-0.824[x]	-
VU/L	-0.574[z]	0.992[z]	-0.179[z]	1.275[z]	0.504[z]	-	-	-
VU/V	0.554[z]	-	0.642[z]	-	-	-0.044[x]	0.220[z]	-

Variable	DAWWS		DAHE		DWS		DWI	
	Current	Lagged	Current	Lagged	Current	Lagged	Current	Lagged
$1/U^2$	-	-	2.284^z	1.481^z	-	-	0.798^z	1.400^z
DW_{-1}	-	-	-0.358^y	-	-0.114^x	0.648^y	-	-
DP	-	-0.518^z	1.505^z	-1.577^z	-0.131^z	-	-	-
ρ	-0.711	-0.636	-0.611	-0.808	-0.702	-0.204	-0.500	-0.495
$\bar{R}^2$	0.971	0.938	0.980	0.964	0.997	0.294	0.951	0.929
S.E.E.	0.455^a	0.627^a	0.489^a	0.747^a	0.073^a	0.607^a	0.600^a	0.723^a

[a] Multiplied by 100

[x] Significant at 0.10 level

[y] Significant at 0.05 level

[z] Significant at 0.01 level

TABLE CXXI

ADDITIONAL VARIABLES -- QUARTERLY WAGE MODELS

		DAWWS		DAHE		DWS
		S.A.	M.M.	S.A.	M.M.	S.A.
W_c/W_{us}	F	0.801	1.111	1.184	1.130	1.773
	$\bar{R}^2$	0.457	0.667	0.792	0.805	0.867
	$(W_c/W_{us})_{-1}$	0.222	-0.326	-0.327	-0.191	0.813
	$\overline{(W_c/W_{us})}$	-1.060	-0.855	-0.474	-0.327	0.964
	$\overline{(W_c/W_{us})}_{-4}$	0.299	0.816	0.137	-0.785	3.024
	DW Sum.	-2.546	-2.535	-1.675	-2.702	-4.918
	DP Sum.	0.007	-2.023	1.300	0.712	-1.022
TLS	F	3.235	2.679	1.774	0.343	1.616
	$\bar{R}^2$	0.579	0.707	0.804	0.790	0.865
	TLS_{-1}	-1.189	-3.032	-0.465	0.933	-5.946
	$\overline{TLS}$	15.982^y	16.368	12.725^y	3.994	-17.117

		DAWWS		DAHE		DWS
		S.A.	M.M.	S.A.	M.M.	S.A.
	$\overline{TLS}_{-4}$	-5.170	-12.559	3.461	2.723	2.533
	DW Sum.	-2.247	-1.430	-2.338	-2.699	-3.829
	DP Sum.	-1.121	-2.286	-0.271	0.041	5.236
RVAR	F	1.975	0.838	0.485	0.498	0.061
	$\overline{R}^2$	0.515	0.658	0.771	0.793	0.839
	$RVAR_{-1}$	0.124	-0.208	-0.383	-0.207	0.832
	$\overline{RVAR}$	0.494	1.731	-0.072	0.880	-0.247
	$\overline{RVAR}_{-4}$	-2.778	0.459	0.561	0.150	0.105
	DW Sum.	-1.441	-2.584	-2.200	-2.642	-3.427
	DP Sum.	-0.362	-0.244	0.483	0.787	5.223

TABLE CXXI (Continued)

		DAWWS		DAHE		DWS
		S.A.	M.M.	S.A.	M.M.	S.A.
All Variables	F	2.724	2.007	1.445	3.070	1.416
	DW Sum.	-0.533	0.899	-1.665	-2.499	-6.875
	DP Sum.	-1.128	-0.700	0.973	3.879	-7.454

TABLE CXXII

ADDITIONAL VARIABLES -- MONTHLY WAGE MODELS

		DAWWS		DAHE	
		S.A.	M.M.	S.A.	M.M.
Standard Model	$\bar{R}^2$	0.364	0.461	0.318	0.303
	DW Sum.	-8.405	-4.895	-4.876	-6.355
	DP Sum.	3.007	-0.631	1.255	2.320
W_c/W_{us}	F	0.497	0.662	1.910	1.294
	$\bar{R}^2$	0.368	0.456	0.334	0.308
	W_c/W_{us-1}^M	-0.176	-0.359	0.050	0.156
	W_c/W_{us}^Q	0.583^y	-0.088	-0.458^y	-0.463^x
	W_c/W_{us}^A	-0.528	0.260	0.171	0.079
	W_c/W_{us-12}^A	0.032	0.059	0.110	0.591
	DW Sum.	-8.545	-4.313	-4.217	-6.657

TABLE CXXII (Continued)

		DAWWS		DAHE	
		S.A.	M.M.	S.A.	M.M.
	DP Sum.	1.822	0.761	2.279	1.427
TLS	F	1.092	0.404	3.195	1.282
	$\bar{R}^2$	0.366	0.452	0.356	0.308
	TLS^M_{-1}	-0.324	1.468	0.556	-0.042
	TLS^Q	-1.152	-3.112	-0.775	-0.047
	TLS^A	7.485	4.183	13.332^z	8.681^x
	TLS^A_{-12}	0.110	-3.768	4.264	1.732
	DW Sum.	-8.601	-4.767	-5.256	-6.752
	DP Sum.	2.310	0.457	-0.148	0.747
RVAR	F	2.437	0.686	0.401	1.055
	$\bar{R}^2$	0.388	0.457	0.306	0.304

	DAWWS		DAHE	
	S.A.	M.M.	S.A.	M.M.
$RVAR^M_{-1}$	1.254^x	-1.358	0.62^z	1.173^x
$RVAR^Q$	-1.250	0.748	-0.791	-1.629^x
$RVAR^A$	1.663^y	1.013	0.475	0.854
$RVAR^A_{-12}$	-0.536	-0.065	0.108	-0.229
DW Sum.	-9.049	-5.864	-4.986	-6.891
DP Sum.	5.007	0.253	1.814	3.169

TABLE CXXIII

SECTORAL MONTHLY WAGE MODELS

Seasonally Adjusted
A. DAWWS

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Services
K	-2.804^{z}	1.359^{x}	1.133	0.737	1.522^{z}	1.116^{x}	0.023	0.217
t	-0.012	0.835^{ax}	-0.105^{a}	0.909^{a}	-0.369^{az}	-0.195^{a}	-0.094^{a}	0.280^{a}
t^2	-0.355^{az}	0.094	0.042^{a}	0.013^{a}	0.100^{az}	-0.013	-0.011	-0.088^{ay}
z_i^Q	-0.004	0.052	-0.250	0.047	-0.189	0.271	-	-0.035
z_i^A	0.037	-0.120^{x}	2.472	0.057	0.355	0.307	-	0.093
$(V/ER)_i^Q$	-0.497	0.933	0.866	0.133	1.500	1.018	0.808	0.180
$(V/ER)_i^A$	0.870	-1.427	-3.226	-0.293	-3.853	3.101	-4.322^{y}	-0.203
$(V/ER)^Q$	-1.969	2.521	0.104	0.130	-1.211	1.417	-2.629	2.399
$(V/ER)^A$	8.683	-7.091^{y}	-0.257	-6.812	2.275	-1.047	5.285	-7.769

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Services
$(VU/L)_i^Q$	1.1634	-2.940^y	-9.073^x	-17.390^y	5.940	-9.054	-4.438	-
$(VU/L)_i^A$	0.218	2.812	10.026	22.006	-9.548	-11.211	12.969^x	-
VU/L^Q	2.861	-2.606	0.461	-0.733	-6.417	-2.632	4.823	-10.094^y
VU/L^A	-8.413	5.502	5.462	2.199	22.203	14.045	-5.817	-9.367
$(VU/V)_i^Q$	-0.070	0.131^y	0.101	0.755^z	-0.218^x	0.025	0.108	8.504^y
$(VU/V)_i^A$	-0.043	-0.194	-0.015	-0.996^y	0.333	0.029	-0.240^x	-8.522
VU/V^Q	-0.578	0.447	0.107	0.007	0.252	0.165	-0.121	0.006
VU/V^A	1.966^x	-0.972^y	-0.374	-0.877	-0.670	0.530	0.301	-0.033
$(1/U^2)_i^Q$	1.350	0.004	0.122	-2.504	0.043	0.264	0.006	-
$(1/U^2)_i^A$	-8.617	0.60	-0.335	9.661^z	-0.232^z	0.015	-0.010	-
$(1/U^2)^Q$	0.294	-0.138	0.006	-0.251	-0.064	-0.045	-0.063	-0.004

TABLE CXXIII (Continued)

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Services
$(1/U^2)^A$	0.786	0.203	0.340	1.128	-0.128	-1.801^z	0.240	0.604^x
DW_i^Q	-0.554^y	-0.839^z	-1.208^z	-0.864^z	-0.552^z	-0.729^z	-0.665^z	-0.684^z
DW_i^A	-3.519^z	-3.220^z	-1.934^x	-1.512^x	-2.558^z	-1.903^y	-0.120	-2.710^z
$(W_i/W)^Q$	-0.205	-0.117	0.065	-0.358^z	-0.046	-0.449^z	0.064	0.361^y
$(W_i/W)^A$	-0.039	-0.349	-0.716	-0.610^y	-1.000^z	-1.302^z	-0.245	-1.115^z
$(W_i/W_{us})^Q$	-0.806	0.571	-0.081	0.780	0.087	-0.355	-0.179	0.157
$(W_i/W_{us})^A$	4.157^y	-1.205	-0.628	0.063	-0.912^z	0.901	0.422	0.309
DP^Q	2.022	0.688	0.371	2.774^y	-0.326	0.428	-0.401	0.312
DP^A	-0.699	-2.215	1.354	-9.995^x	0.855	0.403	-2.235	1.711
TLS_i	-0.017	0.013	0.018	-0.003	-0.232	0.319	-7.554^x	-0.121
$(P/ER)_{i-1}$	-0.702	0.940	0.254	0.014	-0.224	-0.503	-0.504	0.159

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Services
$\bar{R}^2$	0.197	0.221	0.229	0.272	0.298	0.257	0.067	0.235
S.E.E.	2.476[a]	0.804[a]	0.575[a]	1.784[a]	0.483[a]	1.514[a]	0.560[a]	0.551[a]
ρ	-	-	-	-0.437	-0.448	-0.483	-	-
D.W.	2.27	2.36	2.49	2.32	2.11	2.32	2.27	2.24

[a] Multiplied by 100

[x] Significant at 0.10 level

[y] Significant at 0.05 level

[z] Significant at 0.01 level

TABLE CXXIII (Continued)

Minimum Month
B. DAWWS

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Services
K	-2.825	0.447	0.837	1.511	2.031[z]	0.466	0.109	0.151
t	-0.743[a]	0.453[a]	0.418[a]	0.011	-0.573[ay]	-0.652[a]	-0.070[a]	0.350[a]
t^2	-0.283[a]	-0.003[a]	0.052[a]	0.079[a]	0.154[az]	-0.010[a]	0.007[a]	-0.068
z_i^Q	-0.002	-0.021	-0.122	-0.047	0.028	-0.366	-	-0.171[y]
z_i^A	-0.018	-0.073	0.049	0.024	0.899[y]	1.161[z]	-	0.313[z]
$(V/ER)_i^Q$	-1.072	1.792[y]	0.050	1.626	-4.745[z]	3.277[y]	0.470	-0.188
$(V/ER)_i^A$	2.400	-3.285[y]	-8.718	0.121	-9.120[x]	-2.474	-5.216[z]	0.118
$(V/ER)^Q$	-0.902	-1.631	-4.262[z]	-4.214	2.921[y]	-2.760[y]	-1.570	-4.830
$(V/ER)^A$	8.199	0.099	5.290	-3.548	5.794[x]	2.489	7.547	-7.741
$(VU/L)_i^Q$	-0.257	-5.457[y]	-7.794	-55.357[y]	-14.940	-3.753	3.252	-
$(VU/L)_i^A$	10.295	11.444[z]	15.434	44.201	48.32	10.482	11.241[x]	-
$(VU/L)^Q$	4.322	1.494	1.635	5.974	11.298	28.716	-0.344	-0.143

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Services
$(VU/L)^A$	-84.014	-0.151	-0.382	-6.465	-35.242	3.495^b	-0.080	1.209
$(VU/V)_i^Q$	0.130	0.215^z	0.168	1.198^y	0.008	-0.004	-0.012	0.041
$(VU/V)_i^A$	-0.484	-0.316^y	0.082	-1.218	-0.538	-0.149	-0.176	-0.070
$(VU/V)^Q$	0.234	-0.439^z	-0.024	-0.416	0.005	0.191	0.006	-0.027
$(VU/V)^A$	1.085	0.102	-0.393	-0.103	0.071	0.230	0.009	-0.015
$(1/U^2)_i^Q$	-0.051	-0.023	0.040	0.031	-0.006	0.035^z	-0.002	-
$(1/U^2)_i^A$	-0.640	0.017	-0.188^y	0.666	-0.019	-0.128^y	0.005	-
$(1/U^2)^Q$	1.709	-0.222	0.640^x	-3.146	-0.442	1.117^x	-0.051	-0.404
$(1/U^2)^A$	2.127	0.208	-0.379	8.671	-1.031	-6.396^z	0.117	1.445
DW_i^Q	-1.132^z	-1.103^z	-1.228	-0.885^z	-0.986^z	-0.844^z	-0.697^z	-0.825^z
DW_i^A	-0.218	0.520	2.080	0.891	-3.040^z	-2.093^y	1.126	-2.043^x
$(W_i/W)^Q$	-0.633^z	-0.155	-0.606^y	-1.015^z	-0.322	-0.400^y	-0.244^y	-0.035

TABLE CXXIII (Continued)

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Services
$(W_i/W)^A$	0.088	-0.479	0.384	0.270	-1.064^y	-0.983^y	0.175	-0.579^x
$(W_i/W_{us})^Q$	-0.351	-0.264	0.054	0.018	0.467^y	0.447	-0.017	-0.043
$(W_i/W_{us})^A$	4.303	1.007	0.732	-0.674	-1.785^z	0.555	0.059	0.429
DP^Q	5.013	0.955	0.542	1.677	-0.821	0.697	-0.739	0.479
DP^A	-9.463	-0.107	0.390	-5.383	-0.868	-1.922	-1.335	0.209
TLS_i^Q	-0.027	0.025	0.190	0.060	-0.117	0.390^x	-4.406	-0.187
$(P/ER)_{i-1}^M$	-0.154	-6.814^z	2.969	-0.971	0.392	-3.058^y	-5.181	0.382
$\overline{R}^2$	0.336	0.282	0.429	0.346	0.421	0.269	0.227	0.265
S.E.E.	4.145^a	1.488^a	1.198^a	5.485^a	0.764^a	1.685^a	0.630^a	0.895^a
ρ	-	-0.358	-0.541	-0.501	-	-0.435	-	-
D.W.	2.31	2.08	2.33	2.49	2.30	2.23	2.26	2.29

C. DAHE

Variable	Seasonally Adjusted			Minimum Month		
	Min.	Mfg.	Cons.	Min.	Mfg.	Cons.
K	0.153	0.718	0.145	0.154	1.339	-0.122
t	0.017[a]	-0.360[a]	0.261[a]	0.117[a]	-0.106[a]	0.350[a]
t^2	0.017[a]	0.004[a]	0.034	0.033[a]	0.003[a]	0.061[a]
z_i^Q	0.018	-0.355	-0.099	0.043[x]	-0.052	-0.030
z_i^A	-0.026	2.209	0.214[y]	-0.058	0.069	0.131
$(V/ER)_i^Q$	-0.070	-0.264	0.035	0.215	2.588	1.740[y]
$(V/ER)_i^A$	0.546	-1.704	-0.096	0.951	-4.494	-0.628
$(V/ER)^Q$	0.386	-0.708	-0.040	0.729	-1.953[x]	-4.540[z]
$(V/ER)^A$	-0.606	1.244	0.074	0.446	4.492[x]	2.570
$(VU/L)_i^Q$	-0.054	-6.625[x]	-6.195	-0.990	-0.031	-9.028
$(VU/L)_i^A$	1.087	8.891	8.688	2.948	0.094	-5.579

TABLE CXXIII (Continued)

Variable	Seasonally Adjusted			Minimum Month		
	Min.	Mfg.	Cons.	Min.	Mfg.	Cons.
$(VU/L)^Q$	-2.265	9.172	-5.517	-6.536	0.002	1.484
$(VU/L)^A$	7.299	-8.083	4.697	23.878	-0.017	1.571
$(VU/V)_i^Q$	0.007	0.143	0.224^x	0.031	0.027	0.102
$(VU/V)_i^A$	-0.017	-0.136	-0.461^x	-0.009	0.125	-0.207
$(VU/V)^Q$	0.020	-0.179	0.027	-0.045	-0.060	-0.446^z
$(VU/V)^A$	-0.056	0.174	0.006	0.003	0.235	0.167
$(1/U^2)_i^Q$	0.019	0.065	-0.642	0.010	0.016	0.026
$(1/U^2)_i^A$	-0.053	-0.332^x	-2.072	-0.037	-0.055	0.179
$(1/U^2)^Q$	-0.011	0.005	0.034	0.222	0.129	-0.849
$(1/U^2)^A$	-0.333	0.303	0.331	-1.364^y	-0.581	1.700
DW_i^Q	-0.080	-0.842^z	-0.811^z	0.145	-0.145	-0.236
DW_i^A	0.369	-2.826^z	-1.204	-0.721	-3.020^y	-0.518

Variable	Seasonally Adjusted			Minimum Month		
	Min.	Mfg.	Cons.	Min.	Mfg.	Cons.
$(W_i/W)^Q$	-0.175	-0.260	-0.021	-0.250^z	-0.211	-0.394^z
$(W_i/W)^A$	0.101	-0.377	-0.494^y	0.420^z	-1.008	-0.265
$(W_i/W_{us})^Q$	-0.146	-0.322^y	0.304	-0.378^y	-0.443^y	-0.261
$(W_i/W_{us})^A$	0.061	0.779	0.207	0.303	0.152	1.295^y
DP^Q	-0.016	0.425	0.395	0.306	0.900^x	1.892^y
DP^A	-1.818	2.073	-1.862	-2.414	-0.494	-7.443^y
TLS_i	0.050^z	0.054	0.006	0.047^y	-0.015	-0.051^y
$(P/ER)_{i-1}$	0.304	1.291	0.000	-2.550^y	0.810	-0.809
$\bar{R}^2$	0.327	0.313	0.234	0.478	0.317	0.512
S.E.E.	0.616	0.410^a	0.756^a	0.699^a	0.587^a	0.949^a
ρ	-0.463	-	-	-0.485	-	-
D.W.	2.32	2.39	2.36	2.37	2.46	2.42

TABLE CXXIV

SECTORAL MONTHLY WAGE MODELS

AFTER ELIMINATION OF INSIGNIFICANT COEFFICIENTS

A. DAWWS - Seasonally Adjusted

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Serv.
K	0.114	0.018^{z}	0.007	-0.145^{x}	1.400^{z}	0.946^{z}	0.133^{z}	0.136
t	-	-	-	-	-0.257^{ay}	-	-	-
t^{2}	-0.075^{y}	-	-	-	0.099^{az}	-	-	-0.070^{z}
z_i^{Q}	-	-	-	-	-0.282^{x}	-	-	-
z_i^{A}	-	-	-	-	0.411^{y}	0.590^{y}	-	-
$(V/ER)_i^{Q}$	-	-	-	-	-	-	-	0.133^{y}
$(V/ER)_i^{A}$	0.394^{y}	-	-0.717^{y}	-	-0.872^{x}	-	-3.587^{z}	-0.218^{z}
$(V/ER)^{Q}$	-	-	-	-	-	3.353^{z}	-	-
$(V/ER)^{A}$	-	-0.729^{z}	-	-	-	-	-	-
$(VU/L)_i^{Q}$	-	-	-1.638^{y}	-14.542^{z}	-	-	-	-

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Serv.
$(VU/L)_i^A$	-	-	1.790^x	10.558^z	-	-	10.476^z	-
$(VU/L)^Q$	-	-	-	-	-	-20.285^y	-	-6.126^z
$(VU/L)^A$	-1.604^z	5.342^z	-	-	16.003^z	13.250^z	-	-
$(VU/V)_i^Q$	-	-	-	0.568^z	-	-	-	0.049^x
$(VU/V)_i^A$	-	-	-	-0.504^z	-	-	-0.156^y	-
$(VU/V)^Q$	-	-	0.087^z	-	-	0.551^z	-	-
$(VU/V)^A$	0.629^z	-	-	-	-0.283^y	-	-	-
$(1/U^2)_i^Q$	-	-	0.079^y	-	-	0.288^y	-	-
$(1/U^2)_i^A$	6.724^x	-	-	0.517^z	-0.137^y	-	-	-
$(1/U^2)^Q$	-	-	-	-	-	-	-	-
$(1/U^2)^A$	-	-	-	-	-0.432^y	-1.441^z	0.249^z	0.484^z
$(DW)_i^Q$	-0.602^z	-0.691	-1.138^z	-0.882^z	-1.070^z	-0.723^z	-0.616^z	-0.536^z

TABLE CXXIV (Continued)

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Serv.
$(DW)_i^A$	-3.187^z	-1.653	-2.115^z	-2.022^z	-2.671^z	-2.355^z	-	-2.650^z
$(W_i/W)^Q$	-	-	-	-	-	-	-	0.331^y
$(W_i/W)^A$	-0.569^z	-	-	-0.323^z	-0.984^z	-1.601^z	-0.174^z	-0.880^z
$(W_i/W_{us})^Q$	-	-	-	0.657^z	-	-	-0.262^x	0.356^z
$(W_i/W_{us})^A$	0.696^y	-	-	-	-0.726^y	0.565^y	0.398^y	-
DP^Q	-	-	-	-	-	-	-	-
DP^A	-	-	-	-6.823^z	-	-	-1.812^y	1.721^x
TLS_i	-	-	-	-	-	0.296^z	-	-
$(P/ER)_{i-1}$	-	-	-	-	-	-	-	0.192^y
$\bar{R}^2$	0.262	0.173	0.284	0.246	0.333	0.251	0.123	0.243
S.E.E.	1.815^a	0.829^a	0.554^a	1.833^a	0.514^a	1.522^a	0.544^a	0.548^a

Variable	For.	Min.	Mfg.	Cons.	Trade	TUC	FIR	Serv.
ρ	-	-	-	-0.367	-	-0.423	-	-
D.W.	2.23	2.34	2.49	2.17	2.41	2.18	2.21	2.22

TABLE CXXIV (Continued)

B. DAWWS - Minimum Month

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Serv.
K	-0.124	0.309^{z}	0.498^{z}	0.498^{z}	1.014^{z}	0.799^{z}	0.217^{z}	-0.062
t	-	-	-	-	-0.410^{az}	-0.585^{y}	-	-
t^2	-	-	-	-	0.087^{az}	-	-	-0.056^{ax}
z_i^Q	-	-	-	-	-	-0.409^{y}	-	-0.192^{z}
z_i^A	-	-	-	-	0.499^{y}	1.236^{z}	-	$-.290^{z}$
$(V/ER)_i^Q$	-1.136^{z}	-	-	-	-5.198^{z}	0.255^{z}	-	-0.118^{y}
$(V/ER)_i^A$	2.292^{z}	-	-	-	-	-	-3.343^{z}	-
$(V/ER)^Q$	-	-	-1.365^{z}	-	3.771^{z}	-0.260^{z}	-3.637^{z}	-4.856^{z}
$(V/ER)^A$	-	-	1.040^{z}	-	-	-	4.481^{y}	-
$(VU/L)_i^Q$	-	-	-	-15.657^{z}	-9.410^{z}	-	4.064^{z}	-
$(VU/L)_i^A$	-	4.572^{z}	-	-	10.087^{x}	-	9.295^{y}	-
$(VU/L)^Q$	-	-	-	-	-	-	-	-

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Serv.
$(VU/L)^{A}$	-	-	-	-	-	4.861^{z}	-	12.558^{z}
$(VU/V)_{i}^{Q}$	-	0.119^{z}	0.085^{z}	0.398^{z}	-	-	-	-
$(VU/V)_{i}^{A}$	-	-0.215^{z}	-	-	-	-	-0.115^{y}	-
$(VU/V)^{Q}$	0.406^{z}	-0.202^{z}	-	-	2.190^{z}	0.189^{z}	-	-0.274^{z}
$(VU/V)^{A}$	-	-	-	-	-	-	-	-
$(1/U^{2})_{i}^{Q}$	-	-	-	-	-	0.400^{z}	-0.029^{x}	-
$(1/U^{2})_{i}^{A}$	-0.527^{z}	-	-	-	-0.314^{y}	-1.689^{z}	0.056^{y}	-
$(1/U^{2})^{Q}$	-	-	-	-	-	1.139^{y}	-	-
$(1/U^{2})^{A}$	-	-	-	2.126^{z}	-0.825^{x}	-5.931^{z}	-	-
DW_{i}^{Q}	-1.126^{z}	-1.390^{z}	-1.152^{z}	-0.911^{z}	-0.946^{z}	-0.855^{z}	-0.646^{z}	-0.829^{z}
DW_{i}^{A}	-	-	-	-	-3.772^{z}	-1.627^{z}	1.249^{y}	-1.358^{y}
$(W_{i}/W)^{Q}$	-0.558^{z}	-	-0.483^{z}	-0.532^{z}	-0.806^{z}	-0.435^{z}	-0.163^{z}	-

TABLE CXXIV (Continued)

Variable	For.	Min.	Mfg.	Cons.	Trade	TCU	FIR	Serv.
$(W_i/W)^A$	-	-0.738^z	-	-	-	-0.903^z	-	-0.421^y
$(W_i/W_{us})^Q$	-	-	-	-	0.383^y	0.583^z	-	-
$(W_i/W_{us})^A$	0.740^z	0.888^z	-	-	-0.977^z	-	-	0.461^x
DP^Q	-	-	-	-	-	-	-0.940^y	-
DP^A	-	-	-3.712^z	-	-	-	-	-
TLS_i	-	-	-	-	-	0.350^y	-	-
$(P/ER)_{i-1}$	-	-6.825^z	-	-	-	-3.106^y	-5.234^z	-
$\bar{R}^2$	0.382	0.304	0.401	0.339	0.440	0.303	0.256	0.290
S.E.E.	4.001^a	1.545^a	1.215^a	5.491^a	0.752^a	1.646^a	0.618^a	0.879^a
ρ	-	-	-0.450	-0.443	-	-0.433	-	-
D.W.	2.19	2.44	2.13	2.29	2.21	2.22	2.27	2.25

C. DAHE

Variable	Seasonally Adjusted			Minimum Month		
	Min.	Mfg.	Cons.	Min.	Mfg.	Cons.
K	0.612^{az}	0.584^{z}	0.381^{z}	-0.107^{y}	1.172^{z}	0.537^{z}
t	-	-0.410^{az}	0.285^{az}	-	-	0.744^{az}
t^2	0.013^{az}	-	0.039^{az}	0.051^{az}	-	0.055^{az}
z_i^Q	-	-	-	0.023^{z}	-0.094^{y}	-0.058^{z}
z_i^A	-0.008^{z}	1.824^{z}	0.700^{x}	-	0.109^{y}	0.054^{x}
$(V/ER)_i^Q$	-	-	-	-	1.720^{z}	0.464^{y}
$(V/ER)_i^A$	-	-	-0.791^{z}	0.821^{z}	-2.898^{z}	-2.494^{z}
$(V/ER)^Q$	-	-	-	0.874^{z}	-1.366^{z}	-
$(V/ER)^A$	-	-	-	-	3.965^{z}	-
$(VU/L)_i^Q$	-	-1.750^{y}	-0.599^{z}	-	-	-

TABLE CXXIV (Continued)

Variable	Seasonally Adjusted			Minimum Month		
	Min.	Mfg.	Cons.	Min.	Mfg.	Cons.
$(VU/L)_i^A$	1.065^z	-	1.039^y	-	-	-
$(VU/L)^Q$	-	2.851^z	-	-	-	-
$(VU/L)^A$	-	-	-	-	-1.651^z	-
$(VU/V)_i^Q$	-	-	0.190^y	-	-	-
$(VU/V)_i^A$	-	-	-0.441^z	-	0.321^z	-0.158^x
$(VU/V)^Q$	-	-	-	-0.062^z	-	-
$(VU/V)^A$	-	-	-	-	-	-0.146^z
$(1/U^2)_i^A$	-	-0.272^z	2.002^z	-	-	0.181^z
$(1/U^2)^A$	-	0.325^z	-	-	-	1.521^z
DW_i^Q	-	-0.739^z	-0.850^z	-	-	-

Variable	Seasonally Adjusted			Minimum Month		
	Min.	Mfg.	Cons.	Min.	Mfg.	Cons.
DW_i^A	-0.645^y	-2.541^z	-	-1.281^z	-3.077^z	-
$(W_i/W)^Q$	-	-0.595^z	-	-	-	-0.409^z
$(W_i/W)^A$	-	-	-0.312^z	-0.243^z	-1.057^z	-
$(W_i/W_{us})^Q$	-	-0.197^z	-	-	-0.628^z	-
$(W_i/W_{us})A$	-	-	-	-	0.356^y	-
DP^Q	-	-	-	-	0.010^y	-
DP^A	-1.732^z	2.531^z	-	-	-	-
TLS_i	0.054^z	-	-	0.064^z	-	-
$(P/ER)_{i-1}$	-	-	-	-3.524	-	-
$\overline{R}^2$	0.362	0.338	0.256	0.403	0.343	0.508

TABLE CXXIV (Continued)

Variable	Seasonally Adjusted			Minimum Month		
	Min.	Mfg.	Cons.	Min.	Mfg.	Cons.
S.E.E.	0.592[a]	0.402[a]	0.745[a]	0.720[a]	0.575[a]	0.952[a]
ρ	-0.414	-	-	-0.369	-	-
D.W.	2.22	2.38	2.37	2.12	2.40	2.42

chapter ten

CONCLUSION

Summary of Results

This study has been directed primarily at the question of whether wage changes and, possibly, price changes affect the unemployment rate. As a secondary interest, the way in which conditions in labor markets affect wage changes has been considered. In terms of sorting out what these effects are, the study has been, and was foreseen to be, largely a failure. This failure might seem in many ways to be perturbing, but its nature and sources are instructive.

A caricature of many economists' views of the working of the labor market might be described as follows. Employment is largely determined by output, possibly with a distributed lag. Labor-force participation is determined by the workings of the standard types of discouraged-worker, additional-worker hypotheses with the discouraged-worker effect predominating. These relationships set the unemployment rate and that rate enters the Phillips curve (possibly in connection with a simultaneous price-determination equation depending largely on wage and price changes) to determine the rate of change of money wages.

The main lines of argument of this study have been aimed at challenging this type of view, not simply in the sense that expectations may produce a "vertical" long-run Phillips curve along the lines of Phelps (1967) or Friedman (1968) but rather by suggesting that the process may be somewhat different in nature and certainly a good deal more complicated. While the study has not provided a clear-cut picture of how the labor-market works, it seems reasonable to believe that it does provide a challenge to the more simplistic view.

It is worth reviewing the sources of the failure of this study to provide a clear set of results, both to recall the difficulties involved and the sources of puzzlement that were uncovered, and also to note the places where the welter of findings discussed do point to interesting, albeit negative findings.

We started the investigation by examining some of the implications to be derived from considering the micro-economic search process involved in finding and changing jobs. This approach has become standard in the literature, though the use made of it in this study appears to be somewhat different. For the supply side of labor markets, wage changes were treated initially as exogenous in the theoretical work. With simplifying assumptions and by drawing a distinction between actual conditions and perceived conditions some fairly definite conclusions about the response of the unemployment rate could be drawn. However, a serious problem for the model emerges because the way in which expectations or perceptions are formed is unknown. For example, if it takes people a year to perceive that wages have been changed, changes which occur within a year could be treated as unperceived; but if the lag is only a month, most of these changes would already have entered perceptions.

The theoretical model developed left the determination of wages and of variables, such as vacancies and hiring standards, which affect labor-market tightness from the demand side, to be determined by employers on the basis of their rate of output and perceptions of conditions in the labor market. The model matched that for individual workers' decisions in that it recognized the type of process job-searchers were assumed to be engaged in and that finding work, finding employees, or retaining employees were all regarded as being uncertain processes.

The demand side of the model produced theoretical equations which have the property that the variables were determined by perceived rather than actual conditions. They did not yield qualitatively definite conclusions. That is, the signs of the effects of variables treated as exogenous to these decisions by employers on the variables treated as endogenous could not be determined from the assumptions which were made.

One feature of these models is that they treat labor-market tightness as arising from a variety of separate conditions, or as having a number of facets, and not as being simply the unemployment rate. Such a view is not uncommon in dealing with other markets. For example, financial markets are sometimes described in terms of their depth, breadth and resiliency. In dealing with labor markets, however, a serious problem arises from this view. The nature of the variables affecting the market which pertain to such things as hiring standards, vacancies and search efforts of employers (which were not even included in the formal models) is not known. Not surprisingly in view of this fact, they are also not measured. For empirical models, it was argued in addition that some more clearly defined variables also are not measured.

These difficulties of conception and of data mean that conceptually one has to "solve out" the variables involved. This conceptual process is also implicitly involved in dealing with expectations and perceptions. As a result, even conceptually the parameters of the models which can be estimated reflect not only the parameters of the original conceptual model, but also the values of the coefficients that arise from the solution process. Combined with the problems that even in the structural model many of the signs of effects were unknown, this conceptual mixture of unknown parameters coming from different relationships means that theory does not provide any indication of what the signs are of most of the coefficients in the relationships investigated.

This problem, that the nature of the relationships is not predicted by theory, is compounded by the fact that errors in the variables may change the magnitude and even the signs of the parameters being estimated in regression models from those of the corresponding models where the variables are measured without error. Equally serious, such errors may make variables which are correlated with others in the system appear to play a role which in truth they do not have. However, without additional information there is no way to discriminate between this hypothesis for the inclusion of variables and the more direct hypothesis that they actually do play a role.

This set of arguments means that there are no direct presumptions about the signs of the coefficients that were estimated. Discussion of the equations naturally was focussed on whether a simple picture appeared and whether the accounts for similar phenomena appeared to be consistent with each other. In only a very limited number of cases could the particular values of the regression coefficients be taken to throw much light on the validity of the underlying theoretical models, and even in these instances there are still some elements of presuming that the solution to an unknown set of simultaneous equations can be intuited, a clearly dubious undertaking. The main way in which confirmation could be achieved was through complicated models fitting the data well, and this they did in a large number of instances. Of course, this is a very weak and undiscriminating test of the theory.

Although these difficulties produce quite enough problems to prevent any easy resolution of the issues, the difficulties which the operation of the Canadian economy present to the investigator are even more complicated. One of these difficulties is that seasonal fluctuations in fact provide much of the variation and covariation in many of the series being studied. It is doubtful if the theoretical models developed provide an adequate account of both seasonal and cyclical variations and certainly it is implausible that the same parameters should apply to both. But with the run of data available, it would quite clearly be impossible to fit separate models for seasonal and non-seasonal components of any great complexity even if these separate components could be adequately identified.

The nature and inter-connections of seasonal fluctuations are largely a mystery and it was far beyond the scope of this study to attempt any sort of adequate exploration of the subject. What was attempted was some description of the magnitude of the problem. It was also established that, as conventionally measured, the seasonal components appear to depend on economic conditions as measured by the unemployment rate. This finding is disturbing in that seasonally-adjusted data can be regarded as containing still an average of the seasonal component. With the large seasonal fluctuations present, relations among the seasonals may still account for the associations found among alledgedly non-seasonal data. To deal with this a further, rather *ad hoc*, adjustment to seasonally-adjusted data was suggested to make them correspond to points of lowest rather than average seasonal fluctuation. It was noteworthy that in subsequent empirical investigations the minimum-month data that resulted provided not only different models but also, in some cases though certainly not in all, models which appeared to provide better explanations of the data. Obviously these findings do not prove that the minimum-month adjustment is correct; instead they would seem to point to the very serious need for better understanding of seasonal fluctuations and for methods of dealing with them that are more clearly related to the nature of the processes at work than are the conventional, ad hoc methods currently in use.

The empirical work started by building some very simple models for relationships among the unemployment and labor-force variables. These models were highly successful in the sense that close fits were often obtained though this was not always the case for models for duration and for transition among various categories as recalled by respondents to the Labour Force Survey. The models in many cases give a clearer indication of patterns in the structure of unemployment than do the more complicated models fitted at a later stage in the study. However, there were indications that these later models provide statistically superior accounts. The simple models were used for some simulation work to investigate whether the nature of unemployment has been changing. The only source of major shifts that was found arose from changes in seasonal patterns though some trends were also found which suggested that the unemployment rate would provide its lowest reading for given conditions in the labor markets in the early 1960s. How to evaluate the meaning of these changes, particularly those associated with shifting seasonal patterns, for the unemployment rates which the economy can reasonably be hoped to produce does not emerge from this sort of model, partly because it is not connected to the rest of the economy. The simple models developed also gave no indication that disguised unemployment is a major problem to be taken into account in evaluating the unemployment rate.

The investigations of the data on hirings, placements, and various types of employment reveal some alarming things about the data available. Placements and hirings are only loosely related and one can only presume that the same thing holds for the relationship of the vacancy records which are available and the numbers of vacancies which there actually were in the economy. As investigation of the associative relationship between these vacancy data and the unemployment rate showed, there are some trends which, if taken at face value, would indicate a worsening of the labor market. However, given the nature of the data, there can be no presumption that this indication represents a genuine change in the economy. Investigation of the variety of data which might be taken to represent wages or wage changes also revealed a disturbing amount of heterogeneity among the various measures.

Various models related to the variables discussed in the theoretical chapters were estimated in a variety of contexts. These investigations started with labor flows and employment changes which might appear to be related to the basic flows entering into the unemployment rate. These models were first fitted to the data for the industrial composite, then to those for the major divisions of the Standard Industrial Classifications. Unemployment rates and labor-force participation rates were next investigated with the same types of models. Finally, wage-change equations were fitted.

These equations have already been discussed at considerable length; indeed possibly excessive length in view of the lack of *a priori* expectations about them, although this discussion seemed desirable to establish the major conclusions. These models showed first that there was strong evidence in favor of fairly complicated models being appropriate. The equations fitted well and a variety of different variables were highly significant in at least some parts of the investigation. This applied particularly to a variety of vacancy variables that were used. Long and apparently complicated distributed lag patterns appeared. In many instances the signs and magnitudes of the coefficients would appear surprising if expectations about their values were based on simple notions of associations that individually would appear to be reasonable, though probably they are not unexpected in view of the considerations about the actual nature of the coefficients being estimated. No strong confirmation about parts of the theoretical models that might be related to the current values of some independent variables was obtained. This fact may arise from errors in the data, from problems about which parts of other variables represent actual and which perceived conditions, from conceptual discrepancies between the variables used and those which are relevant, or from the hypotheses being false. No simple pattern about the signs and relative magnitudes of coefficients in different equations, either pertaining to the same types of phenomena, or to different ones appeared so that it was not possible to provide any simple overall interpretations. This finding is not surprising if the actual relative values of the parameters of the models vary much, for then no pattern would be expected, especially following the conceptual "reduction" needed to get rid of unobservable variables. The finding could also arise from errors in the variables if the underlying parameters are not all the same, as would hardly seem likely to be the case. However, for whatever reason, we are left with a picture of the labor market which is not simple or directly interpretable but which appears to dominate simpler accounts.

It is worth stressing that this set of findings applies particularly to the wage-change equations. Part of the theoretical work in this study casts doubt on what sort of interpretation can be placed on the conventionally used and estimated Phillips curve. It has long been evident that firm estimates of this curve could only be achieved through the use of rather dubious statistical procedures. These procedures might be justified if one had every confidence that a Phillips curve of fairly well-known properties actually exists, but on theoretical grounds such confidence would seem to be misplaced. Recent work for the United Kingdom by Archibald, Kemmis & Perkins (1971) casts severe doubt on the empirical validity of a Phillips curve. The record of the need to "patch up" the Phillips curve for the United States, reviewed by Eckstein and Brinner (1972), also raises doubts about its usefulness for that economy. This study provides no basis for belief in a simple Phillips curve for Canada and the most commonly used one of Bond, Bodkin, Reuber and Robinson (1967) is no more solidly established than those for other countries. What emerges from this study is the belief that a more complicated process is at work.

The picture painted by this study of the workings of the labor market is one of opaque complexity. How these various parts would fit together to provide for developments over time and how the values of the various variables would change with alterations in various conditions was not explored. Such an exploration, which would require simulation with a model containing the parameters estimated, was not pursued for a number of reasons.

The chief reason was that time constraints placed on the study by the nature of the organization which sponsored this research ruled out the possibility of carrying out simulation exercises. Related to this, it will have been noticed that some parts of the work have been carried out in only a fairly cursory fashion. Furthermore, some variables for which equations would be needed were not studied. The most obvious of these are the vacancy variables for which models of the sort fitted in this study could be provided easily.[1] It would also not appear sensible to simulate on the basis of externally determined real domestic product and prices, though it might be possible to operate on the basis of externally generated money values for output. Accounting for either RDP or prices would have carried us far beyond the present scope of the study.

Two other considerations were equally important for the decision not to pursue simulation exercises (by truncating the work done to permit time to carry them out). The first is the dubious nature of some of the specifications adopted and the clear indication that seemingly different specification variants giving what do not appear to be the same results are often about equally likely to be the relevant ones. Simulation to be useful would have to explore the robustness of results to variations in specification, though it would be even more desirable to establish the specifications more firmly. More important, however, is the fact that for most of the interesting problems which might be investigated, the conceptual nature of the equations is probably not appropriate and their specifications are not adequately broad. The coefficients which were estimated were of a semi-reduced form nature and were very likely to be highly contaminated by errors in the data. Such parameters are useful for examining over time the workings of a system, whose structure remains unchanged, on the basis of changes in the exogeneous variables (here RDP and consumer prices) of the sort which have been experienced in the past. Most of the policy issues of interest are concerned with the effects of changes in manpower policies or other provisions to deal with the problems of unemployment or the effects of incomes policies. Such policies are likely

---

[1] Actually some of these models were explored to a limited extent. They produced results for vacancies available and unfilled vacancies which had many of the properties of the equations presented and discussed. They fitted the data very closely; all groups of variables and many of the individual coefficients were significant; strong lags appeared; and there were no simple patterns evident.

to have their effects on either the structural parameters of the models or on variables which enter those structural equations which we have treated as constants. This study makes no claim to estimate structural parameters and the effects of changes in policy are subsumed in the trends or other variables.[2] Thus the presently formulated models could only try to deal with the effects of changes in demand management and even then only when accompanied by changes in other policies of the sorts which have been experienced historically. In view of the other reasons for not carrying out simulations, this effort did not seem worth pursuing.

The models developed in this study then are mainly of interest in showing what the labor markets are not, namely, a simply conceived, or visualized, and easily predicted set of processes, rather than at showing how they do operate. That would require an additional major research effort and one which is not likely to be accomplished by tinkering with simple-minded empirical relationships.

Data and Further Research

The problems associated with inaccurate or inadequate data have arisen repeatedly in the course of this study. It might seem that this implies that only with better data will progress be made and might seem to entail some criticism of the gathering of statistics which have occurred. Such criticism is not intended and it is not clear that the implication is valid. What does emerge is the inadequacy of many of the research tools used to investigate labor markets.

The method used here, in line with the limited objectives of the study, was primarily multiple regression analysis,

---

[2] Some of the major recent programs affecting unemployment such as the recent sweeping changes in the coverage and provisions of unemployment insurance or the Local Initiatives Program came into effect after the data used here ended. Other programs were, however, being developed and altered in the course of the observation period. The fact that they did not seem to appear in the residuals can be taken only as an indication that their effects are subsumed in other variables or are mixed with other unspecified effects, not that the programs had no effect.

which in the presence of weak data or incorrect specification simply does not estimate the structural parameters on the knowledge of which an adequate understanding of the nature of the processes at work is generally supposed to rest. Regression is able to reveal what sorts of influence appear to be entering various processes and what the nature of the most straightforward associations are; though these associations involve not only the direct or "true" ones, but also those arising through the effects of data limitations and of ways of looking at the processes imposed by the specifications adopted. Such an approach conforms to the practices of many earlier studies and is suitable for the type of investigation conducted here; but other approaches may be needed.

To take account of the weakness of data, two things are likely to be needed. The first is explicit recognition of the errors by the methods used; the second may well be exploitation of varieties of data on similar phenomena to help to establish their underlying nature and the extent of error present. The information which is available has yet to be fully exploited. For example, we have made no use of the sampling error estimates which accompany the data from the Labour Force Survey. Such error calculations also accompany the recently instituted Job Vacancy Survey and it is possible that these figures and the connections that are being revealed between them and the conceptually very different vacancy data which we used will allow better use of those figures long before the run of data from the Job Vacancy Survey is extensive enough to allow much time-series analysis. It is also the case that information relevant to the subjects which we have been discussing may be contained in data arising from the operations of the Unemployment Insurance Commission, which we have not used at all, and from other operating data of the Canada Manpower Centres and the National Employment Service which we did not investigate.

Whether such research would be fruitful is problematical and better data would undoubtedly ease some tasks. However, the essence of the view of labor markets adopted here is that they can be understood only in terms of flows over time, and it will be a long time before any new set of data provided enough observations to allow much resolution. This attitude does not preclude the usefulness of short-term, cross-section analyses or deny that much is to be learned in other wages. The recent study by Maki (1972) well reveals how much can be learned from examination of a very limited run of observation and direct investigations of the workings of parts of the market may be highly revealing.[3] Such studies, however, cannot be expected to reveal the overall workings of labor markets over time and it is possible that only the development of a run of more clearly relevant data than are available presently can resolve the issues.

Certainly there are shortcomings in the data available that one would hope will be rectified. The most important for the types of study which we have been conducting are in the area of wages, where the nature of most data is distressingly far removed from anything which could be treated as the directly relevant variables for the operation of labor markets. Certainly some improvements might be made, such as going to a "straight time" earnings measure. The existence of an annual wage index would seem to indicate that the problems of producing index numbers of wages at more frequent intervals and with wider coverage would not be insuperable.

It is also not the case that some of the major flows that occur in the labor markets and which may need separate investigation are being measured. The hirings and separations series which were available have been discontinued and as yet no alternative has been made available. The gross-movements data are based on recollection rather than fact, do not measure switches in employment, and do not record the reasons for termination of employment. The Job Vacancy Survey, excellent though it is in conception and execution, does not record the flows into and out of employment that are associated with these vacancies.[4] Wage data associated with the

---

[3] A yet to be completed study by G.G. Johnson on decisions made by employers conducted for the Prices and Incomes Commission contains a number of interesting findings and insights. It is to be hoped that these findings can be made generally available before too long.

[4] It has been remarked that such remarks are like complaining that the Boeing 747 doesn't fly faster. The criticism is rather that of building a 747 and only filling one compartment with seats. The main point, of course, is that, for research, data which have associated with them comparably conceived and classified measurements on what appear to be related phenomena are more useful than ones where the related quantities are measured on different bases or not at all, no matter how good the measurement may be of a single series.

vacancies have yet to be made available, nor are these figures that would allow for comparison of hiring rates of pay and those generally paid.

The list might be extended considerably of what additional data might be desired. The fact remains that presently available data have probably not been fully exploited and that there are major methodological or technical problems to be overcome before satisfactory analyses can be conducted either with these data or with ones yet to be produced. The appropriate way of analyzing and treating seasonal adjustment, for example, is one of the areas needing better resolution before confidence can be placed in what data appear to reveal.

Implications

It is usual to end a report such as this one with a list of policy recommendations. This will not be done here, largely because the nature of the finding are such that no firm recommendations emerge. The study reveals that the workings of labor markets are a good deal more complicated than usually supposed. This is not to deny that the usually supposed picture does not provide an adequate first approximation to the process through which the joint problems of inflation and unemployment arise. An account, such as the one embodied in the Report of the Prices and Incomes Commission, based on the reading of the evidence of the historical record and in line with a wide variety of the associations that have been found in that record, serves as a distillation of the available evidence and a basis for proceeding.

The results of this study do not imply that wages do not rise more rapidly when excess-demand types of pressures arise in labor markets, or that expectations do not play a major role in furthering and continuing the process. Indeed the prevalence of strong effects in our models coming from vacancies and from lagged wage and price changes point in these directions. Nor is there anything to preclude the reverse proposition that was advanced in the theoretical parts of the study, namely that wage changes play a crucial role in fluctuations in employment and that rising rates of increase of money wages may be needed if low rates of unemployment are to be achieved. But even if these effects are present, our results indicate that their operation is likely to be complicated. These complexities, especially the ones arising from the complicated ways in which vacancies appear to operate, may well provide opportunities for a variety of manpower programs and a diversity of other policies to operate to produce more satisfactory overall outcomes from the operation of the economy; but until such time as the workings of the labor markets are better understood, surprises may well lie in store from various changes in policy.

The situation may well be illustrated by the recent changes in unemployment insurance provisions. These changes might be expected to "shift" the position of the Phillips curve and result in higher rates of unemployment being associated with other economic conditions, even as they altered the nature of the unemployment somewhat and its effects on those who are unemployed. How much shift occurred is, however, unknown and since the wage-determination and unemployment-determination processes are a good deal more complicated than a simple curve, how the structure of labor markets was affected is unknown and cannot simply be assessed in terms of a shift of a simple curve. As a result, it would be very difficult to assess the effects of the program or to evaluate the ensuing conditions which have been recorded for the performance of the economy.

Such problems of evaluation could be extended to the whole gamut of policies undertaken to improve employment opportunities and income opportunities, and to reduce regional economic disparities. The complexity found in this study indicates that the requisite understanding will not be easily or quickly achieved. At the same time, over-simplified approaches, such as the Phillips curve now appears to be, are likely to produce the same dilemmas and disasters which arose as it became clear that any immediate and straightforward trade-off between the level of the unemployment rate and the rate of change of prices was not available, and that the opportunity set was both more complicated and also quantitatively less well known than the Phillips curve analysis would suggest.

REFERENCES

Allingham, John D. (1967), Demographic Background to Change in the Number and Composition of Female Wage-Earners in Canada, 1951 to 1961, Special Labour Force Studies, B, 1, Ottawa: Queen's Printer.

Allingham, John D. and Spencer, Byron G. (1968), Women Who Work: Part 2, Married Women in the Labour Force: The Influence of Age, Education, Child-bearing Status, and Residence, Special Labour Force Studies, B, 2, Ottawa: Queen's Printer.

Almon, Shirley (1965), "The Distributed Lag Between Capital Appropriations and Expenditures," Econometrica, 30, 1, pp.178-196.

Archibald, G.C. (1965), "The Qualitative Content of Maximizing Models", The Journal of Political Economy , LXXIII, 1, pp.27-36.

Archibald, G.C. (1969), "The Phillips Curve and the Distribution of Unemployment", American Economic Review, LIX, 2, pp.124-34.

Archibald, G.C., Kemmis, Robyn and Perkins, J.W. (1971), "Excess Demand for Labour, Unemployment and the Phillips Curve: A Theoretical and Empirical Study," Discussion Paper 34, Department of Economics, University of Essex.

Black, Stanley W., and Russell, R. Robert (1969), "Participation Functions and Potential Labour Force", Industrial and Labour Relations Review, pp.84-94.

Bodkin, Ronald G.; Bond, Elizabeth P.; Reuben, Grant L.; and Robinson, T. Russell (1967), Price Stability and High Employment: The Options for Canadian Economic Policy: An Econometric Study, Special Study 5, Economic Council of Canada, Ottawa: Queen's Printer.

Bowen, W.G. (1960), The Wage-Price Issue: A Theoretical Analysis, Princeton: Princeton University Press.

Brechling, F.P.R. (1965), "The Relationship Between Output and Employment in British Manufacturing Industries", The Review of Economic Studies, XXXII (3), 91, pp.187-216.

Brechling, Frank, and O'Brien, Peter (1967), "Short-Run Employment Function in Manufacturing Industries: An International Comparison", Review of Economics and Statistics, XLIX, 3, pp.277-87.

Cragg, J.G., (1967), "On the Relative Small-Sample Properties of Several Structural - Equation Estimators", Econometrica, 35, 1, pp.89-110.

Cragg, J.G. (1971), "On the Use of Proxy Variables", mimeo.

Cragg, J.G. (1971b), "Internal Factors and Canadian Inflation", in N. Swan and D. Wilton (eds), Inflation and the Canadian Experience, Kingston: Industrial Relations Centre, Queen's University.

Cragg, J.G. and Young, H.T., (1973), "Patterns in Price Changes", in Essays on Price Change, prepared for the Prices and Incomes Commission, Ottawa. Information Canada.

Dawson, Donald A. and Denton, Frank T. (1972), "Some Models for Simulating Canadian Manpower Flows and Related Systems", Working paper 72-14, Department of Economics, McMaster University.

Denton, Frank T. (1972), "A Simulation Model of Month-to-Month Labour Force Movement in Canada," Working papers 72-11, Department of Economics, McMaster University.

Dicks-Mireaux, L.A., and Dow, J.C.R., (1959), The Determinants of Wage Inflation: United Kingdom, 1946-56". Journal of the Royal Statistical Society, 122, II, pp.145-74.

Eckstein, Otto (1968), "Money Wage Determination Revisited", The Review of Economic Studies, 35(2), 102, pp.133-43.

Eckstein, Otto, and Brinner, Roger (1972), The Inflation Process in the United States, Joint Economic Committee, U.S. Congress, Washington U.S. Government Printing Office.

Fisher, Irving (1926), "A Statistical Relation Between Unemployment and Price Change", International Labour Review, XIII, 6, pp.785-92.

Friedman, M. (1968), "The Role of Monetary Policy", American Economic Review, LVIII, 1, pp.1-18.

Goldberger, Arthur S. (1964), Econometric Theory, New York: Wiley.

Hicks, J.R. (1948), The Theory of Wages, New York.

Hildreth, Clifford and Lu, John Y. (1960), "Demand Relations with Autocorrelated Disturbances," Technical Bulletin 2-76, Agricultural Experiment Station, Michigan State University.

Holt, Charles C., and David, Martin H. (1966), "The Concept of Job Vacancies in a Dynamic Theory of the Labour Market" in The Measurement of Job Vacancies, New York: NBER, pp.73-110.

Holt, Charles C. (1969), "Improving the Labour Market Trade-Off Between Inflation and Unemployment", American Economic Review, LIX, 2, pp.135-46.

Holt, Charles C. (1970), "Job Search, Phillips' Wage Relation, and Union Influence: Theory and Evidence", in Edmund S. Phelps et al, Microeconomic Foundations of Employment and Inflation Theory, New York: Norton, pp.53-123.

Hutton, Mary and Polianski, A.V. (1966), "Gross Movements of the Labour Force," Manpower Supply Studies, Report 1, Ottawa: Research Branch Program Development Service, Department of Manpower and Immigration.

Johnston, J. (1972), Econometric Methods, New York: McGraw-Hill.

Kaldor, N. (1959), "Economic Growth and the Problem of Inflation", Economica, NS. 26, Part I (Aug.) pp. 212-26, Part II (Nov.) pp.287-98.

Kaliski, S.F. (1964), "The Relation Between Unemployment and the Rate of Change of Money Wages in Canada", International Economic Review, r, 1, pp.1-33.

Lipsey, R.G. (1960), "The Relationship Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1862-1957: A Further Analysis", Economica, XXVII, pp.1-31.

Maki, Dennis R. (1972), Search Behaviour in Canadian Job Markets, Special Study 15, Economic Council of Canada, Ottawa: Information Canada.

Mortensen, Dale T. (1971), "Job Search, the Duration of Unemployment, and the Phillips Curve", American Economic Review, 1970, pp.847-62.

Officer, Lawrence H., and Anderson, Peter R. (1969), "Labour Force Participation in Canada", Canadian Journal of Economics, II, 2, pp.278-87.

Oi, Walter Y. (1962), "Labour as a Quasi-Fixed Factor", The Journal of Political Economy, LXX, 6, pp.538-55.

Penz, Peter (1970), Structural Unemployment: Theory and Measurement, Ottawa: Canada Department of Manpower and Immigration.

Phelps, Edmund S. (1967), "Phillips Curves, Expectations of Inflation and Optimal Unemployment Over Time", Economica, XXXIV, 135, pp.254-81.

Phelps, Edmund S. (1968), "Money-Wage Dynamics and Labour Market Adjustment", The Journal of Political Economy, 76, 4-II, pp.678-711.

Phelps, Edmund S. (1969), "The New Micro-Economics in Inflation and Employment Theory", American Economic Review, LIX, 2, pp.147-60.

Phelps, Edmund S. et al (1970), Micro-economic Foundation of Employment and Inflation Theory, New York, Norton.

Phillips, A.W. (1958), "The Relationship Between Unemployment and the Rate of Change of Money Wages in the United Kingdom, 1861-1957", Economica, NS, XXV, 100, pp.283-99.

Saunders, George (1965), "Wage Determination in Canada", Occasional Paper 3, Economics and Research Branch, Canada, Department of Labour, Ottawa: Queen's Printer.

Schultze, C.L. (1959), "Recent Inflation in the United States", U.S. Congress, Joint Economic Committee, Study of Employment Growth and Price Levels, Study Paper 1.

Shiskin, Julius; Young, Allen H., and Musgrave, John C. (1967) "The X-11 Variant of the Census Method II Seasonal Adjustment Program", U.S. Bureau of the Census, Washington: Government Printing Office.

Simler, N.J. and Tella, Alfred (1968), "Labour Reserves and the Phillips Curve", The Review of Economics and Statistics, L, 1, pp.32-49.

Smith, David C. (1965), "Seasonal Unemployment and Economic Conditions", in Arthur M. Ross (ed), Unemployment Policy and the Labour Market, Berkeley: University of California Press, pp.191-209.

Sparks, Gordon R., and Wilton, David A. (1969), "Determinants of Negotiated Wage Increases: An Empirical Analysis", mimeo.

Spencer, Byron G., and Featherstone, Dennis C. (1970), "Married Female Labour Force Participation: A Micro Study", Dominion Bureau of Statistics, Special Labour Force Studies, Series B, N., 4, Ottawa: Information Canada.

Stigler, George J. (1962), "Information and the Labour Market", The Journal of Political Economy, LXX, 5(2), Supplement pp.94-105.

Sylos-Labini, P. (1971), "Oligopoly, Unions and Inflation" in N. Swan and D. Wilton, (eds), Inflation and the Canadian Experience, Kingston: Industrial Relations Centre, Queen's University.

Swidinsky, R. (1969), "Unemployment and Labour Force Participation: The Canadian Experience", Discussion Paper 16, Department of Economics, The University of British Columbia.

Swidinsky, Robert (1971) "Trade Union Aggressiveness and Wage Determination in Canada", Discussion Paper 62, Department of Economics, University of British Columbia.

Taylor, Jim (1970), "Hidden Unemployment, Hoarded Labour and the Phillips Curve", Southern Economic Journal, XXXVII, 1, pp.1-16.

Taylor, Lester D.; Turnovsky, Stephen J., and Wilson, Thomas A. (1973), The Inflationary Process in North American Manufacturing, Study prepared for the Prices and Incomes Commission, Ottawa: Information Canada.

Tella, Alfred (1964), "The Relation of Labour Force to Employment", Industrial and Labor Relations Review, 17, 1964, pp.454-69.

Theil, Henri (1954), The Linear Aggregation of Economic Relations, Amsterdam: North-Holland.

Thompson, W. (1966), "Collection and Use of Job Vacancy Data in Canada", in The Measurement and Interpretation of Job Vacancies, New York: National Bureau of Economic Research, pp.173-94.

Thornber, H. (1966), "Application of Decision Theory to Econometrics", unpublished doctoral thesis, Department of Economics, University of Chicago.

Vanderkamp, John (1966), "Wage and Price Level Determination: An Empirical Model for Canada", Economica, NS, XXXIII, 130, pp.194-212.

Vanderkamp, John (1970), "Wage Adjustment, Productivity and Price Change Expectations," Discussion Paper 45, Department of Economics, The University of British Columbia.

Wilton, David A. (1969), "Wage Determination at the Industry Level," Discussion Paper 13, Institute for Economics Research, Queen's University, Kingston, Ont.