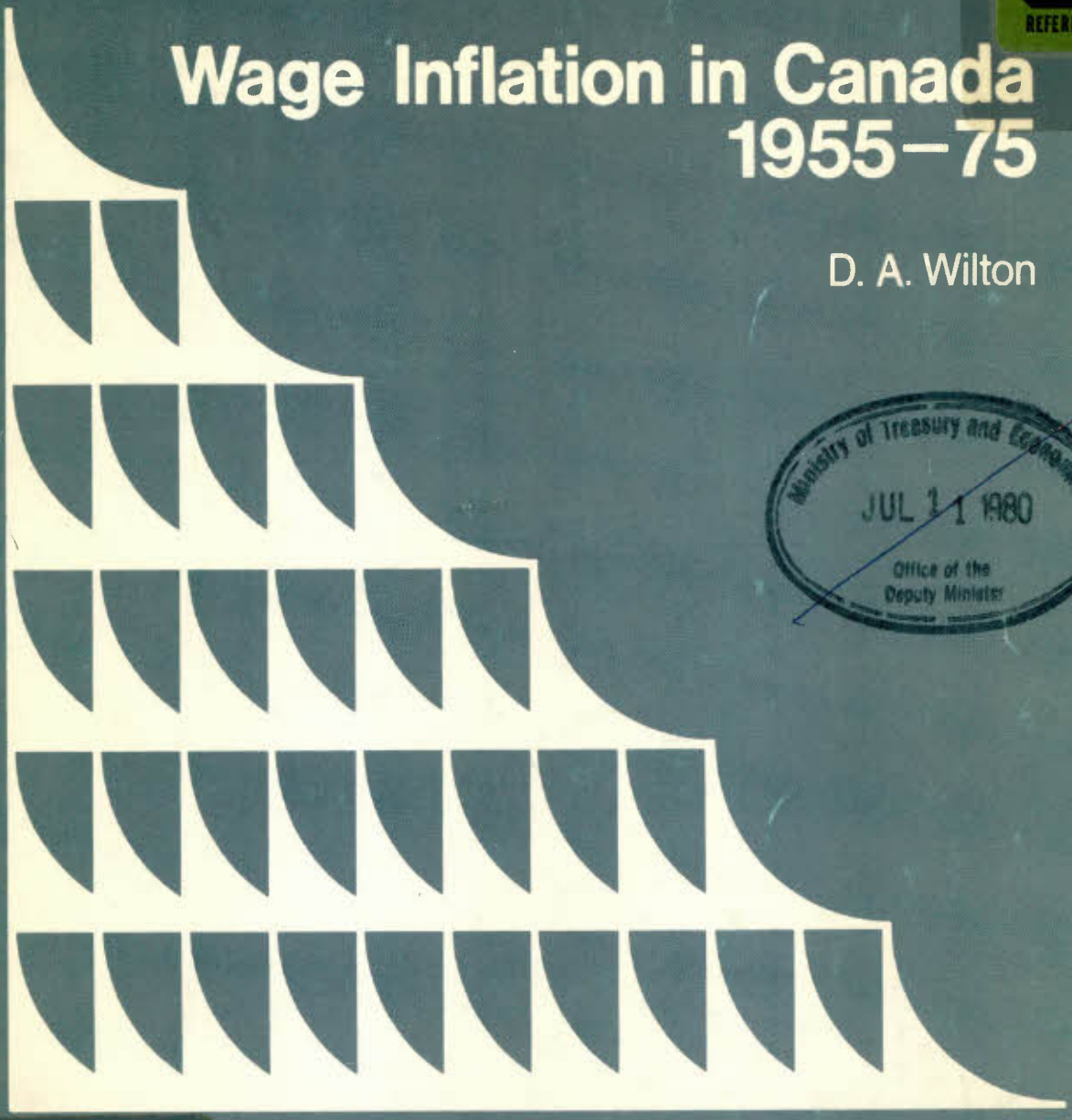
Wage Inflation in Canada 1955–75

D. A. Wilton



prepared for the
mic Council of Canada

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Preface

This study attempts to analyse, in a nontechnical manner, the structure and policy implications of wage inflation in Canada prior to the introduction of the Anti-Inflation Board. While the approach taken is deliberately noneconometric, the presentation draws heavily on two earlier econometric studies. The first part of Chapter 4 summarizes much of the institutional and econometric material presented in the Economic Council of Canada study entitled *The Determination of Wage Change Relationships* (1977), co-authored by J.C.R. Rowley. Chapters 5 and 6 review the theoretical arguments and econometric results presented in a 1979 Anti-Inflation Board monograph entitled *The Determinants of Negotiated Wage Settlements in Canada, 1966-75,* co-authored by D.A.L. Auld, L. N. Christofides, and R. Swidinsky. I would like to thank my co-authors of these two earlier books for their implicit contribution to this study. In addition, a number of economists have read this monograph, and I would like to thank, J. Crow, D. Dodge, P. Grady, C. Freedman, J. Sargent, B. Scarth, J. Vanderkamp, and several anonymous referees for their valuable comments and suggestions. Finally, research assistance provided by J. Arnott is much appreciated.

Wage Inflation in Canada, 1955-75

1 Introduction

During the 20 years from 1955 to 1975 the average weekly wage in Canada increased from $61.05 to $203.34 — equivalent to an average increase of 6.2 per cent per annum. Given an increase in labour productivity of approximately 2 per cent per year, it is not surprising that over these 20 years the rate of price inflation in Canada averaged approximately 4 per cent per annum. These 20-year changes, however, conceal one very important aspect of inflation in Canada. While the rate of wage and price inflation was relatively stable during most of the 1950s and 1960s, inflation rates accelerated quite rapidly in the late 1960s and early 1970s. Inflation rates for the 1970s have been persistently higher than those found in the 1950s and 1960s or, for that matter, in any previous decade in history.

The two major objectives in writing this monograph are 1/ to attempt to provide an economic explanation of wage movements in Canada over the 20-year period prior to the introduction of the Anti-Inflation Board (AIB), and 2/ to examine the policy implications of the Canadian wage structure, particularly as they apply to the dynamic interrelated problems of inflation and unemployment. As Professor Tobin prophetically noted in his 1972 presidential address to the American Economics Association:

> Unemployment and inflation still preoccupy and perplex economists, statesmen, journalists, housewives and everyone else. The connection between them is the principal domestic economic burden of presidents and prime ministers, and the major area of controversy and ignorance in macroeconomics. [Tobin (1972), p. 1]

As much as possible, the highly technical, mathematical, and econometric analysis to be found in the professional economic literature on wage determination and inflation has been suppressed in favour of charts, graphs, and prose.

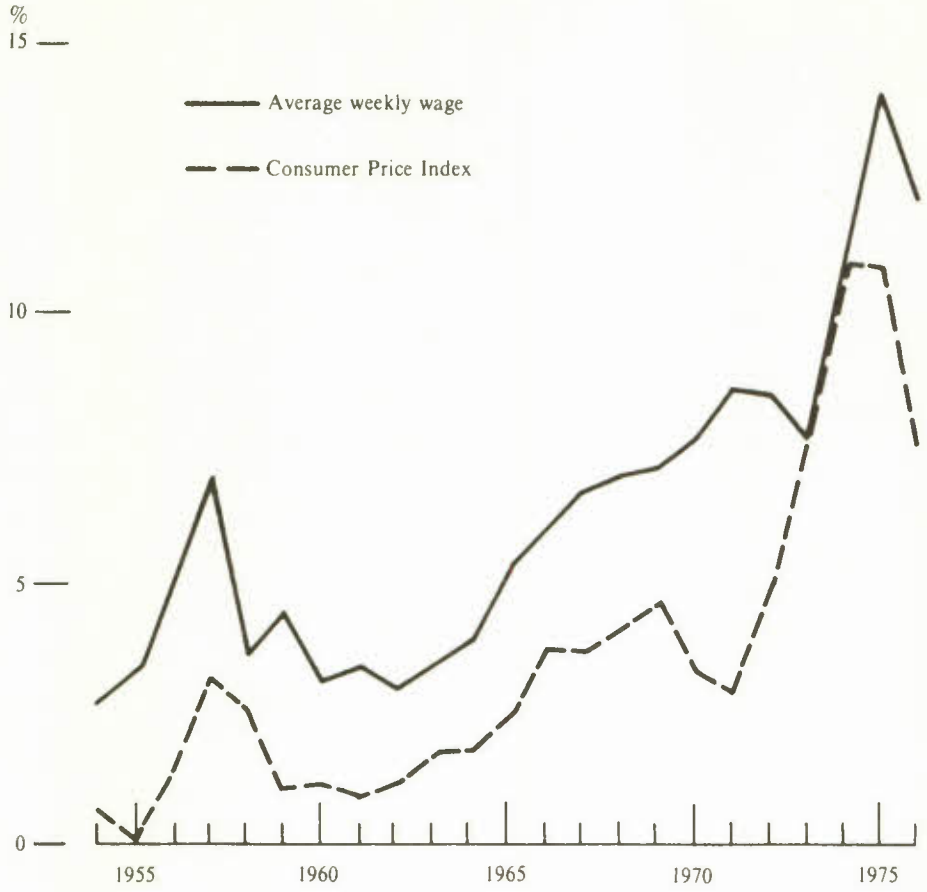
While the monograph has been subdivided into two main parts (an economic explanation of Canadian wage movements, and the policy implications thereof), the common thread running throughout the study is the Phillips-curve concept. Twenty years ago Professor A. W. Phillips published a paper that demonstrated that the rate of wage inflation could be explained by labour market conditions. When unemployment rates are high, the rate of wage inflation should be relatively low. Conversely, when unemployment rates are low, the rate of wage inflation should be relatively high. As discussed in Chapter 2, the Phillips curve provided an explanation for movements in wage rates; more important, it implied that the desirable goals of low inflation and low unemployment were *not* jointly attainable. Policy-makers must "trade off" low rates of unemployment against higher rates of inflation (or vice versa). Almost instantaneously the Phillips curve became an important rationalization for *not* pursuing policies that might substantially lower the unemployment rate, and the concept of a "trade-off" became an integral part of the policy-maker's lexicon.

> It's easy to beat inflation, we could just put the money supply increase down to zero and we won't have inflation. . . so what happens is you slow the economy down so darn much that you have massive unemployment. [P. E. Trudeau, as quoted in The Toronto *Star*, February 24, 1979]

Chapters 3 and 4 provide an account of the key theoretical assumptions implicit in the Phillips-curve model and a review of the relevant Canadian empirical evidence. As these chapters make clear, the

CHART 1-1

ANNUAL PERCENTAGE CHANGE IN WAGES AND PRICES



Phillips-curve model is subject to a number of important limitations, and several major revisions to the basic model are required to uncover this most elusive relationship. Despite the fact that the Canadian Phillips-curve relationship is subject to rather large statistical errors (and possible unstable tendencies), there is substantial empirical evidence that labour market conditions exert a significant effect on the rate of wage inflation.

The important influence of price movements on the wage determination process is discussed in Chapter 5. The rate of wage inflation is clearly influenced by both the "expectations" of future price inflation and the need for labour to "catch up" from past unexpected inflation. The key empirical question is not whether price movements are incorporated into wage rates (they most certainly are), but rather what proportion of price changes are built into wage rates. This chapter concludes with a brief analysis of the recent cost-of-living allowance (COLA) clause phenomenon.

It is frequently alleged that the wage inflation process is intensified by wage comparisons and spillovers between different bargaining groups. Chapter 6 of this study explores both the theoretical role and the empirical relevance of wage spillovers within the Canadian labour market.

Chapters 7 through 9 analyse some of the major policy implications of the Canadian wage determination process during the 1955-75 time period.[1] Again, the key integrating theme is the Phillips-curve concept and

the implicit trade-off between inflation and unemployment. Among the important policy questions investigated in these three chapters are the following:

1 Is there a sustainable long-run trade-off between inflation and unemployment?

2 What are the causes and implications of the wage/price spiral?

3 Is Keynesian economics dead?

4 Why do government monetary and fiscal policies likely have an inflationary bias?

5 What are the inflationary consequences of an increase in the relative size of the government sector?

Chapter 10 provides a summary of the major conclusions of this monograph, and some readers may prefer to read it first.

Two final introductory comments must be emphasized. As indicated above, the Phillips-curve concept has been adopted as the major integrating theme for this monograph. While not denying that other approaches to wage determination are possible (e.g. bargaining theories, institutional explanations, sociological models), the Phillips-curve approach is the most commonly used "economic" model to explain wage movements and is a very convenient device for organizing one's thoughts about the macroeconomic policy implications of the Canadian wage determination process. As much as possible I have attempted to integrate institutional labour market considerations, such as contract length, catch-up, and spillover considerations, into this Phillips-curve model. Second, the fact that inflation has been such a persistent problem for Canada and most other countries suggests that there is no quick and easy cure for this modern disease of the mixed, free-enterprise government economy. The reader is forewarned that no new "snake oil" will be mysteriously concocted that will provide an immediate painless solution to the difficult interrelated problems of inflation and unemployment. A better understanding of the inflationary process, however, may lead to more enlightened policy in the future.

Part I

The Structure of Canadian Wage Inflation

2 The Rise of the Phillips Curve

In 1958 A. W. Phillips of the London School of Economics published a paper illustrating how the laws of demand and supply could be applied to changes in wage rates. Assuming that the level of unemployment is a reasonable measure of the strength of labour supply relative to labour demand, Phillips found considerable empirical evidence to support the proposition that "the rate of change of money wage rates can be explained by the level of unemployment" [Phillips (1958), p. 299]. When unemployment rates were high, the rate of wage inflation was relatively low; and, conversely, when unemployment rates were low, the rate of wage inflation was much higher. Phillips' seminal paper provided economists and policy-makers with an important "new" relationship, connecting wage inflation to the level of unemployment — the now famous Phillips curve.

The purpose of this chapter is to provide an overview of the Phillips curve, emphasizing its important role in macroeconomics and policy formulation. During the last decade the Phillips curve was vigorously attacked, and the next two chapters will review a number of the more important criticisms of the Phillips-curve concept. While the Phillips curve took a considerable battering and barely limped into the 1970s, it still remains the major integrating theme in most analyses of wage inflation.

THE ESSENCE OF THE PHILLIPS CURVE

Because of this vigorous attack, it is important to re-emphasize the simple, underlying economic principle behind the Phillips curve. A brief statement of this basic economic principle is probably best presented by Phillips in the opening lines of his 1958 study:

> When the demand for a commodity or service is high relatively [*sic*] to the supply of it we expect the price to rise, the rate of rise being greater the greater the excess demand. Conversely when the demand is low relatively [*sic*] to the supply we expect the price to fall, the rate of fall being greater the greater the deficiency of demand. It seems plausible that this principle should operate as one of the factors determining the rate of change of money wage rates, which are the price of labour services. When the demand for labour is high and there are very few unemployed we should expect employers to bid wage rates up quite rapidly, each firm and each industry being continually tempted to offer a little above the prevailing rate to attract the most suitable labour from other firms and industries. On the other hand it appears that workers are reluctant to offer their services at less than the prevailing rates when the demand for labour is low and unemployment is high so that rates fall only very slowly. [Phillips (1958), p. 283]

Thus even though a great deal of controversy has engulfed the Phillips curve, the essential idea behind the Phillips curve is simple and straightforward: the price of labour responds to demand and supply conditions within the labour market.[1]

HISTORICAL PRECEDENTS TO THE PHILLIPS CURVE

This simple, basic, labour market adjustment model outlined in Phillips' 1958 paper was not original to Phillips.[2] Three years prior to Phillips' 1958 study, two prominent American economists presented an empirical wage relationship linking wage changes to unemployment.

> The main reasoning behind this equation is that of the law of supply and demand. Money wage rates move in response to excess supply or excess demand on the labour market. [Klein and Goldberger (1955), p. 18]

In fact, Klein's earlier 1950 Cowles Commission study, *Economic Fluctuations in the United States*, also included a wage equation that specified the annual change in wage rates as a function of current and lagged unemployment levels.

Jan Tinbergen, the initial co-recipient of the Nobel prize in economics, explicitly recognized the key relationship between wage inflation and unemployment two decades earlier. In his pioneering efforts at macroeconometric model-building, the very first equation in his 1936 econometric model of the Dutch economy is a "Phillips curve." Since Tinbergen's analysis of wage behaviour is highly prophetic of many of the results and conclusions of wage research conducted during the 1960s and 1970s (but seldom acknowledged), it is worth quoting in entirety his discussion of his wage equation in this seminal 1936 study:

> Wages: It is assumed that the change in the wage level from year to year is influenced by the changes in the cost of living and by the state of employment. A price increase will occasion a rise in wages and so will a state of above normal employment. It is moreover assumed that a price decrease will give rise to a wage decrease, just as will a subnormal level of employment. It is further assumed that the full effect of price changes on wages requires ample time to be felt (one year). The slowness of response of wages is well known.
>
> The significance of the question discussed here for the entire line of reasoning is that, unless the contrary is expressly stated, it is always taken for granted that the price changes which occur lead a year later to wage changes of the indicated size. Furthermore when employment exceeds the value which is considered normal, wages will rise while a subnormal level of employment leads to wage decreases. [Tinbergen (1936), pp. 51-52]

One final historical precedent to the Phillips curve should be noted. During the 1920s Professor Irving Fisher of Yale University extensively analysed the statistical relationship between price inflation and employment/unemployment, although imputing causality from inflation to unemployment:

> . . . note in Chart II the relation between the dance of the dollar. . . and the fluctuations in employment. . . this conclusion (i.e. of a strong connection between price changes and unemployment). . . . [Fisher (1926), p. 791]

THE PHILLIPS-LIPSEY PAPERS AND THE CANADIAN CONVERSION TO THE PHILLIPS CURVE

As is obvious from the preceding discussion, the basic idea that unemployment and wage inflation are related goes back much further than the 1958 Phillips paper. The importance of Phillips' study was not the discovery of a new theoretical relationship but rather the discovery of a *stable*, *reliable* empirical relationship between wage changes and unemployment rates. Phillips' study can best be described as a statistical *tour de force*, carefully probing almost a century of British data (1860-1957) on wage changes and unemployment. Relying repeatedly on visual displays of the data, one cannot help but be impressed by how Phillips skilfully explains and forecasts almost one hundred years of British wage inflation in terms of one simple theoretical model. Given the apparent stability of this century-old relationship, the reader is left with the clear impression that Phillips has stumbled upon one of those "grand constants" in a changing world for which economists are forever searching.

Phillips' paper was quickly followed by a subsequent wage inflation study by his colleague at the London School of Economics, Professor R. G. Lipsey (now at Queen's University). Lipsey recast Phillips' verbal rationale for his wage determination model into an explicit wage adjustment function based on the existence of disequilibrium in a competitive labour market.[3] Utilizing more conventional econometric techniques, Lipsey reconfirmed the basic findings of Phillips.

> Although many of Phillips' subsidiary hypotheses are rejected, the data are shown to support Phillips' main contention that there is a significant relation between the rate of change of money wage rates and the level. . . of unemployment. [Lipsey (1960), p. 2]

The Phillips and Lipsey papers provided the stimulus for a great outpouring of empirical research on the wage determination process, and numerous economists replicated the Phillips-curve result for different countries and different time periods.

While a number of excellent early papers[4] established the existence of a Canadian Phillips curve and played a prominent role in the international acceptance of the Phillips-curve concept, the Economic Council of Canada's special study by Bodkin, Bond, Reuber, and Robinson (1966) can legitimately be described as "a definitive study of the 'trade-off' between price changes and unemployment in Canada up to the mid-1960s" [Kaliski (1972), p. v]. The central chapters of this large study are devoted to an empirical analysis of wage and price relationships for Canada and for five other countries. The authors summarized their lengthy econometric investigation of Canadian wages in the following manner:

> With regard to the determinants of wage changes, we have found that the traditional explanatory variables, the level of unemployment and the rate of change of consumer prices, have statistically significant influence. [Bodkin et al. (1966), p. 155]

THE IMPORTANCE OF THE PHILLIPS-CURVE CONCEPT

Simple variants of the Phillips curve were quickly assimilated into the conventional economic wisdom, and almost immediately the Phillips curve took on a life of its own.[5] This rapid acceptance of the Phillips curve by both economists and policy-makers can be attributed to two basic factors. In an area largely ignored by traditional economic theory, the Phillips curve provided a simple, sensible explanation for movements in money-wages. In addition, the policy ramifications of the Phillips curve were ominous and could not be overlooked.

Strange as it now sounds, economists of the 1950s and earlier had virtually ignored the issue of movements in aggregate money-wage rates. Traditional, marginal productivity theory was cast in real equilibrium terms, and a strict dichotomy between real and nominal wage theorizing prevailed. Nominal wages were assumed to reflect the underlying real equilibrium wage levels adjusted for monetary influences. Since monetary policy was thought to have little influence on real equilibrium phenomena, changes in the quantity of money were regarded as the principal cause of movements in aggregate price levels and nominal wage rates.

The central disturbing conclusion of Keynesian economics asserted that a free-enterprise economy left to its own devices would likely experience sustained periods of unemployment. To generate such a conclusion, Keynes replaced the classical assumption of labour market equilibrium with an assumption pertaining to the relative inflexibility of money-wages.

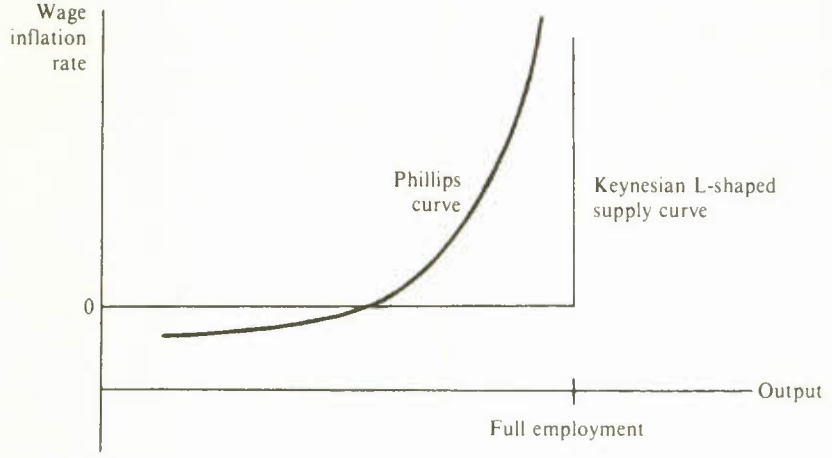
> When there is a change in unemployment, money-wages tend to change in the same direction as, but not in great disproportion to, the change in unemployment; i.e. moderate changes in employment are not associated with very great changes in money-wages. This is a condition of the stability of prices rather than of employment. [Keynes (1936), p. 251]

While Keynes recognized the possibility of a "Phillips-curve effect," he assumed that it was sufficiently weak that it could be ignored. Thus even prolonged periods of unemployment would not likely bring about the reduction in money-wages necessary to correct the state of labour market disequilibrium. By the same token, expansionary demand management policies undertaken during such periods of unemployment would not be accompanied by wage and price inflation but, rather, would generate additional output and employment. Once full employment was reached, however, further expansionary policies would only lead to

inflation. Such an *assumed* output/wage-inflation path has often been referred to as an L-shaped supply curve (and is plotted in Chart 2-1). In effect, Keynes substituted an inflexible money-wage assumption for the classical assumption that wages will adjust to "clear the labour market" and introduced a new dichotomy between states of full employment and states of persistent unemployment. Whatever the merits of the General Theory, a new theory of inflation it is not.

CHART 2-1

HYPOTHETICAL WAGE-INFLATION/OUTPUT PATHS



Phillips' disequilibrium wage adjustment model can be thought of as a bridge between the classical, labour market equilibrium assumption and the Keynesian "persistent unemployment" (no wage adjustment) model. The Keynesian L-shaped wage-inflation/output (employment) path has been replaced by a smooth Phillips curve (Chart 2-1). Wage inflation can now occur at output levels for which unemployment exists, but it will accelerate as the economy "heats up" (unemployment falls). The Phillips curve provides a new explanation, absent from both classical and Keynesian models, of how an economic system may simultaneously experience *both* persistent inflation and unemployment [for further elaboration, see Lipsey (1976)].

In this context, the Phillips curve plays a most important role in macroeconomic policy formulation. Ever since the General Theory, most economists would agree that an appropriate change in monetary and/or fiscal policy will affect the level of aggregate demand. As the government pursues demand management policies to reduce unemployment, however, wages and prices will start to rise at faster rates (the Phillips curve "kicks in"). From a macroeconomic policy perspective, the Phillips curve became a (convenient) rationale for *not* pursuing policies that would lower the unemployment rate. Government policy-makers may choose to live with a certain amount of unemployment on the presumption that the inflation rate will be lower.

Thus the Phillips curve represents an important new constraint for policy formulation. The major policy conclusion of the previously cited Economic Council of Canada study was stated succinctly.

> . . . there is almost certainly a conflict between the objectives of price stability and high employment. . . . No vestige of evidence has been found for Canada or any other country that suggests that. . . these two objectives are complementary rather than conflicting. [Bodkin et al. (1966), p. 280]

Policy-makers are faced with a cruel dilemma, as attempts to "wrestle inflation to the ground" will have the unfortunate side effect of raising the unemployment rate (and vice versa). In a sense, conducting

macroeconomic policy is like riding a teeter-totter. The more one tries to get one end down (say, unemployment), the higher up the other end will be driven (inflation).

Under such circumstances the rapid conversion of policy-makers to the Phillips-curve concept is perhaps understandable. A government should no longer be expected to lower or get rid of *both* inflation and unemployment simultaneously. The populace must be educated to accept that policy-makers should be absolved from their failure to conquer both economic evils of unemployment and inflation. The notion of a "trade-off" between unemployment and inflation was quickly incorporated into the politician's lexicon, and the Phillips curve became a popular explanation or rationalization for the existence of unemployment *or* inflation. The best that policy-makers could do was to trade off one problem for the other.[6] One cannot help but recall Lord Keynes's closing remarks in the General Theory:

> The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slave of some defunct economist. Madmen in authority who hear voices in the air are distilling their frenzy from some academic scribbler of a few years back. [Keynes (1936), p. 383]

3 The Canadian Phillips Curve: Warts and All

As discussed in the previous chapter, the Phillips curve burst onto the economic scene in 1958 and by the 1960s was a well-established part of the conventional economic wisdom. A rapidly proliferating wage literature unearthed the Phillips curve in nearly every conceivable geographic-time plane. The purpose of this chapter is to explore the existence of the Canadian Phillips curve, using relatively simple graphical techniques. First, the Lipsey market adjustment model of the Phillips curve will be outlined, pointing out the key assumptions in the theoretical derivation of a wage-change/unemployment relationship. The second section of this chapter will confront the "theory" of the Phillips curve with "Canadian data." As we shall see, the Canadian Phillips curve turns out to be an elusive statistical relationship subject to rather sizeable errors. Pinning down *the* Canadian Phillips curve is like trying to catch an unruly pup under a large rug. Just when you think that you have finally caught the pup, it wriggles free to the opposite corner of the rug.

THE LIPSEY DERIVATION OF THE PHILLIPS CURVE

A brief review of Lipsey's derivation of the Phillips curve is useful to highlight the key assumptions implicit in the model. In essence, Lipsey formulates the Phillips curve as an explicit, disequilibrium wage-adjustment function for a competitive labour market. To illustrate the mechanics of the Lipsey disequilibrium model, Chart 3-1(a) portrays a conventional set of demand and supply curves for labour services in which the wage rate W_E clears the market. A wage rate W_A would give rise to a state of excess labour demand (XLD), while a wage rate W_B would result in a state of excess labour supply (XLS).[1] Elementary economics argues that the wage rate would be bid up in the first case (XLD) and bid down in the second case (XLS). In both cases, given sufficient time, competitive labour market pressures would force the wage rate to return to its equilibrium level W_E.

While all economists would likely accept the above argument, the Phillips curve involves three additional assumptions, which are more debatable:

1 The *amount* of excess labour demand will determine the *speed* of the wage adjustment.

2 The level of unemployment is a reliable proxy for the amount of excess labour demand, which cannot be observed directly.

3 The relevant wage rate is the nominal or money-wage rate, not the real or constant-dollar wage rate.

Each of these three key assumptions will be examined in turn.

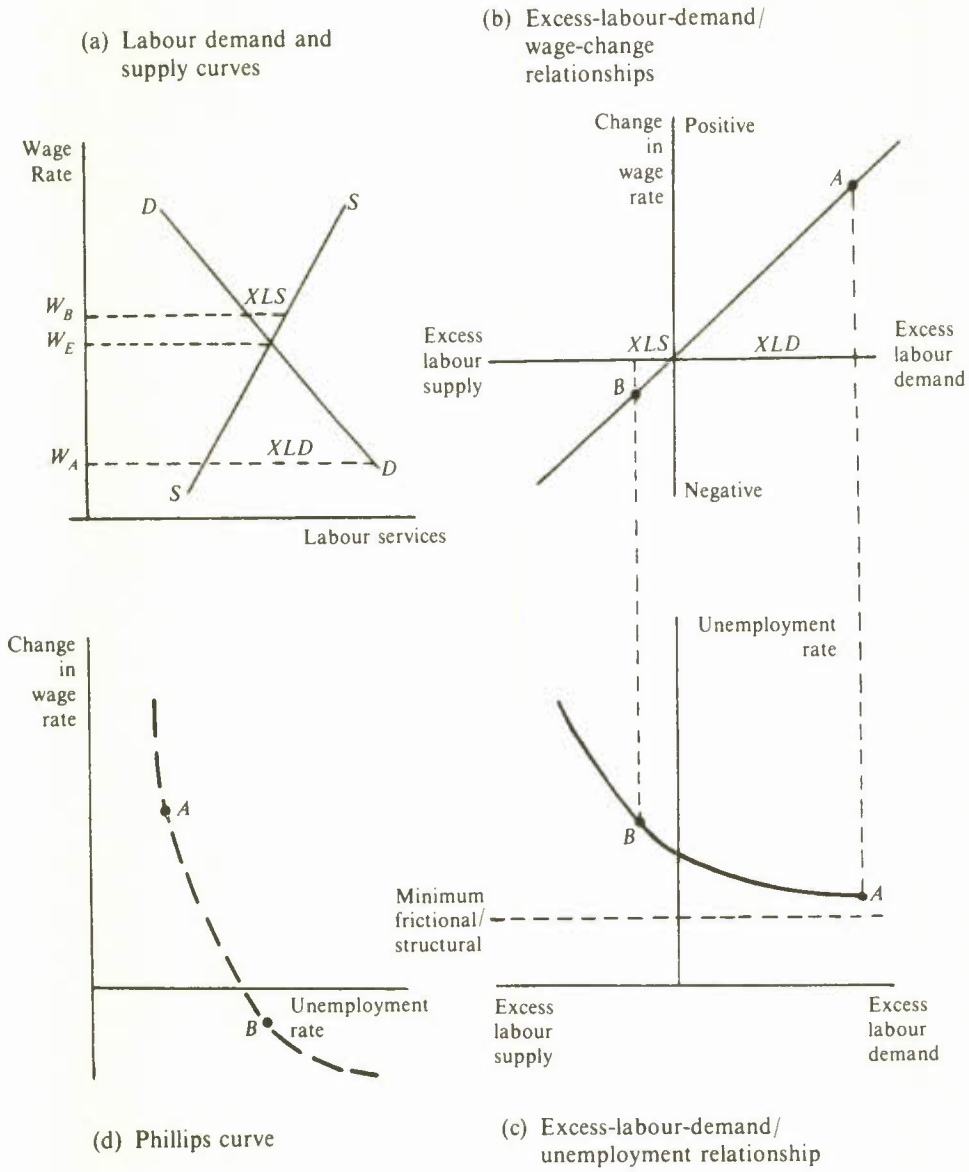
The Speed of Wage Adjustment

The first assumption simply states that the speed of the wage adjustment during the disequilibrium period is directly related to the size of the gap between the demand and supply curves (for the given

disequilibrium wage rate). In Chart 3-1 the amount of excess labour demand shown in quadrant (a) is plotted in quadrant (b) on the horizontal axis and the *hypothesized* wage adjustment per unit of time is plotted on the vertical axis. While this wage adjustment function need not be linear, the key point is that larger amounts of excess labour demand are *assumed* to generate larger increases in the wage rate over a given interval of time. In other words, the speed of the wage response varies directly with the disequilibrium (pressure) level in the labour market. This initial assumption concerning the disequilibrium wage dynamics of a competitive labour market is the heart of the Phillips-Lipsey model.

CHART 3-1

LIPSEY DERIVATION OF THE PHILLIPS CURVE



One important feature of this disequilibrium approach to wage movements is that such an approach avoids an analysis of the specific determinants of the demand and supply curves for labour services. Even though the underlying labour demand and supply curves may be shifting about, one need not worry about isolating the causes of such shifts. The only relevant factor for wage movements is a measure of disequilibrium or excess demand within the labour market. This great simplifying property of the Phillips-Lipsey model has important consequences that have often been overlooked in the wage literature. For example, the empirical testing of the Phillips-Lipsey model should *not* include variables that are determinants of either the labour demand or supply curve along with a measure of excess labour demand. Such labour demand and supply curve determinants would clearly be redundant and would offer no independent explanation of the wage adjustment that was not already captured by the excess labour demand variable. Furthermore, from a statistical perspective such a redundant explanatory variable could sufficiently "muddy the waters" that the role of the excess demand variable may be in doubt.[2]

In this context, much of the empirical literature can be characterized as a search for new explanatory variables to augment the basic Phillips curve.[3] While such additional variables may be rationalized in other ways (e.g. union bargaining theories), they cannot be easily accommodated within the Lipsey-Phillips theoretical model.

Unemployment as a Proxy for Excess Labour Demand

The second assumption states that the level of unemployment bears a systematic relationship with the *unobservable* level of excess labour demand/supply. As the amount of excess labour demand increases, it is *assumed* that the level of unemployment will systematically decrease. Changing demands for different products, technological improvements, seasonal factors, and demographic effects (e.g. workers entering and exiting the labour force) mean that there will always exist some minimum level of frictional or structural unemployment irrespective of the amount of excess labour demand. Consequently, the relationship between the unemployment rate and excess labour demand will not be linear (see Chart 3-1(c)). Given a stable wage-change/excess-labour-demand relationship (Chart 3-1(b)) and a stable excess-labour-demand/unemployment relationship (Chart 3-1(c)), the conventional Phillips curve can be easily derived.[4] In Chart 3-1(d), the resulting stable relationship between wage changes and unemployment is presented, with specific *A* and *B* points labelled in all four quadrants.

Nominal or Real Wage Rates

The final assumption concerns the choice of either nominal or real wage rates for the disequilibrium Phillips-Lipsey model. This assumption has clearly been the most controversial aspect of the Phillips-curve model, and Chapter 5 will be devoted entirely to this issue. For the purposes of this chapter, we simply acknowledge the fact that *all* Phillips-curve studies have explicitly included an additional variable to reflect movements in prices. While on the surface an additional price-change explanatory variable appears to be an "intruder" into the disequilibrium Phillips-Lipsey model, it can be accommodated on the assumption that such a price-change variable represents a proxy for *expected* future price changes (Chapter 5). As seen in Chapter 5, the key question is whether *all* price changes or *only part* of the price changes are incorporated into wage rates. The answer to this question has been hotly debated and is of crucial policy importance, since the existence of a *permanent* trade-off between inflation and unemployment depends principally on the answer to this key question (see Chapter 7). Anticipating Chapter 5's review of the empirical evidence, it appears that most, if not all, price movements are directly incorporated in wage rates (although not instantaneously).

THE EMPIRICAL EVIDENCE FOR A CANADIAN PHILLIPS CURVE

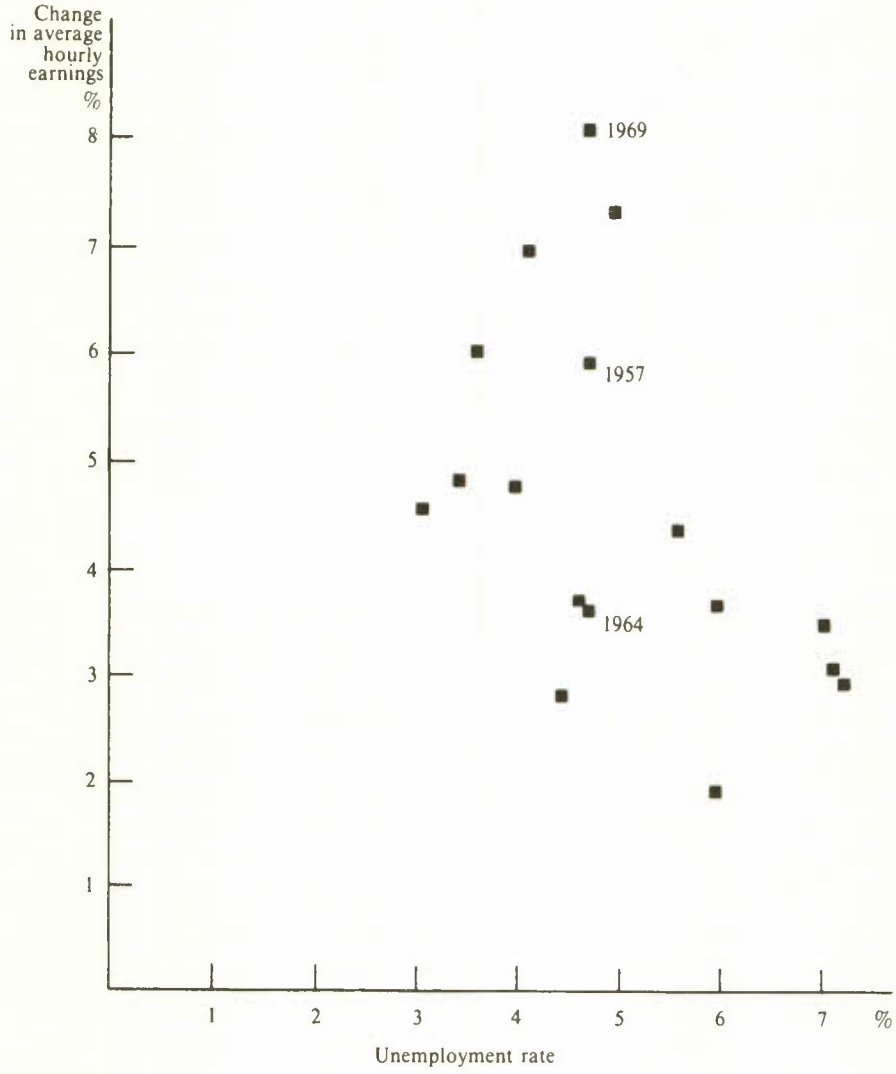
THE 1950S AND 1960S

Having discussed the three key assumptions in the Phillips-Lipsey model, we now turn to an examination of the Canadian data. Chart 3-2 presents a scatter diagram, with the unemployment rate plotted on the horizontal axis and the annual percentage change in average hourly earnings within the manufacturing sector plotted on the vertical axis.[5]

For each year between 1953 and 1969,[6] the relevant wage-inflation/unemployment-rate data point is plotted. At first glance, this scatter diagram is somewhat discouraging. The points seem to be all over the place, with only the slightest indication that wage changes and unemployment rates are negatively related

CHART 3-2

CANADIAN NOMINAL-WAGE-CHANGE/UNEMPLOYMENT RELATIONSHIP, 1953-69



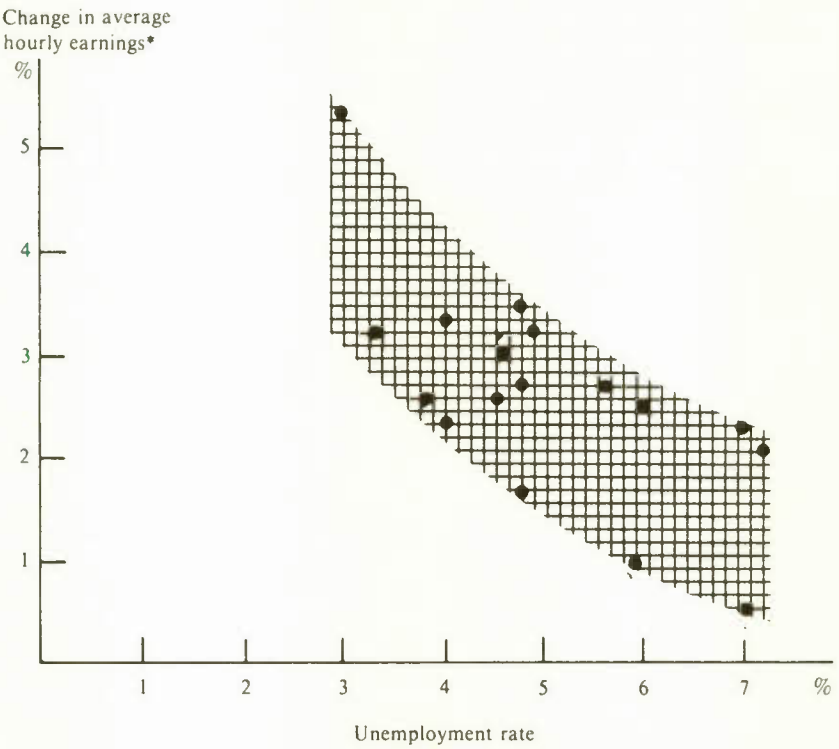
(i.e. the Phillips curve slopes down). An econometrician employing a conventional 5 per cent margin for error would conclude that there is *no* statistical relationship between Canadian wage changes and the unemployment rate over these 17 years of data.

A closer inspection of Chart 3-2, however, suggests that this scatter diagram may be concealing important information. Take, for example, the three years 1969, 1957, and 1964 in which the unemployment rate was virtually constant at 4.7 per cent. The wage change associated with this "given" level of unemployment ranges from 8.2 per cent in 1969 down to 3.6 per cent in 1964 — a very wide spread to be uniquely related to a given level of unemployment. On the other hand, if one takes into account the differing rates of price inflation in each of these three years (the common second variable in all Phillips-curve studies), then this wide spread is not as puzzling. In 1969 the rate of price inflation was 4.5 per cent, whereas in 1964 it was only 1.8 per cent. For the "intermediate" year of wage inflation (1957) the rate of change in consumer prices was 3.2 per cent — midway between the price inflation rates of 1969 and 1964. Thus part of the explanation for the wide scatter of points may be the failure to take account of price movements within the Phillips-curve model.

Given the difficulties of depicting *two* determinants of wage inflation in a simple diagram, we have adopted, for expositional purposes, the assumption that *exactly 100 per cent* of all price inflation is immediately reflected in wage changes.[7] In other words, the change in the *real* wage rate will be assumed to be inversely related to the level of unemployment. In Chart 3-3 the percentage change in nominal wages minus the percentage change in consumer prices is now placed on the vertical axis.

CHART 3-3

CANADIAN REAL-WAGE-CHANGE/UNEMPLOYMENT RELATIONSHIP, 1953-69



*Minus the percentage change in consumer prices.

A comparison of the scatter diagrams in Charts 3-2 and 3-3 reveals that there is a much more systematic relationship between real wage changes and the unemployment rate. While the relationship between real wage changes and the unemployment rate is by no means perfect, most of the actual points fall within a two-point-wide, downward-sloping band.[8] Thus the Canadian data during the 1953-69 time period are consistent with the Phillips-curve hypothesis as long as one also includes the rate of change in consumer prices in the wage adjustment equation.

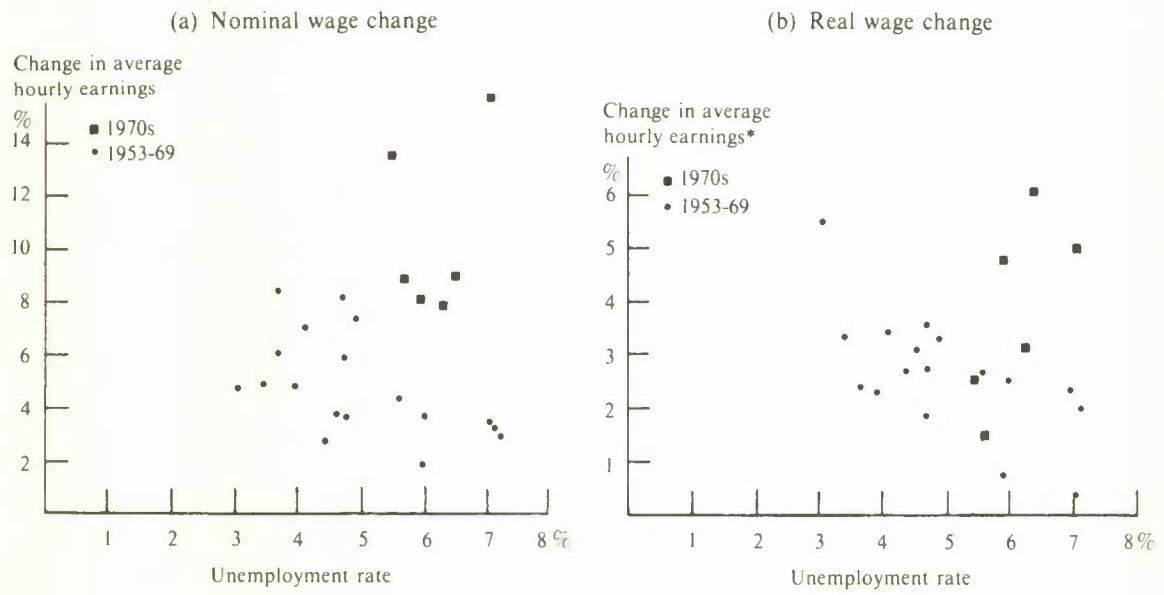
The 1970s

During the decade after the Phillips paper, the empirical literature provided ample evidence that the Canadian Phillips curve existed during the 1950s and into the 1960s.[9] As the time period was extended to later years and the Phillips-curve models were refined, however, a number of damaging results began to emerge. Most notably, the key labour market variable tended to "fall out" of the estimated wage equations. For example, in Kaliski's re-estimation of the Economic Council's 1966 study, *not once* does the unemployment variable pass a standard 5 per cent significance test, and twice it has the wrong sign [Kaliski (1972), Table 2-4, corrected]. Such evidence prompted Kaliski to conclude that "the original wage change equations no longer seem to fit the data very satisfactorily" [Kaliski (1972), p. 34]. A further indication of the possible demise of the Canadian Phillips curve is the absence of published wage studies using conventional *time-series* data for the 1970s, particularly the recent inflationary period beginning in 1973.

The two previous scatter diagrams have been replicated in Chart 3-4, adding data for the 1970s prior to the introduction of the AIB (denoted by squares). Over this 23-year period, the scatter diagrams show *no* statistical relationship for either the change in nominal wages or the change in real wages. In fact, the six additional data points for the 1970s appear to be approaching either a vertical line at approximately 6 per cent unemployment or, even worse, an upward-sloping line.[10] The "golden age of Phillips curves" appears to have given way to a decade of empirical and theoretical agnosticism. As we shall see in the next chapter, a considerable degree of statistical dexterity is required to resurrect a Canadian Phillips curve for the 1970s.

CHART 3-4

THE PHILLIPS RELATIONSHIP INTO THE 1970s



*Minus the percentage change in consumer prices.

4 The Shifting Sands of the Phillips Curve

The purpose of this chapter is to attempt to unravel the mystery: "Whatever happened to the Canadian Phillips curve?" The statistical evidence of the previous chapter suggests that although the Canadian Phillips curve appears to have existed during the 1950s and 1960s, it vanished during the 1970s. The absence of an empirical relationship between wage inflation and unemployment during the 1970s suggests three possible positions regarding the Canadian Phillips curve that might be argued:

1 The Phillips-curve estimates of the 1950s and 1960s are sufficiently "suspect" that any conclusions pertaining to the existence of a Canadian Phillips curve are unwarranted.

2 While the Phillips curve may exist in a theoretical sense, it is subject to inherent instability, rendering empirical analysis (and policy trade-offs) impossible.

3 The Phillips curve is subject to systematic, predictable shifts that can be isolated with careful theoretical and empirical analysis.

Perhaps surprisingly, each of these three different positions has creditable arguments, and an examination of each improves our understanding of the limitations of the Phillips-curve model.

THE EMPIRICAL RELIABILITY OF THE 1950-60 CANADIAN PHILLIPS-CURVE ESTIMATES

Even though there are many studies purporting to have demonstrated the existence of a Canadian Phillips curve during the 1950s and 1960s, this empirical literature is not without its problems. As we have seen in the previous chapter, the statistical errors associated with the Canadian Phillips curve are quite substantial. To illustrate the magnitude of such errors, the construction of a conventional 95 per cent confidence interval for Chart 3-3 produces a Phillips curve that is 3-1/3 percentage points wide. In other words, an econometrician would estimate that the "real" wage change associated with an unemployment rate of 5 per cent would be somewhere between 0.8 per cent and 4.1 per cent, with 95 per cent confidence in his estimates. Other factors or "laws of chance" may have much more to do with the level of wage inflation than the existing unemployment rate.

The existence of these quite sizeable errors in Phillips-curve studies was camouflaged for some time by the use of inappropriate statistical techniques. Most of the early studies of the Phillips curve employed quarterly time-series data drawn from the manufacturing sector. To construct the change in wages, these studies compared the level of wages in a given quarter with the *same* quarter of the *previous* year. Such a procedure generates an "overlap" in the annual percentage change in wages, and each successive *quarterly* observation of the *annual* wage inflation rate will replicate three-quarters of the informational content of

the previous observation.[1] Under such circumstances, the use of the conventional statistical technique (ordinary least squares) may lead to a considerable understatement of the error term and overstatement of the degree of statistical significance of the explanatory variables.

In an earlier paper, J.C.R. Rowley and I proposed an appropriate statistical technique (generalized least squares, GLS) for this "overlap" problem and re-estimated a number of existing studies, using this more appropriate statistical technique. The comparative results were very dramatic.

> In place of fifteen pseudo-significant coefficients in the Bodkin et al. study only three parameter estimates are significant under GLS. . . . The roles of certain variables which are usually considered to be of major importance in the determination of wage levels are in doubt. [Rowley and Wilton (1973), pp. 385-86]

It is only when several of the "intruder" variables of this study are stripped away that the unemployment rate becomes a significant factor in wage inflation.[2] In summary, the use of an inappropriate statistical technique for many of the early Phillips-curve wage studies greatly exaggerated the statistical significance of this relationship and substantially understated the size of the errors associated with the Phillips curve.

A second major methodological problem associated with most Phillips-curve studies is the complete failure to recognize the institutional realities of the labour market. First, one must dispose of a popular myth; the fact that union membership constitutes only about 40 per cent of the Canadian (nonagricultural) labour force is largely beside the point. Most published Canadian Phillips-curve studies are based on data for production workers in the manufacturing sector and, in the manufacturing sector, union members account for roughly 70 per cent of the production work force. A number of institutional features of the unionized labour market can seriously bias the statistical results if not adequately represented in the wage determination model.

First, and most obvious, unions typically sign multiyear contracts with "locked-in" or deferred increments.[3] Since deferred increments are determined at the time the contract is signed, explanatory variables must be appropriately dated so that when the deferred increment occurs (say, two years after the contract was signed) the explanatory variables correctly reflect economic conditions at the time of the contract (two years before) and not the economic conditions that happen to exist at the time the deferred increment becomes effective. In addition, one must correctly specify the "front-end loading" features of these contracts[4] and a set of weights to reflect the bargaining calendar. This latter institutional factor is most important, since the bargaining calendar is not uniformly spread over all months and years (see Table 4-1). In most quarters, very few workers are signing "new" contracts (but many workers may be receiving deferred increments from "old" contracts); therefore *current* values for the explanatory variables may be inappropriate for the estimation of a properly specified Phillips-curve model.

Nearly all empirical wage studies have been undertaken in an institutional vacuum. The empirical implications of long contracts, deferred raises, and a variable bargaining calendar have simply been ignored. As demonstrated in an earlier paper [Rowley and Wilton (1974*a*)], the omission or failure to specify correctly these institutional features in time-series analysis can 1/ seriously bias the estimates of the Phillips curve; 2/ produce substantial instability in the parameter estimates; and 3/ increase the size of the unexplained error. Consequently, any conclusions pertaining to the existence or nonexistence of a Canadian Phillips curve derived from time-series studies that fail to incorporate key institutional features into the analysis of manufacturing (or industrial) wage rates must be viewed with a fair degree of scepticism. Unfortunately, attempts to incorporate these critical institutional (union) features into an aggregate time-series, wage determination model have not produced reliable wage change equations, using conventional explanatory variables [see Rowley and Wilton (1974) and Smith and Wilton (1978)].

Aggregate time-series analysis, however, may not be the most appropriate medium for statistical analysis. Since all of the institutional information required for the correct specification of an institution-oriented wage change model must be collected at the "micro" level,[5] there exist strong econometric arguments for analysing the micro-data prior to aggregation. It is a well-established econometric principle that micro-analysis may yield substantially greater precision in parameter estimation than empirical

TABLE 4-1

SEASONAL DISTRIBUTION OF WAGE ADJUSTMENTS IN THE CANADIAN MANUFACTURING SECTOR, 1955-68

	Percentage of employees							
	Bargaining in each quarter				Receiving an increment in each quarter			
	1	2	3	4	1	2	3	4
1955	15.86	20.05	26.34	6.68	14.62	25.71	33.57	11.41
1956	11.52	23.00	26.04	9.89	14.54	36.62	39.67	14.77
1957	7.80	8.98	15.16	7.06	11.78	27.05	41.70	15.06
1958	5.88	7.25	19.67	19.19	13.01	11.55	27.64	29.90
1959	23.39	10.84	8.31	15.71	33.90	14.94	25.85	34.66
1960	6.19	14.97	9.12	8.12	20.63	29.87	22.51	31.70
1961	5.14	12.68	21.32	15.89	18.30	21.99	30.13	23.70
1962	15.02	18.66	19.82	5.75	25.67	27.83	30.01	23.30
1963	5.36	14.88	12.55	5.16	14.49	34.46	22.02	22.54
1964	2.67	15.03	18.49	11.13	15.77	19.71	34.12	17.32
1965	14.58	11.09	13.27	8.31	31.86	30.51	25.90	31.60
1966	2.16	7.69	26.02	7.11	22.00	20.98	31.31	38.36
1967	2.84	7.63	7.86	1.54	17.02	28.01	36.45	11.48
1968	15.50	15.54	20.05	7.73	27.91	36.53	39.95	26.69

Source Rowley and Wilton (1977), p. 77.

analysis that is based on (smoothed) aggregated data. Thus an analysis of micro-data pertaining to individual wage contracts (prior to aggregation) escapes the severe econometric difficulties associated with time-series analysis and may provide much more reliable statistical evidence on the structure of wage inflation. On the other hand, a micro-analysis does potentially suffer from several important data limitations. Only base wage rate data are available, and one must assume that base rate changes are representative of changes in average wage rates within the entire bargaining unit,[6] as well as changes in fringe benefits. Finally, the larger nonunionized sector of the labour force is totally unrepresented in the data set.[7]

Four recent micro-oriented wage studies [Cousineau and Lacroix (1977), Wilton (1977), Riddell (1978), and Auld, Christofides, Swidinsky, and Wilton (1979)] have demonstrated the statistical significance of the Canadian Phillips curve. For example, the latter study concludes in the following manner:[8]

> Utilizing a micro data base consisting of over 3,000 individual contracts covering more than two million Canadian workers, statistical evidence presented throughout this monograph suggests that a Canadian Phillips curve does exist within the unionized labour sector. However, a number of refinements and elaborations to the basic Phillips curve model are required to uncover this most elusive policy constraint. [Auld et al. (1979), p. 226]

Based on these four micro-econometric wage studies, we conclude that the Phillips curve has existed in Canada, and we now turn to an analysis of its stability.

IS THE PHILLIPS CURVE INHERENTLY UNSTABLE?

Perhaps the one issue that has bedeviled empirical Phillips-curve estimates more than any other is the reported instability of the wage relationship. Professor Kaliski of Queen's University, in an initial study of the Canadian Phillips curve, covering the 1922-58 time period, found that:

> . . . the relation observed for Canadian data is not stable. . . the relation estimated from Canadian data differs between the interwar period and the postwar period. [Kaliski (1964), p. 6]

About a decade later, in a follow-up to the study by Bodkin et al., Kaliski reconfirmed the basic conclusion that the Canadian Phillips curve was not stable.[9]

> . . .The resulting regressions. . . show quite dramatically the instability of the wage change equations over the 17 years. [Kaliski (1972), p. 20]

While part of this reported temporal instability may be a by-product of the failure of these aggregate time-series studies to include key institutional features of the labour market in their analyses (see above), subsequent micro studies have also reported similar results. Comparing wage equations over the 1953-65 and 1965-73 time periods, Riddell finds that "in all cases. . . the hypothesis of a stable structure is rejected" [Riddell (1979), p. 29].[10]

To summarize, any analyst who has tested the Canadian Phillips curve for temporal instability has typically found it. The Canadian Phillips curve exists, but it is clearly not unique to time period or to author. As pointed out in Chapter 2, the great virtue of the original Phillips paper was the purported stability of the unemployment/inflation relationship over 100 years of data. If this trade-off relationship is, in fact, highly sensitive to various specifications (such as the time period chosen), then its usefulness for economic analysis and policy purposes is seriously impaired.

In the previous chapter, three key assumptions of the Phillips-Lipsey model were identified. The initial assumption stated that the speed with which the wage level reacts to a disequilibrium situation is directly proportional to the amount of excess labour demand pressure. While this assumption seems plausible, economists have no theoretical proof that disequilibrium processes operate in such a fashion. It is simply assumed that they do.[11] As Leijonhufvud has pointed out,

> Actually nothing at all can be deduced about the rate of change of prices from the usual competitive model — unless it has already been put in *ad hoc*. . . . The static model is completely inapplicable to the analysis of disequilibrium states. . . .[Leijonhufvud (1968), pp. 68-69]

During the past decade there has been a rapidly growing theoretical literature exploring various potential dynamic models of the labour market [for a "readable" review of this literature, see Santomero and Seater (1978), pp. 515-25]. Spawned by empirical estimates of a negative relationship between wage changes and excess labour demand, numerous papers have been written, attempting to provide a "micro-theoretical foundation" for the Phillips curve. In general, these theoretical models provide a highly mathematical, abstract representation of the labour market.

To illustrate one strand of this theoretical literature, the job-search-theory approach (perhaps the most influential of all these theories) will be briefly outlined. In this theoretical model, it is assumed that the unemployed person follows an optimal search strategy, meticulously comparing a host of job offers from the many existing vacancies with his/her reservation wage. The unemployed person's economic problem is to determine how long to continue job searching, knowing that if an early job offer is accepted, a better job offer that would be ferreted out by a longer search may be overlooked. To generate a Phillips-curve relationship, it is assumed that the unemployed worker is not only uninformed about job offers (i.e. he/she must physically search for job information), the unemployed worker is also temporarily fooled by changing price and wage levels. The unemployed worker's perception of *the* inflation rate is assumed to adjust very slowly to changing economic conditions. Thus an unexpected increase in the actual rate of inflation will cause the uninformed, unemployed worker to be fooled into prematurely stopping job search activities and accepting an "unexpectedly" high wage offer. Ergo, the level of unemployment is related to the rate of unexpected inflation.[12]

Such "abstract" job search theories have, of course, generated much criticism and controversy. The dual assumption that job search can only be conducted when one is unemployed and that all unemployment is *voluntary* on the part of workers (searching for the best job offer) strains reality. No explanation whatsoever is offered for the important phenomenon of job layoffs. As one noted economist concluded:

> . . . one may grant that the search theories are not empty without believing that they are very important. Such indirect evidence as there is suggests that the "misinformed search" story has very little going for it. Even if it is sometimes true, it explains very little of the unemployment we actually have. [Solow (1977), p. 47]

This very brief foray into the micro-theoretical foundations of the Phillips curve demonstrates one important conclusion. There is no commonly accepted theoretical reason why the *rate of change* in wages must bear a *stable* relationship to the *amount* of excess demand. Clearly, wages will respond to excess demand for labour, but the precise disequilibrium path of wages is somewhat of a theoretical mystery. Economists simply do not know much about disequilibrium states, and what they do know tends to be premised on very artificial assumptions. Thus, while the assumption that wage changes are related to the amount of excess demand seems plausible, unfortunately there is no *a priori* reason to assume that this Phillips-curve relationship is necessarily stable for all times, all economic conditions, and all institutional arrangements.

IS THE PHILLIPS CURVE SUBJECT TO PREDICTABLE OR SYSTEMATIC SHIFTS?

Some of the instability in Phillips-curve estimates is explicable; as discussed above, the failure to include key institutional features of the labour market (such as long contracts, deferred increments, and a variable bargaining calendar) in the specifications of wage models has undoubtedly generated an element of *spurious* instability in Phillips-curve estimates that are derived from time-series data. There is, however, a more fundamental instability problem with 1970-vintage Canadian Phillips curves that can be traced back to the second key assumption in the Phillips-Lipsey model.

Recall that this second assumption states that the level of unemployment is a reliable proxy for excess labour demand — an unobservable theoretical construct. Given a number of fundamental structural changes within the Canadian labour market during the latter 1960s and 1970s, a number of economists have argued that the unemployment rate may no longer be a reliable and consistent measure of excess demand/supply in the labour market. As the Economic Council of Canada, in its 1976 study of the Canadian labour market, concluded,

> Basic changes in the labour market have rendered the message of the unemployment rate today rather different from that of a decade ago. From our examination of it and other measurements, we believe that the aggregate rate alone is an incomplete indicator of the idle labour capacity, cyclical phase, or economic hardship. [*People and Jobs*, p. 211]

There are two different explanations that may account for the recent failure of the unemployment rate to provide a reliable measure of excess labour demand within the context of a Phillips-curve model. One explanation focuses on recent demographic changes in the Canadian labour force. The traditional stereotype of the unemployed worker as a prime-age male with a family to support is less and less true.[13] The age/sex/family-status characteristics of the Canadian labour force have changed dramatically in recent years.[14] In particular, the composition of the unemployed has shifted towards younger, more mobile individuals without dependants and second/third earners within the family unit. This trend towards multiple-earner family units may have alleviated some of the financial hardships associated with unemployment. Taken together, these demographic changes have likely reduced the urgency of a "randomly drawn" unemployed person obtaining a job; thus a given unemployment rate in the 1970s will likely reflect a lower degree of excess supply in the labour market than the same unemployment rate in the 1950s or 1960s.

An alternative explanation of the changing "message of the unemployment rate" focuses directly upon revisions to the Unemployment Insurance Act in 1971 (revisions that may have exacerbated these demographic shifts). Universal coverage, higher benefit rates, reduced qualification periods, and extended benefit periods have shielded the unemployed worker from some of the financial hardships traditionally associated with being unemployed. Consequently unemployed persons (including those who have been laid off) will likely exercise more discretion over the choice of jobs that they are willing to accept, and employers may be forced to make higher wage offers to fill vacant jobs, even though there may exist a substantial rate of unemployment. In short, the liberalized unemployment-insurance-benefit structure has reduced the "costs" of being unemployed, with the consequence that more generous wage offers are now required to move individuals from unemployed to employed status.[15]

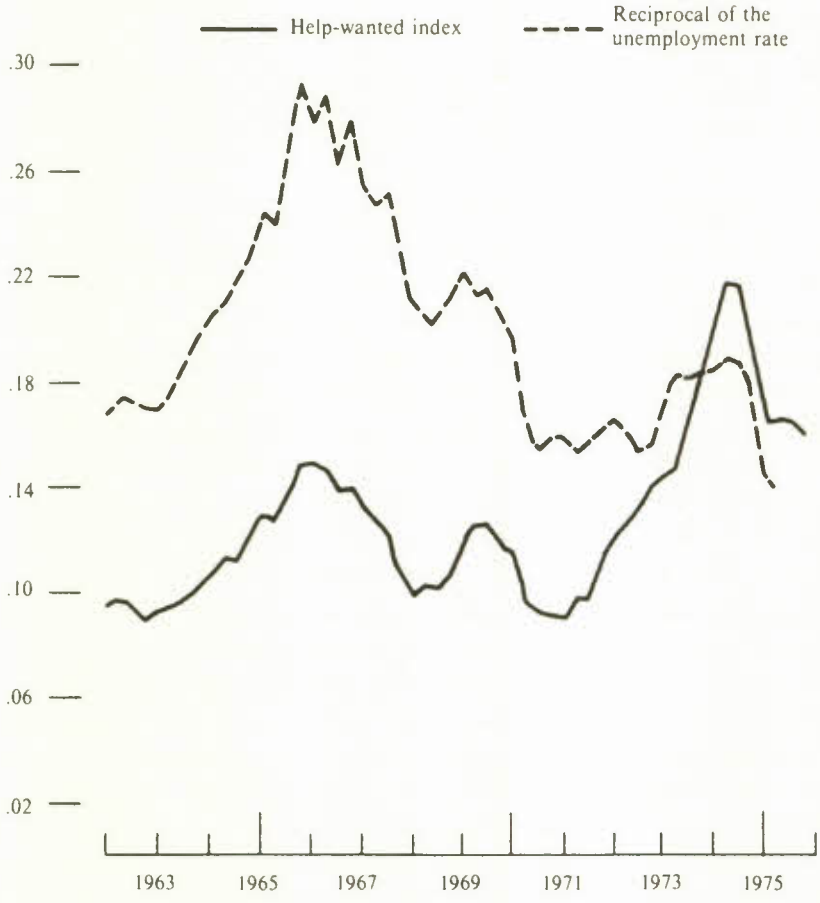
Taken together, these two fundamental changes in the Canadian labour market during the last decade suggest that the unemployment rate may no longer be a reliable measure of excess labour supply pressure on wage inflation. To illustrate the changing nature of the Canadian labour market, two alternative "proxy" variables for labour market conditions are plotted in Chart 4-1: 1/ the unemployment rate (a measure of labour supply), and 2/ the help-wanted index divided by the size of the labour force (a measure of labour demand). To facilitate comparisons with the help-wanted index, the unemployment rate has been graphed in reciprocal form (the traditional nonlinear form used in nearly all Phillips-curve studies).

While these two proxies move in a very coincident manner up until 1971, they diverge radically in the mid-1970s. During the early 1970s, the help-wanted index accelerates off to new "highs" in labour demand, whereas the unemployment rate indicates that the state of the 1970 labour market is very slack compared with demand conditions throughout most of the 1960s. The arguments presented above suggest that the unemployment rate may be overstating the degree of excess supply in the Canadian labour market during the 1970s and that an alternative measure of excess labour demand such as the help-wanted index, or the job vacancy rate, may give a better measure of the true state of the Canadian labour market.[16]

Although the unemployment rate fails to perform satisfactorily in Canadian wage equations estimated over the 1970s, several recent studies have demonstrated that a measure of job vacancies or help wanted does exert a significant positive effect on wage changes [Wilton (1977), Cousineau and Lacroix (1977), and Auld et al. (1979)].

CHART 4-1

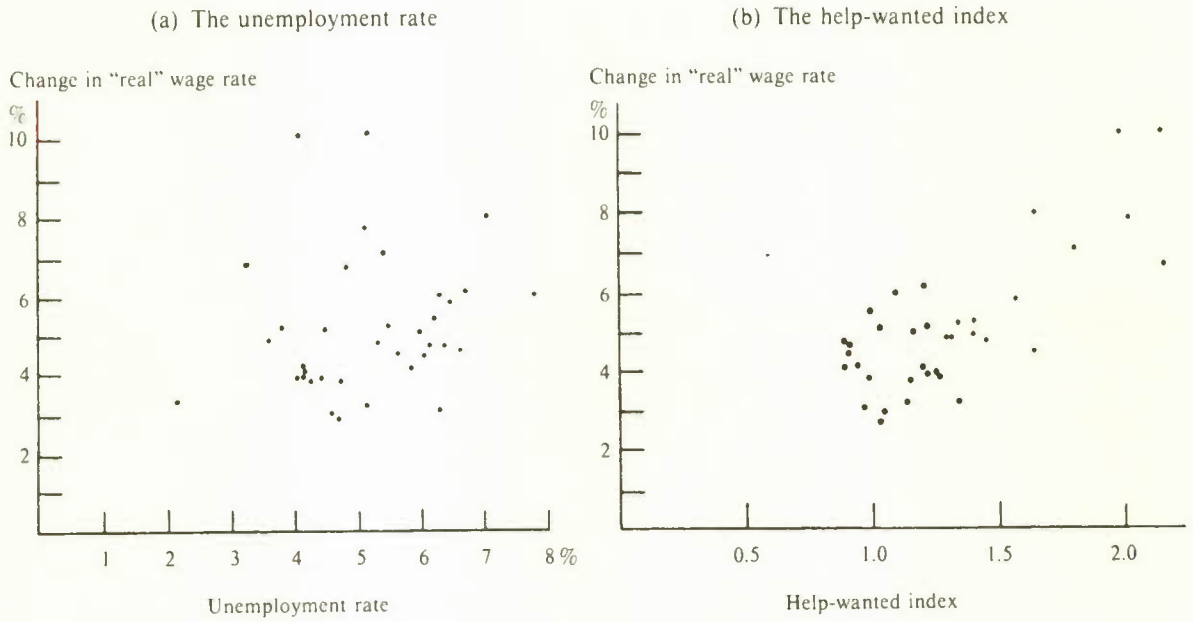
ALTERNATIVE MEASURES OF LABOUR MARKET CONDITIONS, 1962-76



To illustrate the very dramatic differences between Phillips-curve models specified with unemployment rates and help-wanted indexes, we return to the previously cited study by Auld et al.[17] To translate this rather technical econometric study into a simple graphical representation, two additional assumptions are made. First, to allow for price effects, the *annual* rate of inflation (over the life of the *past* wage contract) has been subtracted from the negotiated wage change.[18] Second, to avoid plotting 2,338 points in a scatter diagram, the wage contracts have been grouped together into quarterly averages, weighted by the number of employees covered in each contract. The implied scatter diagram for the negotiated annual "real" wage change plotted against both the unemployment rate and the help-wanted index are displayed in Chart 4-2.

CHART 4-2

SCATTER DIAGRAMS FOR NEGOTIATED WAGE SETTLEMENTS IN THE CANADIAN PRIVATE SECTOR DURING THE 1966-75 TIME PERIOD



The differences between the left and right panels of Chart 4-2 are readily apparent. The left panel continues to depict the absence of any systematic relationship between wage changes and the unemployment rate. The wage-change/help-wanted-index scatter diagram reveals, however, a highly significant positive relationship between these two variables. As the labour market tightens (i.e. the help-wanted index increases), wage inflation accelerates.

In conclusion, a number of micro-econometric studies have statistically demonstrated that the Canadian Phillips curve does exist. Three cautionary comments must again be emphasized, however. First, these empirical studies exhibit a considerable degree of temporal instability, and Phillips-curve estimates for the 1970s are distinctly different from Phillips-curve estimates for the 1950s and 1960s. Since part of this difference can undoubtedly be attributed to the changing nature of the Canadian labour market, various attempts to resurrect a Phillips curve for the 1970s have utilized alternative labour market data concepts (such as the help-wanted index and the job vacancy survey), which lack the statistical precision of even the unemployment rate data series.[19] Finally, as Chart 4-2 clearly attests, even a significant Phillips wage relationship does not really fit the data that well, and there still remains a substantial unexplained error (three to four percentage points). The best that econometricians have been able to produce is a Phillips curve that is a relatively thick band.

5 The Role of Price Inflation in the Wage Determination Process

Ever since Phillips' path-breaking article, models of wage determination have invariably included a measure of price inflation along with a labour market variable. While Phillips speculated rather informally about the significance of price level changes for the wage determination process, Lipsey (1960), Dicks-Mireaux (1961), Eckstein and Wilson (1962), Perry (1966), and others all included the rate of change of some price index in their formal regression analysis of wage determination. Even though the precise mechanism through which price changes feed into wage rates was never discussed at great length, most arguments for including a price change variable centred around the notion that

> while the maximum awareness may be of the money size of a paycheck, there is also considerable sensitivity to how much this paycheck will buy. [Perry (1966), p. 26]

It was not until the two important papers by Phelps (1967) and Friedman (1968) that a more precise theoretical role for price changes within a wage determination model was provided. Both authors argue that firms and workers make labour market decisions in terms of the *real* wage rate — i.e. the money-wage rate adjusted to reflect its purchasing power, and not the nominal or money-wage rate. Phelps and Friedman further argue that the relevant price consideration to determine the real wage is the *expected* value of future prices. In a world in which the value of money is constantly changing, buyers and sellers of labour market services must incorporate into their labour market decisions an "estimate" of future inflation. Even though this estimate may turn out to be incorrect (more on this possibility later in the chapter), expected inflation can hardly be ignored.

Thus, in the Phelps-Friedman theoretical model, workers are assumed to judge a prospective wage rate for the next contract period vis-à-vis the *expected* price level of goods that *will* be purchased. If workers *expect* inflation rates to rise in the future, they will demand (and obtain) higher current wage settlements to compensate them for this higher expected inflation rate. Firms will be willing to pay higher wage rates since they also expect their product prices to rise. Consequently, the price variable in the wage determination model not only reflects the expected rate of inflation over the next contract period; Phelps and Friedman assert that this variable should theoretically have a coefficient exactly equal to unity (to maintain the real wage rate). Even though Phelps and Friedman vigorously argue that 100 per cent of *expected* inflation will be incorporated into wage rates *ex ante* (i.e. before the inflation actually occurs), the direct influence of *unexpected* price inflation on wage rates is totally ignored.

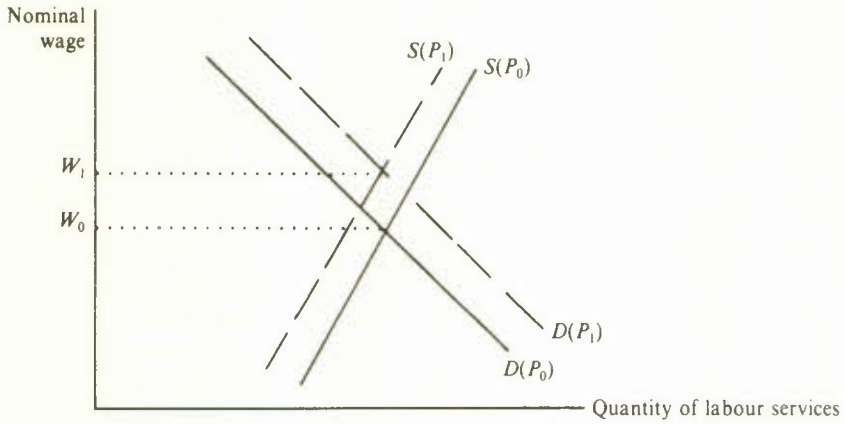
The purpose of this chapter is to analyse the role of prices and price expectations in the wage determination process. The first section of the chapter outlines why a price-expectations variable need not be considered an intruder in the Phillips-curve model. Next, we explore the implications of *unexpected* price changes and price "catch-up" for the wage determination process. Finally, a brief analysis of the phenomenon of COLA clauses is provided. Throughout the chapter, the relevant Canadian evidence pertaining to the proportion of price changes that are incorporated into wage rates is examined. The policy implications of wage-price-wage feedbacks are deferred until Chapters 7 and 8.

PRICE EXPECTATIONS INCORPORATED INTO THE PHILLIPS-LIPSEY DISEQUILIBRIUM MODEL

In Chart 5-1, the demand and supply curves for labour services have been replicated from Chart 3-1(a), with the *nominal* wage rate plotted on the vertical axis. Conventional microeconomic analysis suggests that the price level will be an important shift variable for both the labour demand and supply curves, with each curve shifting up as the price level rises. In general, the demand for labour will increase as prices rise, because firms will want to expand production and therefore hire more labour at the existing nominal wage rate, given the higher price level obtainable for output. Labour supply may be reduced at the given nominal wage rate if prices rise, since some workers (perhaps secondary earners in the family) may withdraw from the labour force because of the new lower implicit real wage. In Chart 5-1, labour demand and supply curves have been drawn on the basis of two hypothetical price levels (P_0 and P_1) reflecting the shift forces described above.

CHART 5-1

DEMAND AND SUPPLY CURVES FOR LABOUR SERVICES



Before considering the theoretical implications of this simple labour demand and supply model, an important institutional fact of life must be recognized. As Tobin pointed out in his presidential address to the American Economics Association:

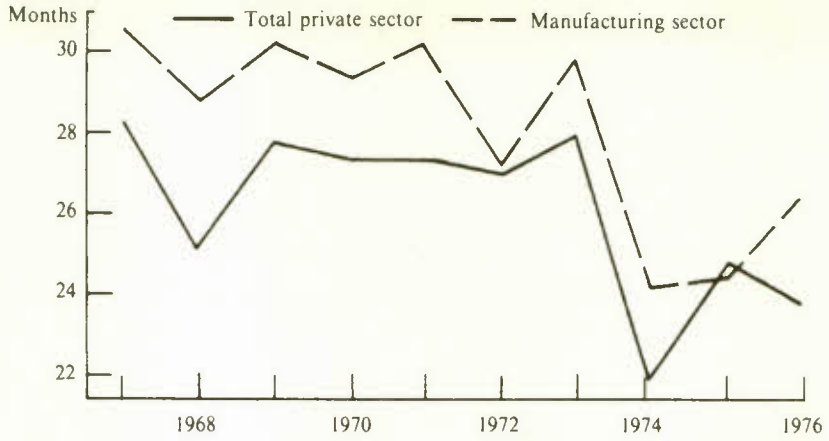
> Money wage rates are, to use an unKeynesian term, "administered prices". That is, they are not set and reset in daily auctions but posted and fixed for finite periods of time. [Tobin (1972), p. 3]

In the nonunion sector, most employers only periodically review and adjust wages. In the union sector, wages are explicitly "locked in place" over the length of the contract between the firm and union. As shown in Chart 5-2, the average length of new contracts signed during the 1966-76 period typically exceeded two years in length. Many contracts are for three years or longer, and only 11 per cent of all contracts signed were for one year or less.

This institutional rigidity of "fixed" wages over long contractual periods of time has important implications for the labour demand and supply analysis presented in Chart 5-1. To illustrate, let us assume that a three-year wage contract is signed at the equilibrium wage W_0 (given an existing price level of P_0) but, during this three-year period, prices rise to a new higher level P_1. Since the nominal wage rate is contractually fixed at W_0, excess labour demand will develop as the price level rises. This disequilibrium situation will persist throughout the contract period and imposes severe costs on both the firm and its workers. Labour is forced to either work at an inappropriately low real wage or quit, while firms are prevented from hiring more labour to satisfy the excess labour demand because they cannot adjust upwards the contractually fixed nominal wage rate.

CHART 5-2

AVERAGE LENGTH OF NEW CONTRACTS SIGNED, 1967-76



It is important to point out that at the time of the *next* contract signing, this excess labour demand pressure (associated with the inappropriate fixed nominal wage) will lead to a Phillips-Lipsey disequilibrium correction of the nominal wage rate. Both the firm and its labour force, however, may prefer a wage strategy that avoids this long, costly period of disequilibrium. The inclusion of a cost-of-living allowance (COLA) clause in the wage contract is one obvious way to prevent this disequilibrium situation from arising and will be discussed later. On a more "informal" basis, if future price movements can be forecast at the time the contract is signed, then both parties may agree to provide deferred wage increments during the life of the contract to offset higher expected price levels. In other words, incorporating an *ex ante* wage increase into the contract to offset (expected) future price movements avoids a disequilibrium situation that the Phillips-Lipsey model can only correct *ex post*. Thus price expectations may be regarded as a legitimate additional variable in the Phillips-Lipsey disequilibrium model of wage determination — a variable that minimizes the extent of disequilibrium over the contract period.

As stated above, all Canadian wage studies found that price changes have a significant effect on wage changes. For example, the study by Bodkin et al., covering the 1953-65 period, found that approximately 50 per cent of last year's price change was incorporated directly into this year's wage change — an estimate that is significantly different from both 0 per cent and 100 per cent. As the time period was extended to later years, however, this estimated price effect tended to rise. When Kaliski (1972) re-estimated the original wage equations of Bodkin et al. for the 1960s, he found that the price coefficient had increased to the 90-150 per cent range. Professor Riddell, employing micro-data on wage contracts, found that the coefficient on the price expectations variable increased from 80 per cent in the 1953-65 period to 219 per cent in the 1966-73 period. As found in the previous chapter, temporal instability continues to plague Canadian Phillips curve estimates.

THE ROLE OF UNEXPECTED INFLATION

While part of this instability in the estimated price effect on wages is undoubtedly associated with the inherent problems of correctly specifying a proxy for the unobservable price expectations variable [more on this later], a more fundamental problem may exist. What happens to *unexpected* inflation within this theoretical model? Despite the explicit treatment of anticipated inflation, the Phelps-Friedman expectational model provides no *direct* mechanism for the individual firm (or union) to rectify *incorrect* past price expectations. To correct for past expectational errors, the Phelps-Friedman model reverts to an *indirect* "market" mechanism; for example, if past price expectations turn out to be too low (i.e. prices increase beyond expectations), then the real wage paid to labour will be too low. Such a decline in real wages will

cause wages to be "bid up" at the next contract negotiation. In short, conventional market forces are assumed to correct *ex post* for any errors in price expectations.

Given a disequilibrium situation arising from *unexpected* inflation, can we automatically assume that the conventional "market correction" mechanism will be triggered? In other words, will the firm attempt to hire additional labour at the inappropriate fixed nominal wage rate, and will part of the firm's labour supply withdraw their labour services because of the *unexpected* erosion of the real wage rate? Both market forces would cause the wage rate to be "bid up" and the nominal wage rate to be corrected to reflect past unexpected inflation. If this market correction mechanism is operative, then an *observable* measure of labour market disequilibrium should capture the effects of this unexpected inflation, and wage change models need not include an explicit variable to capture the effects of unexpected inflation.[1] The actual responses of both the firm and its labour force to unexpected inflation, however, are not likely to be as extreme as the market correction mechanism suggests.

First, let us consider the reaction of labour to an unexpected burst in inflation. Faced with an unexpected erosion of the real wage rate, the "unhappy" worker has three options: 1/ to continue working at the unexpectedly low real wage rate, 2/ to quit working, or 3/ to change employers in order to increase his/her real wage.[2]

These latter two "market correction" options involve the substantial economic and social costs associated with quitting one's regular employer — costs that must be offset by the gains attached to higher wages elsewhere (or leisure). For an *unexpected* bout of inflation during an existing wage contract period, labour may choose to continue working for an inappropriate real wage rate *until* the next contract negotiation in *anticipation* of a wage rate correction. Why incur the costs of switching jobs until the firm has had an opportunity to correct for this unexpected event?[3] With its own labour force "hanging in," the firm may not experience substantial labour supply reductions at this unexpectedly low real wage and may be reluctant to incur the costs of hiring and training additional workers.[4] In short, a firm may choose to satisfy its existing labour force after a bout of unexpected inflation rather than replace them with a pool of unemployed, untrained workers who may be available at the inappropriate nominal wage rate.[5]

If the above scenario is at least partially correct, then during the disequilibrium contractual period caused by unexpected inflation, both the firm and its labour force may be off their true labour demand and supply curves. The excess labour demand effect arising from unexpected inflation is real but *latent*, and observable measures of labour market conditions may not fully reflect the degree of actual disequilibrium in the firm's particular labour market. Consequently, a third variable should be added to the price-expectations-augmented Phillips-curve model to capture *latent* excess labour demand arising from unexpected inflation.

While the above argument for unexpected inflation is deliberately cast within the price-expectations Phillips-curve context, a number of wage analysts [see, for example, Johnston and Timbrell (1973)] have included a price catch-up variable simply to reflect the bargaining demands of labour:

> When inflation is rapid, the sense of inequity creates strong member support of union leaders' wage demands or pressure on the leaders to "catch-up". [Eckstein and Wilson (1962), p. 392]

To illustrate the potential role of price catch-up as a bargaining demand, consider a three-year contract signed in 1972. Based on a reasonable 1972 estimate of 4 to 5 per cent price expectations, labour would have suffered an unexpected 15 per cent loss in real wages during this three-year period. It would be naïve to assume that during the 1975 contract negotiations labour would bargain as if this loss did not occur (i.e. accept the loss in perpetuity) and make wage demands only in terms of expected inflation during the *next* contract period.[6] At the negotiation table, bygones are *not* bygones but, rather, important issues at the next contract negotiation. Labour will in all likelihood bargain just as vigorously for unexpected inflation as it does for expected inflation. The fact that inflation is *unexpected* is hardly a sufficient reason to dismiss it as a bargaining demand.

The study by Auld et al. formulates a wage change model (described in the Appendix to this chapter) that combines both price expectations and price catch-up considerations. The empirical results presented in this study provide overwhelming support for a Phillips-curve model that includes both price expectations and price catch-up components. Both price effects are individually highly significant, and Canadian Phillips-curve estimates that omit the price catch-up variable have a much poorer fit. The empirical results indicate that in the unionized private sector (during the 1966-75 time period), 37 per cent of price expectations are incorporated into wage changes *ex ante*, whereas 57 per cent of price catch-up is included in wages *ex post*. Given the above estimates for price expectations and price catch-up, 73 per cent of correctly anticipated inflation will (eventually) be incorporated into Canadian wage rates.[7]

There is, however, an important qualification to all empirical wage studies that test for the effects of price expectations. Where does one obtain data for price expectations, an abstract theoretical construct? By their very nature, price expectations are highly subjective and difficult to quantify. There is a world of difference between obtaining a measure of today's price of beef and providing an estimate of what people *think* next year's price of beef will be. While attitudinal survey data on aggregate future price movements exist in some countries, no continuous survey data exist for Canada during the 1950s and 1960s. This data deficiency has forced Canadian wage analysts to *create* their own synthetic price expectations data and, for the most part, to *assume* that future price expectations can be approximated by past price changes.

Consequently empirical results for wage determination models must, of necessity, test the *joint* hypothesis that 1/ price expectations are a significant determinant of wage changes; and 2/ the subjective expectational process has been correctly approximated by past and current data. The intertwining of these two different hypotheses may easily produce misleading or conflicting results; for example, the proxy for the unobservable price expectational variable may be substantially incorrect, leading the researcher to conclude erroneously that price expectations were an insignificant determinant of wage changes. Perhaps more important, different proxies for price expectations (employed by different researchers) may generate very different estimates of the strength of the price effect on wages.[8]

To explore the potential sensitivity of estimated price effects within Phillips-curve studies, Table 5-1 presents eight different sets of estimates for the impact of price changes on wage inflation, using four different proxy variables to define price expectations.[9] The odd-numbered rows of Table 5-1 include only a

TABLE 5-1

THE SENSITIVITY OF PRICE EFFECTS IN WAGE CHANGE EQUATIONS

	Price expectations effect	Price catch-up effect	Total composite price effect[1]
Proxy variable for price expectations:		(Per cent)	
1 Previous year's inflation rate	96	—	96
2 Previous year's inflation rate	33	58	72
3 Inflation rate averaged over previous three years	128	—	128
4 Inflation rate averaged over previous three years	41	54	73
5 Inflation rate averaged over previous five years	198	—	198
6 Inflation rate averaged over previous five years	62	58	84
7 Distributed lag of past three years' inflation rates[2]	104	—	104
8 Distributed lag of past three years' inflation rates	37	57	73

1 As defined in the Appendix.
2 See Auld et al. (1979).

price expectations effect, whereas the even-numbered rows include both price expectations and price catch-up effects (see the Appendix for the exact specification of this latter variable). While all 12 individual price coefficients are highly significant,[10] a wide disparity in price estimates is displayed in Table 5-1. The price expectations coefficients are particularly sensitive to the choice of proxy variable and to the inclusion or exclusion of the price catch-up variable. For example, without a price catch-up variable the estimated price expectations coefficients for the four proxy variables range from 96 to 198 per cent! Clearly, the way in which the (unobservable) price expectations variable is specified may have a substantial impact on the *estimated* price (expectations) effect on wages. In contrast, the price catch-up coefficients are remarkably stable, all falling in the narrow interval of 54 to 58 per cent. As defined in the Appendix, the total composite price effects for the joint price expectations/catch-up model suggest that most of a correctly anticipated price inflation rate will be incorporated into wage rates.

THE PHENOMENON OF COLA CLAUSES

As the above results suggest, unexpected inflation and price catch-up exert an important direct influence on wage determination. In this context, one convenient way of coping with inflation uncertainty is through the use of cost-of-living allowance clauses. Regardless of whether inflation is expected or unexpected, a COLA clause will automatically provide protection against price increases. As Table 5-2 indicates, the incidence of COLA clauses has risen dramatically during the most recent bout of unexpected inflation, commencing in mid-1973. While the use of COLA clauses provides an important additional mechanism for labour to protect itself against unexpected inflation, firms are typically unable to establish similar escalator clauses for their product prices with their customers. Given employer resistance to COLA clauses, particularly by firms whose revenues are not closely geared to aggregate price movements, one would expect that 1/ COLA clauses may not exist throughout the labour market, and 2/ the existing COLA contracts may not provide 100 per cent protection against inflation.

TABLE 5-2

THE INCIDENCE OF COLA CLAUSES IN TERMS OF UNION EMPLOYEES SIGNING NEW CONTRACTS

	Manufacturing sector	Total private sector
	(Per cent)	
1972	24	22
1973	43	29
1974	60	52
1975 (pre-AIB)	66	59

Source Labour Canada data files.

Despite the increasing prevalence of COLA clauses, little is actually known about the wage structure of COLA clause contracts. Part of the problem is the wide variety of features present in Canadian COLA clauses. In a 1974 Labour Canada study of existing COLA clause contracts, it was found that the majority of COLA clauses were based on "decimal point" movements in the Consumer Price Index (CPI) converted into "cent" changes in the wage rate. Since the same "cent" change typically applies to all workers within the bargaining unit, the inflation protection in percentage terms obviously declines for more-skilled workers who are paid higher wage rates. Only 28 per cent of workers with COLA clauses were covered by a percentage formula. Furthermore, many of these COLA contracts stipulate minimum CPI changes before the escalator is "triggered" and for maximum amounts ("caps") that will be paid out in COLA.

The only published study that has attempted to "cost out" the inflation protection afforded by these diverse COLA clauses was completed by André Marcil of the Bank of Canada. Calculating an "elasticity measure" for the average amount of inflation protection provided by COLA clauses contained in new wage contracts signed in 1974, Marcil finds that in the Canadian manufacturing sector only 42 per cent of inflation is incorporated into base wage rates directly through COLA clauses. Since most of these COLA clauses are in absolute terms, the inflation protection for workers earning above the minimum base wage would be even lower. Part of the explanation for these low COLA elasticities can be attributed to the fact that many of the 1974 COLA clauses were new and often did not fully apply in the first contract.[11] For manufacturing contracts that previously had COLA clauses, Marcil finds that the COLA elasticity "is nearly twice as high as contracts which had not had COLA clauses previously" [p. 22].[12] More recent unpublished Bank of Canada research suggests that the COLA elasticities within the manufacturing sector are now running about 60 to 70 per cent. Again, these COLA elasticities apply to base wages, and workers earning more than the base wage would typically receive less COLA protection against inflation.

In conclusion, movements in consumer prices clearly affect wage rates. While most of the existing wage research has concentrated on price expectations, this chapter has argued that unexpected inflation and price catch-up also play important roles in the wage determination process. The growing incidence of COLA clause wage contracts following the unexpected burst of inflation in 1973-74 is but one indication of the importance of price catch-up considerations. Empirical estimates presented above suggest that approximately 75 to 85 per cent of price inflation is built into wage rates, with much of this effect taking place after the fact in the form of price catch-up.

6 The Role of "Spillovers" in the Wage Determination Process

In previous chapters, the wage determination process has been analysed in terms of consumer price movements, both expected and unexpected, and basic labour market forces. It has been implicitly assumed that each individual wage settlement is negotiated independently of all other recent wage settlements. While wage settlements of other bargaining groups may have a small *indirect* effect on the aggregate consumer price level and perhaps on the state of the labour market, no attempt has been made to allow for *direct* interrelationships or interdependencies between bargaining groups. Each group of employees was assumed to negotiate a contract in isolation from all other employee bargaining groups. The purpose of the chapter is to relax this "independence" assumption and explore the direct role of wage interrelationships within the labour market.

THE INSTITUTIONAL SPILLOVER HYPOTHESIS

One of the oldest themes in the wage determination literature is the importance of wage spillovers. Many of these wage spillover theories originated in the "institutional school" during the 1940s and early 1950s, and emphasized the importance of social, political, and institutional factors almost to the exclusion of economic and market forces. Most institutional spillover models typically focus on the internal structure and distribution of wage rates within occupational/industrial groups and on the importance of maintaining a "fair pattern" of relative wage differentials. If these institution/historical wage relativities are disturbed, say, by one bargaining group obtaining an abnormally high settlement, then such spillover theories suggest that a wave of higher settlements will be unleashed, as all groups try to re-establish historical wage differentials.[1]

While institutional wage spillover theories seem capable of almost infinite variation and have produced a vocabulary all their own,[2] the two key assumptions of most institutional spillover models are the following: 1/ the wage settlement of any one bargaining group is inextricably linked to the wage settlements of other bargaining groups, and 2/ the "links" are to be principally found in the social, political, institutional arena and not in orthodox economic theory. Wages for any particular group of workers are essentially determined by political comparisons with the wage rates of other workers. Since an excellent review and critique of wage spillover theories has recently been written [Burton and Addison (1978)], only one institutional approach will be discussed — the study by Ross.

According to Ross, union leaders are assumed to be motivated by two major concerns: 1/ to perpetuate the size and power of the union organization, and 2/ to ensure their own re-election. Both concerns force union leaders to attempt to match, or better, the wage increases obtained by other unions. Failure to deliver a comparable wage settlement increases the likelihood that some union members will jump to other more powerful unions, and/or a dissatisfied rank-and-file will vote out the union leadership in favour of aspiring

union leaders who claim that they can deliver such comparable wage increases. Thus Ross contends that intra- and inter-union political forces will cause similar wage settlements to spill over from sector to sector through "orbits of coercive comparisons."

Such a political theory of wage spillovers, however, is deficient in several respects. Most notably it leads to the conclusion that the wage inflation process is unconstrained by the "demand side" of the labour market.[3] It is a one-sided theory that never explains how the employer is "coerced" to concede to whatever wage demands the union leadership makes. Conventional economic analysis of the firm's demand for labour suggests that an increase in the firm's wage rate will, *ceteris paribus*, lead to fewer jobs. Thus "excessive" wage demands of the union must be balanced against the inherent negative employment effects. When job security is a threat to union membership, economic realities may dictate a wage settlement (even to the most politically minded union leader) that falls well short of the wage increases obtained by workers in more "prosperous" industries. In short, the economic conditions of the particular industry are likely to moderate the strength of any wage spillover process that is premised solely on political comparisons.

As is evident from the preceding chapters, an analysis of the wage determination process *must* include a thorough understanding of the institutional setting of the labour market. Equally important, however, the social/political/institutional aspects of wage determination *cannot* be divorced from economics. Thus it is this author's contention that potential spillover theories ought to be firmly grounded in economic theory. To do otherwise would seem to confuse union bargaining "demands" with the economic realities of the firm/union bargaining process.

ECONOMIC THEORIES OF WAGE SPILLOVERS

Even though recent economic wage studies have tended to dismiss wage spillover hypotheses, the concept of wage spillovers is firmly embedded in traditional microeconomic analysis of labour markets. In orthodox Marshallian labour market analysis, the supply of labour to any one firm is a function of that firm's wage rate, as well as the wage rate paid by all other competing firms. If a second firm were to increase its wage rate to attract more labour, then the supply of labour to the initial firm would decline as a number of marginal workers would now evaluate employment at the second firm more highly. Consequently, the equilibrium wage paid by the initial firm will increase, given the reduced supply of labour to that firm. The determination of wages for any given firm is a function of all the usual demand and supply factors, the latter including the wage rates paid by all other competing firms. A change in wage rates paid by one firm will "spill into" other firms' wage rates, with the size of the wage spillover being determined by the relevant cross-price elasticities of the labour supply function and the characteristics of each firm's demand function.

More recently, Phelps (1967) proposed a spillover model in the spirit of the previous Marshallian analysis, with the key innovative feature being the labour cost to the firm of its turnover rate. Such turnover labour costs are based on expenditures in recruitment, hiring, and training new workers to replace those who quit. Phelps argues that the profit-maximizing firm will establish an optimal wage differential between its own wage rate and the wage rate paid by other firms — a differential that minimizes the firm's total labour costs.[4] Thus if other firms raise their wage rate, the given firm must change its own wage rate to maintain an optimal wage differential. In many respects, Phelps has simply provided a microeconomic theoretical foundation for the concept of wage spillovers, not unlike some of the arguments of the earlier institutional school.

In both the Marshallian and Phelps models, one might argue that changes in the excess labour demand variable will capture the effect of another firm altering its wage rate; i.e. one need not include the spillover effect directly in the wage determination model, since its effect is implicitly buried in the labour market variable. One can, however, offer an argument similar to that presented in Chapter 5 concerning "price

catch-up" for the inclusion of wage catch-up (or spillovers) in the Phillips-Lipsey disequilibrium model. During an existing contract period, the wage rate for a given firm's workers is fixed, but other workers employed by alternative firms may receive wage adjustments during this period, since their contracts will likely differ in timing. Under such circumstances, marginal workers employed by the given firm may not immediately jump to an alternative employer who has signed a new contract with higher wage rates. The social and economic costs of job switching may be sizeable, and potentially movable employees may "hang in" with their given employer in anticipation of a wage adjustment at the next contract negotiation — the first chance that the given firm has to rectify the situation.[5] If this is the case, then the potential excess demand attributable to an increase in competitive wage rates may not completely manifest itself in measurable labour market variables. All of the potential vacancies at the firm level may not yet have materialized, as some marginal workers may be sticking with the given firm until the next contract negotiation. Consequently, the introduction of a wage spillover variable may be required to capture this "latent" excess demand effect arising from a change in relative wages. As in the case of the price catch-up variable, this relative wage-spillover variable can be rationalized as a measure of firm-specific excess labour demand, entering the Phillips curve along with a more aggregated measure of labour market conditions.

THE CANADIAN EMPIRICAL EVIDENCE ON WAGE SPILLOVERS

Before discussing the Canadian empirical evidence on wage spillovers, two methodological problems pertaining to the testing of wage spillover theories should be noted. First, how does one identify the previous wage settlements that are legitimate spillover candidates? In other words, what is the appropriate set of relative wages to include in the wage spillover model? Economic theory tends to operate in generalities (e.g. "n" different relative wage rates in the firm's labour supply function), whereas the quantitative economist must deal in specifics and must severely limit the number of possible explanatory variables, to avoid statistical problems.

Even if one can overcome the formidable classification problems in trying to determine which wage changes are relevant for a given group of workers,[6] can one distinguish causation from correlation? To illustrate the nature of this rather fundamental statistical problem, two successive settlements may be determined by the same set of economic factors (such as price movements and labour market conditions) and thus have virtually identical values. The first settlement will obviously "correlate" very highly with the second, but it may not cause the second. To overcome the problem of a wage spillover effect inadvertently being mistaken for common explanatory variables, all spillover models must be formulated in a manner that tests for the significance of wage spillovers in addition to other basic wage determinants.

With these two methodological problems in mind, we now turn to a brief review of two Canadian studies that have examined spillover-relativity effects in the context of wage determination models. Even though these two studies have very different statistical approaches, they both find that wage spillovers (relativities) are important determinants of Canadian wage changes.

Study by G. L. Reuber (1970) — Reuber's paper is devoted to an analysis of the primary determinants of quarterly wage changes in Canadian manufacturing industries, disaggregated to the two-digit level (e.g. the rubber industry or the textile industry).

> . . .For the purpose of examining the determinants of wage changes at the level of individual industries, it is not satisfactory to fit wage-adjustment relationships of the Phillips curve variety for particular industries similar to those that have been fitted at an aggregative level. . . . It is evident that wages in one industry are likely to be influenced by wages in other industries. . . a model has been developed to explain changes in wages in particular industries in terms of the excess demand for labour in each industry. This model is estimated by a two-step procedure. In step one an estimate is made of each industry's demand for labour; and in step two this estimate is combined with the supply function of labour confronting each industry to estimate the determinants of money wage changes. [Reuber (1970), pp. 449-50]

Of the four variables that Reuber tests in the labour supply function, the relative wage of the particular industry compared with the average wage in the manufacturing sector is clearly the dominant explanatory variable, and Reuber concludes that

> although the evidence is subject to several limitations, it is generally consistent with the view that in the majority of industries wage changes are associated with changes in the relative wage. [p. 466]

In the second part of this study the role of key bargains, key bargaining groups, and the existence of a bargaining cycle are examined. Reuber's conclusions in this instance are much more negative:

> Little or no evidence has been found to support the key industry hypothesis for Canada. The identity of the key group of Canadian industries is in doubt; the existence of the assumed bargaining cycle is in doubt; and when wage changes in an assumed key group of Canadian industries are related to wage changes in particular industries, it is doubtful whether these key industry wage changes are any more closely associated with wage changes in non-key industries than are wage changes in manufacturing generally. [p. 466]

Even though Reuber finds that "wage changes among industries are interrelated," his use of quarterly time-series data at the two-digit industrial level to analyse wage relativities and spillover patterns is open to question. The use of such aggregate data discards valuable information pertaining to the exact timing of wage settlements at the individual firm level. The existence of wage spillovers can best be detected and analysed by an examination of "micro" wage data prior to industrial and temporal aggregation.

Study by L. N. Christofides, R. Swidinsky, and D. A. Wilton (1980) — This recent study done in conjunction with two of my colleagues at the University of Guelph provides such a "micro" examination of the phenomenon of wage spillovers. An econometric analysis of over 2,500 individual wage contracts signed during the 1966-75 time period reveals that significant wage spillovers exist within the Canadian private sector. The particular definition of the spillover reference group, however, is of considerable importance. Spillover variables that are defined only in terms of geographic areas performed unsatisfactorily throughout an extensive set of statistical tests. The one characteristic of the spillover reference group definition to receive overwhelming statistical support is the industrial classification. Based on evidence presented in this study, wage spillovers are most pervasive for bargaining units in similar industries within a given region. Simply put, wage spillovers do not appear to transcend broad regional and industrial classifications. Furthermore, the significance of wage spillovers emanating from an industrial reference group cannot be attributed to omitted industry variables such as profit rates or productivity. When specific profit or productivity variables are included, such variables have an insignificant, or perverse, effect on wage changes.

While industrial wage spillovers are found to be an important determinant of wage changes, they are not the only, or even the major, causal factor. The study by Christofides et al. formulates the spillover hypothesis in a manner that permits the following three propositions to be tested statistically:

1 wage spillovers do *not* exist;

2 *only* wage spillovers exist; or

3 wage spillovers exist in conjunction with other basic wage determinants.

The first two propositions are conclusively rejected in favour of the third. The inclusion of spillover variables within the wage change model does *not* render the basic price expectations, price catch-up, labour market variables insignificant. In other words, spillover effects from previous settlements (within the same industrial reference group) are significant additional determinants of wage changes; they do not replace the traditional market-oriented determinants of wages.[7]

With respect to the quantitative impact of wage spillovers, the model of Christofides et al. is specified in a manner that permits the effect of wage spillovers to be estimated over and above a hypothetical wage

settlement that is based solely on price and labour market considerations. To illustrate the mechanics of this model, let us assume that a particular bargaining group might receive a 10 per cent wage settlement based on price expectations, price catch-up, and labour market conditions but that the relevant spillover wage settlements have been running at 15 per cent. How much of the additional five percentage points is this particular bargaining group likely to gain via the wage spillover effect? The empirical evidence of this study suggests that an extra two percentage points will be incorporated into the wage settlement of this particular bargaining group because of wage spillovers. In other words, approximately 40 per cent of the gap between the average wage settlements of earlier relevant bargaining groups and a hypothetical wage settlement based on price and labour market forces will spill into a given wage settlement. This study was able to statistically reject the two polar propositions that either 0 or 100 per cent of this gap would spill into a given wage settlement. Wage spillovers matter, but they are not the whole story.

SUMMARY

It is frequently alleged that the wage inflation process is intensified by wage comparisons and spillovers between different bargaining groups. Such wage spillovers can be premised either on 1/ an institutional/political theory of wage comparisons, or 2/ traditional economic theory, emphasizing relative wage effects in the firm's labour supply function. While not denying the importance of institutional features of the labour market, it is this author's contention that spillover models of wage determination must be firmly grounded in economic theory.

The empirical results of the study by Christofides et al. conclusively demonstrate that wage spillovers are a significant *additional* determinant of wage changes. The importance of this conclusion is twofold. First, economists who for the most part have ignored wage spillovers have missed a very crucial dynamic element in the wage inflation process. Second, institutionalists have tended to overstate the importance of wage spillovers. The role of wage spillovers is clearly to augment the conventional economic determinants of wages, such as labour market conditions and inflation rates, not to replace such market forces. There is much more to the wage inflation process than political comparisons between workers. Furthermore, wage spillovers exist only on a very narrow industrial basis and do not appear to cross over broad industrial and geographic boundaries. Thus there is no reason to expect that the wage settlement at the General Motors plant in Oshawa will affect the wage bargaining of brewery workers in Winnipeg.

Part II

Policy Implications

7 Is There a Long-Run, Sustainable Trade-off between Inflation and Unemployment?

The preceding chapters have examined a number of theoretical and empirical issues pertaining to the Canadian wage determination process. The purpose of the remaining chapters of this monograph is to consider some of the policy implications of this Canadian wage structure, particularly with respect to the dynamic interrelated problems of inflation and unemployment.[1] The Phillips-curve concept will continue to be the major integrating theme in our policy analysis.

As discussed in Chapter 2, the Phillips curve represented an important new constraint for policy formulation. While monetary and fiscal policy may be used to stimulate aggregate demand and reduce unemployment, such expansionary policy will also cause the rate of wage inflation to increase. The desirable goals of price stability and a low level of unemployment are not jointly attainable, and policy-makers face a dilemma. Lower rates of unemployment must be "traded off" against higher rates of inflation (and vice versa).

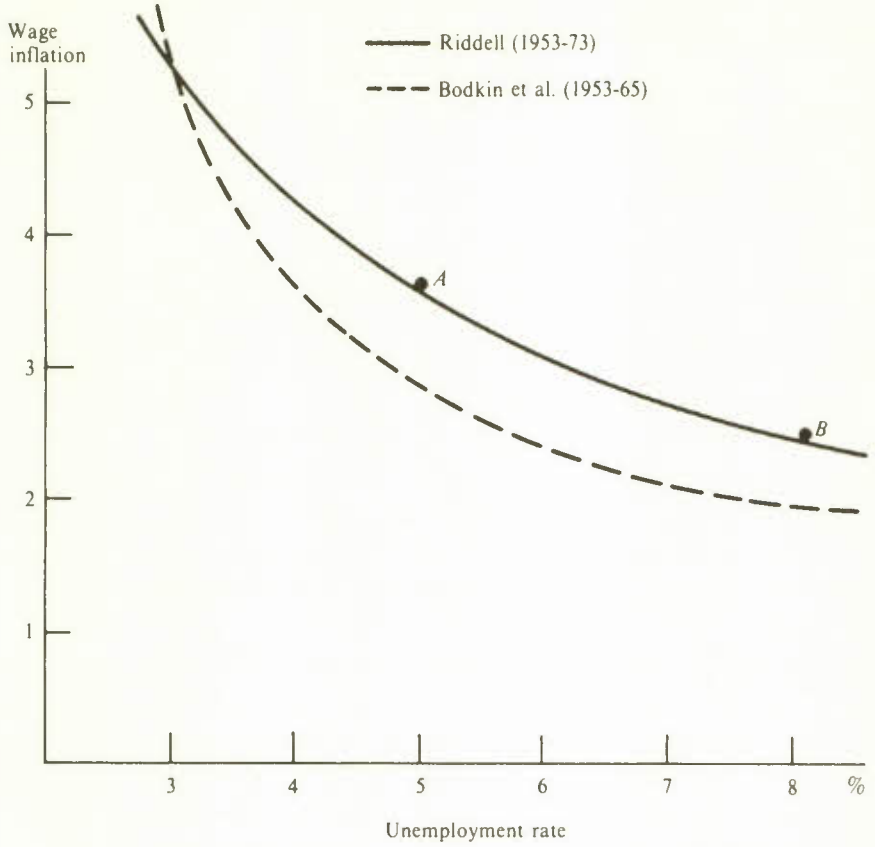
Even though the concept of a stable trade-off between inflation and unemployment has been vigorously attacked in recent years, it is important to re-emphasize the pivotal role that the Phillips curve plays in macroeconomic policy formulation. If one were to jettison the Phillips wage adjustment mechanism from the theoretical macroeconomic model, the main connecting link between the real sector (employment and output) and inflation is lost. In such a non-Phillips-curve world, government policy-makers may be able to pursue full-employment macroeconomic policies without worrying about inflation, since there would be no causal link between lower rates of unemployment and higher rates of wage inflation. While it is possible that excess demand conditions in the product market might directly push up prices irrespective of costs (or affect the exchange rate, which in turn would affect prices), most structural, econometric macroeconomic models rely on a Phillips curve in the labour market to provide the key link between changes in aggregate demand and rates of inflation. From a demand-management-policy perspective, the Phillips curve has become a rationale for *not* pursuing monetary and fiscal policies that might substantially lower the unemployment rate (for fear of generating an excessive amount of inflation).

Consequently, the empirical validity of the Phillips-curve concept is of crucial policy importance. If, for example, the Phillips curve proved to be statistically invalid (i.e. labour market conditions do not affect wage rate changes), then government policy designed to "tolerate" some degree of unemployment in order to "fight inflation" would generate obvious economic costs (more unemployment) but might not have any beneficial effects in the form of a lower inflation rate. As discussed in Chapters 3 and 4, the Canadian Phillips curve has proven to be a very difficult concept to verify empirically, particularly in the 1970s. As Professor Riddell has noted, however, "reports of the disappearance of the Phillips curve have been, like the death of Mark Twain, greatly exaggerated" [p. 2]. In the last several years a number of authors (L. Christofides, J. Cousineau, R. Lacroix, F. Reid, C. Riddell, R. Swidinsky, and D. Wilton) have published "micro-oriented" wage studies that have clearly demonstrated that the Canadian Phillips curve still exists.

To illustrate the potential dimensions of the Canadian wage-inflation/unemployment trade-off curve, Chart 7-1 reproduces the implicit Phillips curves from two Canadian wage determination studies. Both

CHART 7-1

ESTIMATED CANADIAN PHILLIPS CURVES



Phillips curves have been drawn on the assumption that the rate of price inflation is zero — an assumption that must be relaxed shortly. Although the methodology of these two studies is quite different,[2] the results are surprisingly similar. Less than one-half of a percentage point of wage inflation separates the two curves.

Chart 7-1 appears to indicate that Canadian policy-makers have faced a quite favourable wage-inflation/unemployment trade-off curve. According to the Riddell equation covering the 1953-73 period, a 5.0 per cent level of unemployment should correspond to a 3.5 per cent rate of wage inflation (point *A*). Alternatively, an 8.0 per cent unemployment rate should lower the rate of wage inflation to 2.5 per cent (point *B*). In other words the "trade-off cost" of a lower unemployment rate appears to be only a modest increase in the rate of wage inflation (a 3 for 1 ratio). With such an apparently favourable trade-off curve, it is not surprising that governments may have opted for expansionary demand management policies in the hope of achieving lower unemployment rates at relatively mild inflationary costs.

The policy implications of Chart 7-1 are clearly at odds with the harsh economic realities of the 1970s. At present, *both* the unemployment rate and the rate of price inflation are hovering around 8 per cent. The foregoing Phillips-curve policy analysis is, however, deficient in one fundamental respect. Although price changes affect wage rates in the Phillips-curve model, the above policy analysis has implicitly assumed that wage changes do not affect the rate of price inflation (i.e. the rate of price inflation has been held constant). In other words, the potential feedback effect of wage changes on price levels (and then back to wage rates)

has been totally ignored. If product prices are determined by production costs (which include labour payments), then different rates of wage inflation must be associated with different rates of price inflation. Under such circumstances it would be logically impossible to consider different wage-change/unemployment combinations for a given (constant) rate of price inflation. In short, any movement *along* the Phillips curve in Chart 7-1 will generate a new and different rate of price inflation that will cause the Phillips curve to shift to a new location.[3] From a policy perspective, the relevant unemployment/inflation trade-off curve must allow for all feedback effects throughout the economy.[4]

While the preceding discussion of wage-price-wage feedbacks may appear to suggest a complicated (perhaps intractable) problem, the nature of the "feedback-inclusive" trade-off curve can be illustrated quite simply with a little high school algebra. Equation (1) represents a conventional Phillips wage curve including a price change variable:

$$(1)\ \Delta W = c + \alpha \Delta P + \theta U^{-1}.$$

As discussed in Chapter 5, the price effect in the wage determination process may be premised on past (catch-up), present (COLA clauses), or future (expectations) price inflation. To establish the existence and properties of a long-run, sustainable trade-off between inflation and unemployment that will persist after all feedback effects have taken place, the exact temporal specification of the price effect in the Phillips wage curve need not concern us.[5]

To derive a "feedback-inclusive" trade-off curve between inflation and unemployment, it is necessary to specify the general features of a price relationship connecting price levels to wage rates. Since this monograph is principally concerned with the structure and implications of wage inflation, we shall simply adopt the form of a structural price relationship tested and analysed by Bodkin et al. in their study, *Price Stability and High Employment: The Options for Canadian Economic Policy*. The key theoretical determinant of aggregate price inflation is assumed to be changes in unit labour costs (which can be defined as the wage rate divided by labour productivity).

Such a theoretical approach is consistent with either a marginal cost pricing model or a model in which firms "mark up" costs to establish price levels [Bodkin et al. (1966), pp. 13-16]. For expositional convenience we adopt the latter approach and assume that firms apply a *constant* percentage markup (λ) to unit labour costs,

$$(2)\ P = \lambda(W/PROD),$$

which can be approximated in "percentage change" form by the following equation:

$$(3)\ \Delta P = \Delta W - \Delta PROD.$$

There are two additional structural determinants of price inflation that should be considered. First, demand and supply conditions in the final product market may exert a direct effect on product prices; for example, excess demand conditions in the product market may lead to an increase in the markup factor and upward pressure on final prices. While excess demand conditions are undoubtedly important in some specific product markets (such as commodities), the effect of market conditions on aggregate price movements is very difficult to establish empirically.

> . . . a number of experiments were undertaken in which we attempted to assess the direct influence on consumer prices of excess demand in the product markets of the economy. . . . The direct influence of demand factors on price formation would appear to be of decidedly secondary importance. None of the regression coefficients of these proxies for excess demand was significantly different from zero. [Bodkin et al. (1966), pp. 148-49]

A more important additional determinant of Canadian aggregate price levels is the cost of both intermediate and final imported goods. An increase in the price of imported goods will lead to a direct increase in the Canadian price level. In a longer-run theoretical context (which is the orientation of this chapter), however, the foreign exchange rate should adjust to offset the effects of a relatively higher (or lower) rate of inflation in the cost of imported goods. While a change in the price of imported goods (either arising from a change in foreign prices or a change in the Canadian exchange rate) has important short-run implications for macroeconomic policy, it is not likely a determinant of the position of the long-run, sustainable trade-off curve between inflation and unemployment.

Given these two structural equations, which describe the key causal determinants of both wage inflation and price inflation, equation (3) can be substituted into equation (1) to produce the following algebraic result:

$$(4)\ \triangle W = \frac{1}{1 - \alpha}\ (c - \alpha \triangle PROD + \theta U^{-1}.$$

Equation (4) describes the long-run, sustainable trade-off curve between unemployment and wage inflation — a relationship that allows for all wage/price feedback effects throughout the economy. Of particular interest is the slope of this long-run, sustainable trade-off curve, given algebraically as $\frac{\theta}{1 - \alpha}$. Three particular slope cases can be distinguished.

First, if α were zero (i.e. price changes do not affect wage rates), then the long-run, sustainable trade-off curve would have the same slope θ as the Phillips wage relationship. Since all research known to this author has found a significant positive effect of (expected) prices on wages, we can safely dismiss this possibility. Second, if α exceeds zero but is less than unity, then the slope of the long-run trade-off curve will still be negative but will be steeper than the original Phillips wage equation. As α increases towards the value of unity, the long-run policy trade-off curve must become steeper. To illustrate this point, Chart 7-2 depicts a hypothetical linear Phillips wage equation with slope equal to minus one-half.[6] Three different long-run trade-off curves are drawn, assuming hypothetical values for α of 0.5, 0.75, and 0.9, with the previous $\alpha = 0$ case also labelled.[7] The slope of this long-run trade-off curve clearly becomes steeper as the value for α increases. Finally, if α takes on a value of unity (i.e. all price changes are incorporated into wage rates), then the long-run, sustainable trade-off curve will become a vertical line at some particular level of unemployment (sometimes called the "natural" rate of unemployment). In this final case, *no* sustainable trade-off would exist between inflation and unemployment.

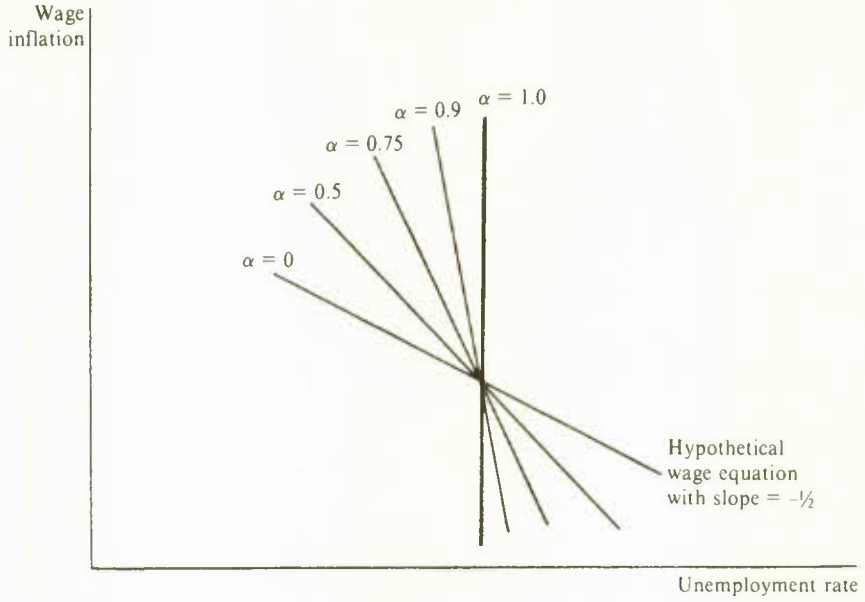
Assuming that price movements fully reflect changes in wage rates, the key parameter to establish the properties of the long-run, sustainable inflation/unemployment trade-off curve is the coefficient of the price change variable in the wage equation. As discussed in Chapter 5, Edmund Phelps and Milton Friedman have argued that this critical price coefficient should theoretically be equal to unity, since rational labour market decisions will be made in terms of the "real" wage rate. If wages were to rise by less than the inflation rate then, *ceteris paribus*, workers would be suffering from a form of "money illusion." The Phelps-Friedman hypothesis, which effectively denies the existence of a downward-sloping, long-run trade-off curve, has been challenged by a number of prominent economists.[8] The subtle, abstract degree of economic rationality attributed to participants of the labour market may be of questionable relevance in a dynamic, uncertain, fluctuating economy.

> In the very longest of runs under the very stablest of conditions, the Phillips curve may therefore be vertical. In the light of the evidence, however, I think it is folly to suppose *as a matter of logic* that twenty or thirty or fifty years of data culled from the real world will permit you to see the Phillips curve becoming vertical. For any span of years meaningful for the formulation and execution of economic policy, it may still be right and necessary to imagine the economy as trading off real output for price stability. [Solow (1976), p. 13]

In other words, the critical price coefficient α in the wage equation may not be equal to unity.

CHART 7-2

HYPOTHETICAL LONG-RUN, SUSTAINABLE TRADE-OFF CURVES FOR DIFFERENT VALUES OF THE PARAMETER α



While theoretical controversies ought to be resolvable with empirical evidence, the econometric evidence pertaining to the size of the price coefficient in the wage equation is inconclusive and subject to serious statistical problems. As pointed out in Chapter 5, all early empirical wage studies find that the price coefficient is well below the critical unity value, typically in the 35-70 per cent range. For example, the study by Bodkin et al. (covering the 1953-65 period) reports price coefficients in the order of 50 per cent and strongly promulgates the concept of a downward-sloping, long-run trade-off between inflation and unemployment. As the time period for these empirical wage studies was extended into the late 1960s and early 1970s, however, the estimated price coefficients clearly tended to rise, with many later studies reporting price coefficients exceeding unity.

In summary, estimates for the critical price coefficient in the wage equation appear to be highly sensitive to the time period selected, among other specification problems. Possible reasons for this parameter instability have been discussed in early chapters, and only two additional comments will be made at this stage. First, the price coefficient estimates contained in the early studies are likely understated for the following reasons. Given the relatively stable and modest rates of price inflation during the 1955-65 period, there may have been insufficient variation in the (expected) inflation rate to distinguish this price change variable from the constant in the regression.[9] Alternatively, a minimum or threshold inflation rate may be required to trigger the price effect in the wage determination process. Second, more recent wage studies have typically ignored price catch-up considerations and likely suffer from serious specification bias. As demonstrated in Chapter 5, price catch-up is not only a highly significant additional determinant of wages; the presence of such a catch-up variable substantially reduces the estimated total (composite) price effect within the wage equation. Thus early wage studies have likely underestimated the role of price inflation in the wage determination process, while more recent studies may have overstated this price effect.

Given "true" price coefficients in the wage change relationship that are likely relatively close to unity, the long-run, sustainable trade-off curve between inflation and unemployment facing Canadian policy-makers will be *very* steep, and for all practical purposes we might as well consider it to be vertical. Even if

the trade-off curve is not quite vertical, a small long-run reduction in the unemployment rate will generate a very substantial permanent increase in the inflation rate.[10] In reality, there is very little flexibility (if any) to lower the unemployment rate permanently through traditional demand management policies.

This is not meant to imply that there are no policy options available that will permanently lower the unemployment rate. Human resource policies can be directed towards 1/ improving job placement and counselling services, and 2/ upgrading the skills and abilities of the unemployed or potentially unemployed. Furthermore, the "supply side" aspects of government tax and transfer policies (such as the 1971 revisions to the Unemployment Insurance Act) may have aggravated the inflation/unemployment problem and implicitly contributed to a higher rate of unemployment (see Chapter 9). Within the macroeconomic context of this study, the important policy message of this chapter can be stated quite succinctly: there is little scope for demand management policies to lower the unemployment rate permanently.

8 The Short-Run Dynamics of the Inflation/Unemployment Trade-off

As discussed in the previous chapter, the long-run, sustainable inflation/unemployment trade-off is very steep (if not vertical), affording policy-makers little flexibility to lower the unemployment rate permanently using conventional demand management policies. The existence of a steep (or even vertical) long-run trade-off curve between inflation and unemployment, however, does not imply the end of "Keynesian economics." As we shall see in this chapter, there still remains a potentially important role for countercyclical demand management policies in the short run, and without such demand management policies the inflation/unemployment conflict may be seriously aggravated.

For purposes of this chapter, we shall assume that policy-makers have carefully weighed the relative costs of inflation and unemployment and have chosen a unique "target" position on a very steep, long-run trade-off curve.[1] In a stable world, discretionary changes in demand management policy would be used initially to steer the economy to this optimal target position on this steep, long-run trade-off curve;[2] but once the economy had reached this target position, no further changes in demand management policy would be required until the relative costs of inflation and unemployment had changed sufficiently to warrant a new target position on the long-run trade-off curve.

Unfortunately, the world we live in is not a stable textbook world. Our economy is continually buffeted by various types of shocks and disturbances. In this dynamic, unstable context, the long-run, sustainable trade-off curve describes the set of possible final equilibrium positions for the economy after all of the feedback effects have worked their way through the economic system. The disequilibrium Phillips wage relationship describes the important short-run path that the economy travels during the adjustment period accompanying a shock or disturbance. Before analysing this short-run adjustment process and the welfare costs associated with this adjustment phase, a brief discussion of the nature of the instability in the economic system is useful.

Disturbances to the economic system can generally be classified by their origin: those that originate from the "demand side" of the economy, and those that originate from the "supply side" of the economy. Supply shocks arise within production or pricing processes, and the recent quadrupling of oil prices, or a permanent reduction in the sales tax rate, would be good illustrations of supply shocks. At this stage of the analysis we shall concentrate on shocks or disturbances that arise from the "demand side" of the economy[3] and briefly discuss the potentially unstable elements in investment and export demand.[4]

Keynes very clearly identified the instability of investment expenditures as the major cause of the business cycle. Since capital formation depends on the long-run appraisal of profits and risks, the expectation of continuing prosperity may be an important stabilizing element in investment expenditures. Consequently the destruction of business confidence may precipitate a serious reduction in investment expenditures, which would lead to an economywide recession. Even though economists have made considerable progress in understanding the investment process, investment decisions are not always simple, predictable functions of current (or recent) economic events and may contain important autonomous elements.[5]

Besides the instability arising from investment demand shocks, the Canadian economy is one of the most "open" economies in the world, with approximately one-quarter of all Canadian-produced goods being exported. Since the principal determinant of export sales is the level of economic activity in foreign markets, a recession in a foreign economy can cause a severe negative demand shock in Canada; e.g. the sharp U.S. recession in 1973-75 produced a substantial reduction in Canadian exports in 1974 and 1975.

While there has been much debate in the economic literature concerning the stability of the economic system, there can be little doubt that the Canadian economy is subject to a continual series of demand shocks (both positive and negative). The key issues concern the predictability of individual demand shocks and the ability of the economic system to adjust on its own to these demand shocks. This latter issue brings us back to the short-run Phillips disequilibrium wage curve and a discussion of the adjustment process.

CHART 8-1

THE ADJUSTMENT PATH FOLLOWING A DEMAND SHOCK

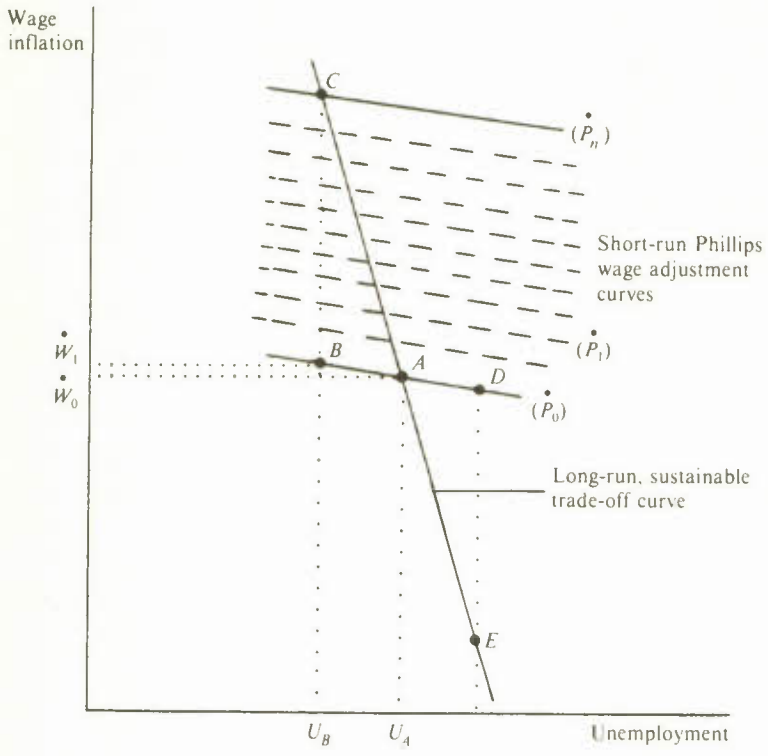


Chart 8-1 depicts a very steep, long-run trade-off curve with a hypothetical target position given as point *A*. For expositional purposes we assume that the economy is "resting" at this optimal long-run equilibrium position *A* (with constant wage and price inflation rates of $\dot{W}_0$ and $\dot{P}_0$ respectively) when an unexpected positive demand shock occurs. It is assumed that this positive demand shock stimulates output and employment, with a consequent reduction in the unemployment rate from U_A to U_B (in Chart 8-1). While such a positive demand shock may have some direct effect on price inflation because of excess demand pressures in the product market (or possibly exchange rate movements), our analysis will be restricted to the labour market.

How will wages respond to this positive demand shock and unexpectedly lower unemployment rate? First, many workers will be "caught in the middle" of a wage contract and will be "trapped" in a given wage structure for the rest of their contracts. Consequently, many workers will be unable to take advantage of this lower unemployment rate to further increase their wage rates until some time in the future. The existing structure of wage contracts means that two to three years will elapse before all workers will have had an opportunity to negotiate a new wage contract that reflects the improved labour market conditions. Thus the contractual rigidities of the labour market ensure that the response of wages to a demand shock will be spread over at least several years.

With the contractual rigidities and bargaining cycle of the labour market firmly in mind, let us now consider the response of wage rates to this unexpectedly low unemployment rate. The short-run adjustment path of wages is given by the Phillips disequilibrium wage curve, the relatively flat curve passing through point A in Chart 8-1. It is important to recall that this short-run curve is drawn on the assumption that the rate of price inflation remains constant (at $\dot{P}_0$). Assuming that this demand shock has little direct effect on the rate of price inflation, initial wage contracts signed during the bargaining cycle following the unexpected demand shock will likely be in the order of W_1 reflecting the (still) prevailing rate of inflation ($\dot{P}_0$) and the new lower unemployment rate (U_B).

As discussed in Chapter 7, however, the wage-price-wage feedback effects cannot be ignored, and position B in Chart 8-1 cannot be maintained. With new wage contracts being settled at somewhat higher rates of wage inflation, unit labour costs to the firms involved will increase at a faster rate than before. Given an increase in the rate at which costs are rising, these firms will increase (mark up) the rate of price inflation for their particular products. As more and more workers negotiate new wage contracts, this modest amount of additional wage inflation generated at point B will feed into price inflation, which will feed back into subsequent wage negotiations. As discussed in the Appendix to this chapter, workers will revise upwards their expectations of future inflation; price catch-up will become more important in wage bargaining; and existing wage contracts with COLA clauses will automatically provide larger wage increases. All of these forces will cause further increases in price inflation and a succession of upward shifts in the short-run Phillips wage curve. The economic system, temporarily resting at point B, will gradually adjust to the positive demand shock and will eventually return to a point on the long-run, sustainable trade-off curve. If the demand shock persists throughout the adjustment period and monetary authorities expand the money supply to validate the increased rate of price inflation, then *ceteris paribus* the economy will gradually move to point C (in Chart 8-1) on the long-run, sustainable trade-off curve.[6]

In summary, the adjustment process triggered by a demand shock consists of both a slow movement along the Phillips wage curve (the contractual bargaining cycle) and the slow process by which price expectations are revised upwards and price catch-up provisions are incorporated into new wage contracts. Even though there may be some offsetting factors, such as COLA clauses, and the tendency for contract length to shorten during serious disequilibrium periods, the adjustment period accompanying a demand shock will undoubtedly persist for a number of years.

THE RELEVANCE OF DEMAND MANAGEMENT POLICIES

Given the existence of demand shocks and the prolonged adjustment process accompanying demand shocks, we now turn to an examination of the potential usefulness of Keynesian countercyclical demand management policies. The first, and most obvious, policy implication of a demand shock is the deflection of the economy from its original point on the long-run, sustainable trade-off curve towards a new point. If the original position on the long-run trade-off curve was "optimal," then the new position to which the economy is heading must be clearly inferior.

To avoid this deflection of the economy to an undesirable position on the long-run trade-off curve, policy-makers could attempt to introduce a corresponding "offset" to the demand shock. Rather than allow the economy to follow an adjustment path from point *A* to point *B* and then, say, to point *C* in Chart 8-1, discretionary monetary and/or fiscal policy could be implemented to "cancel" the demand shock and move the economy back to the optimal point *A*. Recall that the adjustment period must be at least as long as the contractual bargaining cycle, thus giving policy-makers the opportunity to prevent the economy from moving all the way through the adjustment process.

It must be emphasized that when the demand shock is over, the demand management policy offset must be removed. To leave the demand management policy in effect after the shock is over would simply generate a new (undesirable) shock to the system. Demand management policies, as outlined by Keynes, are countercyclical in nature. They were intended to provide only *temporary* offsets to aggregate demand and not intended to form *permanent* features of the economic system.

In recent years a growing number of economists have questioned the validity of this "activist Keynesian" policy model, arguing that discretionary monetary and fiscal demand management policy will not work and will only aggravate the situation. To cite but two requirements of a successful Keynesian countercyclical policy, the demand shock must be sufficiently predictable in size and duration to determine the parameters of the demand management offset. Second, the policy offsets must be capable of affecting aggregate demand while the shock is still in place. If the shock recognition and policy lags exceed the duration of the shock, then demand management offsets will be destabilizing, as they will hit the economic system after the shock is over.

Proponents of a "nonactivist" position, many of whom are monetarists, also stress the ability of the economic system to adjust on its own to demand shocks. At minimum, one can agree with the monetarist view that demand shocks should *not* be validated by changing the rate of monetary expansion to bring it into line with the new (inappropriate) rate of inflation. In fact, by following a monetarist prescription that maintains a constant rate of growth in the money supply,[7] an "automatic" offset to demand shocks will be provided. As price inflation accelerates following a positive demand shock, the real value of the money supply will decline (a restrictive force). Given sufficient time, this automatic "real" monetary offset implicit in a constant, nominal monetary growth rule will bring the economy back to its original (desirable) position on the long-run trade-off curve. The "activist" response to this monetary-rule argument would emphasize the contractual rigidities in the adjustment process and the considerable length of time required for the slowly eroding money supply to bring the economic system back to its original position on the long-run trade-off curve.

In summary, the key issues in this debate between activists and nonactivists (often monetarists) involve 1/ the predictability of demand shocks, 2/ the length and predictability of the policy lags, and 3/ the speed with which the economic system adjusts on its own to demand shocks (again, the length of the lags). These are fundamental issues concerning the structure and stability of our free enterprise system, about which reasonable men can disagree. Without wishing to endorse fully the nonactivist position, there are limitations to the effective use of countercyclical demand management policy, and fiscal activists of the 1960s vastly overstated the ability of economists and policy-makers to "fine tune" the economy.[8]

> . . . the authorities should bear in mind the difficulties inherent in carrying out discretionary demand management policies, which are better understood now than they were ten years ago. The lag before new trends are recognized, the fallibility of forecasts, the delay before action is taken, and uncertainty about the timing and magnitude of the responses in the economy to the action taken, all conspire to render the task extremely difficult. For these reasons we believe that demand management policies should also be *cautious* in the sense that when there is an apparent need to change course, there should be a presumption against taking all the expansionary or restrictive action apparently required in one go. . . . [McCracken et al. (1977), pp. 190-91]

As Robert Gordon has noted,

> Unfortunately, policymakers cannot act as if the economy is an automobile that can quickly be steered back and forth. Rather, the procedure of changing aggregate demand is much closer to that of a captain navigating a giant supertanker. Even if he gives a signal for a hard turn, it takes a mile before he can see a change, and ten miles before the ship makes the turn. In the same way, the real world economy has a momentum of its own, and policy shifts cannot control aggregate demand instantly or precisely. [Gordon (1978), p. 334]

Even though there are severe limitations to the use of countercyclical demand management policies, there will likely exist certain occasions when demand management policy offsets are useful. A severe recession (or boom) in foreign markets or perhaps a major investment expansion (such as a new pipeline) may still render Keynesian countercyclical demand management policy a useful vehicle for steering the economy close to the optimal point on the steep, long-run trade-off curve. But, again, policy-makers would be well-advised to remember Gordon's analogy. Steering the economy with demand management policies is much more akin to "navigating a giant supertanker" than it is to driving a jeep.

THE POTENTIAL INFLATIONARY BIAS OF DEMAND MANAGEMENT POLICIES

While the preceding pages have considered the adjustment process associated with demand shocks, there is a crucial difference in the welfare costs (benefits) to society during this adjustment phase, depending upon whether the demand shock is positive or negative. This asymmetry in welfare costs arising from positive and negative demand shocks has undoubtedly tempered the use of demand management policies and has likely produced a substantial inflationary bias in monetary and fiscal policies.

To illustrate this asymmetry in welfare costs, let us briefly reconsider the effects of both positive and negative demand shocks. Again, our hypothetical economy is assumed to be resting at an optimal point *A* (in Chart 8-1) when a strong *positive* demand shock occurs. The initial short-run effects of this expansionary shock are very favourable as the economy moves leftward on a relatively flat short-run Phillips curve to a point such as *B*. Only minor immediate inflationary pressures will develop, as most of the labour force is locked into long-term wage contracts, and the immediate effects of this expansionary shock are likely to be concentrated in output and employment gains. As more workers renegotiate their wage contracts, however, the modest amount of additional wage inflation generated at point *B* will increase. The combination of upward revisions in price expectations, the need to catch up from unexpected inflation, and the existence of COLA clauses will cause the short-run Phillips wage curve to drift upwards. The economic system, temporarily resting at point *B*, will eventually return to a higher point on the long-run trade-off curve, such as point *C*.[9] Even though this new point on the long-run trade-off curve must be inferior to the original (optimal) position, during the short-run adjustment period society has enjoyed very favourable economic circumstances. In particular, the early adjustment phase of a positive demand shock is accompanied by considerable employment and output expansion, with only modest inflationary consequences. Unfortunately, this brief period of favourable economic circumstances cannot be sustained.

In direct contrast, there will be substantial welfare costs associated with the adjustment period accompanying a negative demand shock. A contractionary demand shock will push the economy out to the right on the relatively flat short-run Phillips curve, say, to point *D* in Chart 8-1. The early phase of the adjustment process is characterized by a substantial increase in unemployment but only a very small reduction in the inflation rate. The insensitivity of wage inflation to excess labour supply is now a serious liability, since a considerable period of unemployment must be endured to move the economic system back down the long-run trade-off curve, say, to point *E* in Chart 8-1. In summary, there are substantial, short-run welfare costs to society during a negative demand shock, in direct contrast to the favourable economic circumstances that accompany the early phase of a positive demand shock.[10]

The asymmetry in welfare costs associated with the early adjustment phase accompanying positive and negative shocks will likely cause government policy to have a strong inflationary bias. First, governments facing a difficult adjustment period arising from a negative demand shock will likely institute appropriate demand management policy to offset the negative effects of the demand shock. On the other hand, governments may resist implementing restrictive policies to offset a positive demand shock (i.e. to "cool off" the economy), preferring the short-run transitory benefits of a relatively lower unemployment rate without a substantial increase in the inflation rate. In short, there are much more compelling short-run reasons to offset negative demand shocks than to offset positive shocks. Unfortunately, riding the crest of positive demand shocks (and offsetting negative demand shocks) only postpones the day of reckoning. Each unchecked positive demand shock sends the economy higher and higher up the steep, long-run trade-off curve. Sooner or later, the inflation rate will be generally recognized as being "too high," and at such time the government will be forced to institute restrictive policies to move the economy back down the long-run trade-off curve. During this downward adjustment period, society must bear the costs of both abnormally high unemployment and high inflation rates. As John Vanderkamp put it:

> In the downward direction, the path of adjustment is likely to be tortuous. . . the Phillips curve is not dead, but it is in fact a more dangerous device than the simple trade-off approach implies. The danger lies in the costs of reducing inflation, which may not be realized when the economy is moving to higher inflation rates. [Vanderkamp (1975), pp. 121-22]

In addition to the natural reluctance of policy-makers to offset a positive demand shock, governments may actually instigate a positive demand shock through expansionary monetary and fiscal policy to procure a brief period of economic tranquility. As is obvious from the above discussion, such "buy now, pay later" policies only postpone the day of reckoning. Expansionary policy forays into the region to the left of the long-run trade-off curve must eventually be countered by a dose of slow-working, restrictive demand management policies (with their painful welfare costs) or tolerated in the form of a permanently higher inflation rate.

The inflationary bias of rolling with the positive demand shocks and pursuing overly expansionary demand management policies is perhaps the principal lesson to be learned from the past decade. Following the sharp 1969-70 recession, demand management policies were abruptly switched from restraint to vigorous stimulation. The money supply was permitted to grow at a record annual rate of 13+ per cent for three successive years (1971-73), all preceding the rapid rise in oil prices. As the Department of Finance noted in its November 1978 study, *Canada's Recent Inflation Experience*:

> . . . the very rapid rates of growth of the money supply between 1970 and 1973 were a striking feature of this period as compared with the expansion of 1961-1966. . . . Fiscal policies in Canada and many other countries were also extremely expansionary between 1970 and 1973. . . .
>
> In retrospect it is clear that aggregate demand policy in the period 1971-73 was excessively expansionary. [pp. 11-14]

Even though international price movements clearly aggravated the dynamics of the inflation/unemployment conflict, excessively expansionary domestic demand management policy in the early 1970s may lie at the heart of the difficult downward adjustment path that the Canadian economy followed in the mid-1970s.[11] A prolonged period of abnormally high unemployment and inflation may be required to bring the economy back down to a lower sustainable inflation rate.[12]

9 The "Supply Side" Implications of Government Tax and Transfer Policies

While traditional macroeconomic analysis has focused almost exclusively on the expenditure side or the "demand side" of government policy, the "supply side" consequences of fiscal policy may have equally important implications for the inflation/unemployment trade-off. The purpose of this chapter is to explore the "supply side" effects of government tax transfer policies, paying particular attention to the effects on labour market decisions and wage inflation. As we shall see, the "supply side" component of recent government policies may have caused a serious deterioration in the Canadian unemployment/inflation trade-off.

THE GROWTH IN THE RELATIVE SIZE OF THE GOVERNMENT SECTOR

Perhaps the most dramatic and important structural change in the Canadian economy in the last 20 years has been the extremely rapid growth of the government sector. While the Canadian Gross National Product (GNP) in nominal terms grew at an average annual rate of 9.2 per cent over the 1955-75 period, government spending on goods and services increased at an average rate of 11.0 per cent (see Table 9-1).[1] This simple comparison of government expenditures on goods and services with GNP fails, however, to consider a very important facet of government fiscal activity — namely, transfer payments such as baby bonus cheques, unemployment insurance, welfare payments, and so on. Adding together total government revenues and the size of the government deficit provides a more appropriate measure of total government spending (including transfers). As displayed in Chart 9-1, the proportion of total GNP spent and transferred by the government rose from 25 per cent in 1955 to 40 per cent in 1975, with most of that growth in the relative size of the government sector occurring during the 1965-75 period.

TABLE 9-1

ANNUAL GROWTH RATE OF SELECTED NATIONAL ACCOUNTS SERIES (in Current Dollars)

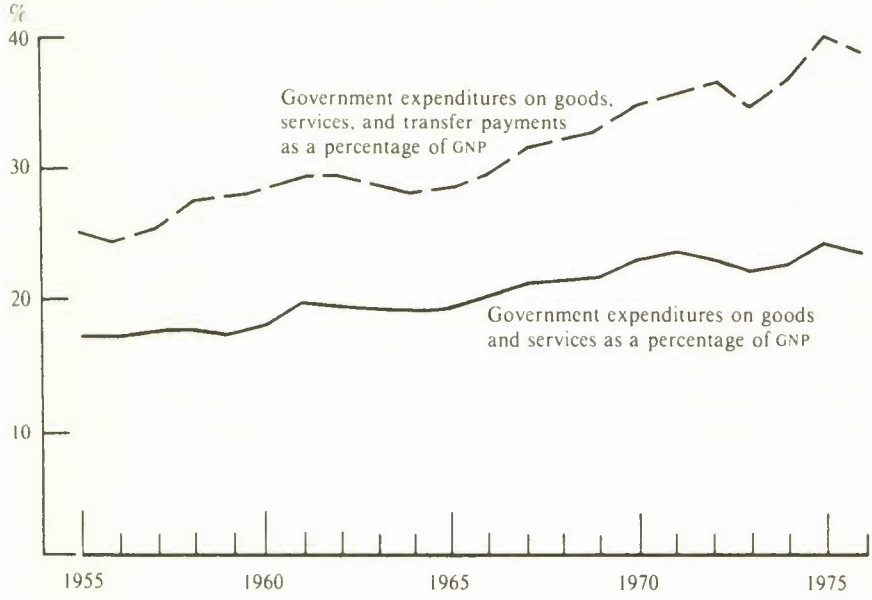
	1955-75	1955-65	1965-75
		(Per cent)	
Gross National Product	9.2	6.8	11.5
Consumption expenditures	8.7	6.3	11.0
Wages and salaries	10.0	7.3	12.7
Government expenditures on goods and services	11.0	8.0	14.0
Government revenues	11.4	8.4	14.5
Indirect taxes	9.7	8.5	10.8
Direct personal taxes	13.7	9.0	18.3

Despite this tremendous growth in Canadian government fiscal activities, conventional macroeconomic analysis typically regards the size of the government deficit as the key indicator of fiscal policy. In this context, a review of the National Accounts produces a rather surprising result. During the 1964-74 period when the government sector grew most rapidly, *not once* was there a deficit for total government fiscal activity. On the basis of 11 successive years of surpluses, most macroeconomic analysts would likely describe the fiscal posture of the Canadian government during these years of rapid growth in government activity as being "restrictive" or "noninflationary."

It is the argument of this chapter, however, that restricting one's attention to the "demand side" of fiscal policy may overlook important "supply side" effects of fiscal policy. In particular, the tax and transfer policies of the government may have inflationary consequences that should not be ignored. We begin our analysis with an examination of the potential inflationary effects of increases in the rate of taxation on the wage determination process. Both indirect (e.g. sales) taxes and personal income taxes — the two principal components of the Canadian tax system — are considered. In each case the theoretical implications of higher rates of taxation are discussed, followed by a review of the relevant Canadian empirical evidence. The final section of this chapter examines the potential inflationary "supply side" consequences of a change in a major government transfer program — the 1971 revisions to the Unemployment Insurance Act.

CHART 9-1

GROWTH IN THE RELATIVE SIZE OF THE GOVERNMENT SECTOR, 1955-76



INDIRECT TAXES

As discussed in Chapter 5, increases in consumer prices exert a strong positive effect on wages, as workers attempt to maintain their real wage rate. Included in the final price of consumer goods are not only the costs (and profits) associated with producing these goods, but also a number of indirect taxes such as provincial sales tax, manufacturing sales tax, excise tax, and customs duties. The imposition of an indirect tax drives a wedge between the price that the consumer pays for the product and the price that the firm

receives for producing the product. If indirect taxes are "shifted forward" to the consumer, then final consumer prices will be higher than they would have been in the absence of indirect taxes. Douglas Auld has estimated that during the 1949-70 period 93 per cent of all indirect taxes in Canada were shifted forward into higher consumer prices [Auld (1974), p. 150].[2] To the extent that workers negotiate larger wage settlements to offset tax-induced higher price levels, an increase in the rate of indirect taxation will trigger the wage/price spiral described in the previous two chapters.

To analyse the inflationary consequences of increasing rates of indirect taxation, the long-run trade-off curve must be derived, with the role of indirect taxes made explicit. Following the analysis of Chapter 7, prices are assumed to be based on a *constant* percentage markup of unit labour costs ($W \div PROD$). This constant percentage markup, however, must now be generalized to include the "government markup" through indirect taxation. In equation (1), $\triangle TAX$ represents the indirect taxation wedge between the firm's supply price and the final consumer price, with all variables being expressed in percentage change form. Utilizing

$$(1)\ \triangle P = \triangle W - \triangle PROD + \triangle TAX \text{ and}$$

our conventional Phillips wage-adjustment relationship,

$$(2)\ \triangle W = c + \alpha \triangle P + \theta U^{-1},$$

the long-run feedback-inclusive trade-off curve can be derived by substituting equation (1) into equation (2):

$$(3)\ \triangle W = \frac{1}{1 - \alpha}\ (c - \alpha \triangle PROD + \alpha \triangle TAX + \theta U^{-1}).$$

While an increase in the rate of indirect taxation ($\triangle TAX$) does not alter the slope of the long-run inflation/unemployment trade-off curve, the intercept of the trade-off curve is clearly affected. An increase in the rate of indirect taxation will cause an unambiguous upward shift (deterioration) in the long-run sustainable trade-off relationship between inflation and unemployment, with the magnitude of this shift determined by $\frac{\alpha}{1 - \alpha}\ (\triangle TAX)$. It is important to point out, however, that this deterioration in the trade-off curve is only present while indirect tax rates are rising — i.e. while governments are expanding and increasing their relative share of GNP by imposing higher indirect tax rates. Once the rate of indirect taxation is held constant ($\triangle TAX = 0$), then the long-run trade-off curve will shift back to its original, more desirable location.

Having outlined the theoretical inflationary consequences of changing the rate of indirect taxation, we now briefly examine the trend of Canadian indirect tax rates over the last 20 years. While total indirect tax revenues have increased by an average annual rate of 9.7 per cent, total nominal-dollar GNP has increased by 9.2 per cent (see Table 9-1). This evidence would suggest that indirect tax rates have increased on an annual basis by a relatively small amount. To obtain a rough estimate of the change in indirect tax rates, an average implicit rate of indirect taxation has been computed as the ratio of total indirect tax revenues to total nominal-dollar consumption expenditures.[3] This average implicit rate of indirect taxation increased from 18.5 per cent in 1955 to 22.2 per cent in 1975, equivalent to a 0.15 per cent increase per year. This increase in indirect taxation corresponds to the increases in provincial sales tax rates during this period; thus any "modest" deterioration in the long-run inflation/unemployment trade-off curve associated with increased rates of indirect taxation[4] should primarily be attributed to the increased activities of provincial governments.

THE CANADIAN PERSONAL INCOME TAX SYSTEM

Increases in the average rate of personal income tax may be inflationary if labour attempts to recoup part or all of their "lost income" from higher rates of income tax in the form of larger wage settlements. If labour bargains in terms of "net take-home" pay rather than "gross" pay, then an increase in the rate of income taxation may lead to a higher wage settlement than would otherwise have prevailed.[5] In terms of the conventional wage determination model, a new variable representing the change in the rate of income tax ($\triangle YTAX$) would appear with an expected positive effect.

$$\triangle W = c + \alpha \triangle P + \theta U^{-1} + \gamma \triangle YTAX$$

In a bargaining context, a possible mitigating influence on this "tax push" inflationary pressure on wage rates might occur if labour perceives that the benefits accruing from increased government spending on public goods offset the utility loss associated with the forgone consumption of private goods[6] because of the higher tax rates.[7] Unfortunately, the incidence of benefits from government spending (e.g. on highways, schools, medicare, and postal services) is seldom perceived to be the same as the incidence of taxation and the loss of private consumption goods. This argument is undoubtedly strengthened, as government spending is directed away from the provision of public goods and towards increased transfer payments. Since transfer programs typically represent deliberate government attempts to alter the distribution of income, the incidence of taxation and the benefits of transfer payments cannot be the same. Many taxpayers will regard higher income tax rates to pay for improved transfer programs as "legislated charity" to which they would not have voluntarily contributed. Under such circumstances, taxpayers would clearly perceive themselves to be worse off and might seek higher wage rates to compensate for their loss in real income and consumption of private goods and services.

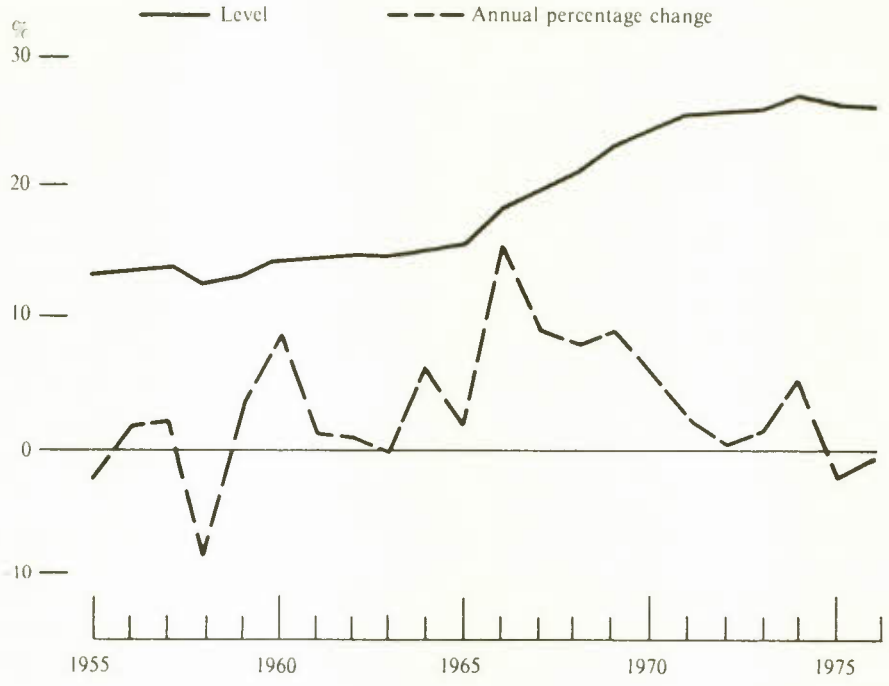
To the extent that γ is positive in the above wage adjustment equation, an increase in the rate of income tax would lead to an outward shift (deterioration) in the long-run inflation/unemployment trade-off curve. The policy implications of an increase in the rate of income taxation are identical to those of an increase in the rate of indirect taxation. While average income tax rates are rising as the relative size of the government increases, the trade-off curve necessarily deteriorates. Once tax rates are held constant, the trade-off curve will shift back to its original position. Finally, a permanent reduction in average income tax rates will cause a temporary, favourable inward shift in the long-run trade-off curve.

Turning to an examination of Canadian income tax trends during the 1955-75 period, one finds that personal income tax revenue grew at an extremely rapid rate. While total wages and salaries increased by an average of 10.0 per cent per annum, personal income tax revenue increased by 13.7 per cent, with an accelerating trend in the 1965-75 period (see Table 9-1). As Chart 9-2 reveals, the average implicit income tax rate (computed as total personal direct taxes divided by total wages and salaries) was only 13.3 per cent in 1955 and 15.7 per cent in 1965 but had risen to 25.7 per cent by 1975.

It is interesting to note that this tremendous growth in personal income tax revenue from the mid-1960s to the early 1970s was accomplished with few increases in statutory tax rates and was attributable almost entirely to the "progressivity" of the personal income tax structure. Prior to the 1974 indexation of the Canadian income tax system, wage increases associated with inflation (and labour productivity) pushed workers into higher average and marginal tax brackets. To illustrate the implications of the progressive Canadian income tax structure, Table 9-2 presents the average and marginal tax rates for a married Ontario worker (with spouse and two children as dependants) who earns the *average* wage level. This typical average wage earner saw his average and marginal tax rates increase from 6.4 and 18.5 per cent in 1961 to 13.4 and 30.0 per cent, respectively, in 1975. Put in dollar terms, this *average* worker would have had an extra $750 per annum in take-home pay (in 1975) had the income tax system remained proportional at the 1961 levels.

CHART 9-2

PERSONAL DIRECT INCOME TAX AS A PERCENTAGE OF TOTAL WAGES AND SALARIES, 1955-76



Given this doubling in the average income tax rate over a span of approximately ten years, it would seem reasonable to expect that labour would try to recoup at least part of this tax-induced income loss via larger wage settlements.

> The scramble by individuals to regain their pre-tax levels of real income will likely be translated into demands for higher nominal wages. [Courchene (1977), p. 150]

Five recent Canadian studies[8] have attempted to measure statistically the impact of the Canadian tax system on wage changes. While the evidence presented in these studies is open to various interpretations (and is not without its econometric problems), all five studies indicate that the Canadian income tax system has had a positive effect on wage inflation.

TABLE 9-2

PERSONAL INCOME TAX RATES FOR AN "AVERAGE" WORKER,* SELECTED YEARS, 1961 TO 1975

	Average annual wage	Average income tax rate	Marginal income tax rate
	(Dollars)	(Per cent)	
1961	4,090	6.4	18.5
1965	4,760	8.5	21.0
1970	6,630	13.6	29.0
1975	10,630	13.4	30.0

*Married, with spouse and two children as dependants, and living in Ontario.

Even though the existing econometric evidence is "very tentative" [Kotowitz (1979), p. 7], there are strong theoretical reasons to believe that a causal relationship exists between income tax rates and wage levels. While the exact magnitude of the "tax push" effect may be debatable, it would be difficult to rationalize a tax-financed growth in the government sector, from 25 to 40 per cent of GNP, as being neutral with respect to wage and price levels. In fact, the possible existence of "tax push" inflation was implicitly acknowledged by the Honourable John Turner, then Minister of Finance, in his November 1974 Federal Budget:

> . . . the fiscal stimulus should come primarily from a further cut in taxes, rather than an additional increase in expenditures. I believe that tax cuts can help to reduce prices and costs directly and indirectly and thus slow down the upward momentum of inflation. [*Hansard*, p. 1422]

As discussed above, an expanding government sector, financed by higher rates of taxation, will lead to a deterioration in the long-run trade-off between inflation and unemployment. However, the maintenance of the same average rate of income taxation as accomplished by the 1974 indexing of the federal income tax system should neutralize "tax push" inflationary pressures arising from the progressive income tax system and should lead to a favourable inward shift of the long-run trade-off curve.

THE "SUPPLY SIDE" EFFECTS OF GOVERNMENT TRANSFER PROGRAMS: UNEMPLOYMENT INSURANCE

Besides the inflationary consequences of increasing tax rates, one may also want to consider the potential "supply side" effects of government transfer programs. If government fiscal policy affects the basic incentive structure of the economy, then restricting one's analysis exclusively to "demand side" effects may overlook important "supply side" reactions. Workers and/or firms may respond to a new incentive structure implicit in a government program by altering their behaviour — a "supply side" reaction that may fundamentally alter the long-run trade-off possibilities between inflation and unemployment.

Since this monograph is explicitly concerned with wage inflation, our attention will be limited to the "supply side" effects of government fiscal policy within the labour market. In particular, are labour market decisions affected by the existence, availability, and generosity of government transfer programs? The substantial liberalization of the Unemployment Insurance Act in 1971 provides an interesting test case to examine the potential "supply side" effects of a major change in a government transfer program.

As discussed in the latter part of Chapter 4, there is a strong consensus that the unemployment rate is no longer a consistent measure of demand and supply conditions within the Canadian labour market. As the Economic Council of Canada concluded, "basic changes in the labour market have rendered the message of the unemployment rate today rather different from that of a decade ago" [Economic Council (1976), p. 211]. The conventional relationship between unemployment rates and job vacancies has dramatically shifted, and a given level of excess labour demand, as measured by the job vacancy index, now corresponds to a much higher rate of unemployment (see Chart 4-1).

A wage change relationship that is estimated in terms of the vacancy rate will, therefore, now translate into a much higher wage-change/unemployment trade-off curve; i.e. higher rates of wage inflation are now associated with a given unemployment rate.[9] Thus the long-run sustainable trade-off curve facing Canada in the 1970s is decidedly worse than that encountered in earlier decades — a direct by-product of the changing structure of the labour market.

Two alternative explanations have been advanced to account for the structural transformation of the Canadian labour market during the 1970s. One explanation focuses on exogenous demographic factors and points to dramatic changes in the age/sex/family-status characteristics of the Canadian labour force during the 1970s. The traditional stereotype of the unemployed worker as a prime-aged male with a family to

support is less and less true, and the trend towards multi-earner family units may have alleviated some of the financial hardships associated with unemployment. Consequently, a given unemployment rate in the 1970s likely reflects a lower degree of excess supply pressure in the labour market than the same unemployment rate would have reflected in the 1950s and 1960s.

An alternative explanation for the structural transformation of the Canadian labour market emphasizes the 1971 liberalization of the Unemployment Insurance Act. Higher benefit rates, extended benefit periods, and reduced qualification time periods have lowered the cost of being unemployed. It would be very surprising if some persons, particularly secondary workers, did not react rationally to this new incentive structure by exercising much more discretion over the choice of jobs that they will accept. As a consequence of this new policy-induced labour supply response, employers may now be forced to make *higher* wage offers if they wish to fill vacant jobs for any given level of unemployment.[10]

Whether this deterioration in the long-run trade-off curve arising from structural changes in the labour market should be attributed primarily to the exogenous demographic forces described above or to the liberalization of the Unemployment Insurance Act is perhaps a moot point. There are, however, a number of reasons to believe that the changes in the Unemployment Insurance Act may have been an important factor. First, the timing of the revisions in the Act corresponds with the breakdown of the unemployment/vacancy-rate relationship in the early 1970s [Green and Cousineau (1976), particularly Chapter 4]. Second, a recent study by Reid and Meltz (1978) suggests that approximately 60 per cent of the shift in the unemployment-rate/vacancy-rate relationship can be attributed to changes in the Unemployment Insurance Act, the remainder being attributable to demographic effects. In fact, a number of studies have examined the impact of the 1971 revisions and have concluded that the level of unemployment in Canada was significantly higher than it would have been in the absence of changes to the Act.[11] Finally, Louis Christofides, Robert Swidinsky, and I recently tested a wage change model in which a variable representing the benefit/wage ratio associated with the unemployment insurance program was directly interacted with the intercept and slope parameters of the Phillips wage curve. This unemployment insurance variable is significant and suggests that the 1971 revisions to the Act have shifted the wage-change/vacancy-rate relationship upwards by approximately one percentage point [Christofides et al. (1980)]. To the extent that most of the shift in the unemployment/vacancy-rate relationship can also be attributed to the 1971 revisions, the wage-change/unemployment trade-off curve will be decidedly worse in the 1970s, as both unemployment insurance effects operate in the same direction.

To summarize the last section of this chapter concerning the potential inflationary consequences of the 1971 revisions to the Unemployment Insurance Act, we quote from the Department of Finance report of November 1978, *Canada's Recent Inflation Experience*:

> The changes made to Canada's unemployment insurance system in 1971 also stand out as an important factor contributing to the upward drift of the measured unemployment rate and worsening of the inflation-unemployment trade-off. . . .
>
> In conclusion much of the evidence now available suggests that UI revisions of 1971 may have had the effect of increasing the unemployment rate by inducing higher participation rates, at least in certain provinces, and, more importantly, higher rates of job quitting and longer average durations of unemployment for some groups in the labour force. To the extent that this occurred, the unemployment rate associated with a given rate of inflation rose. [pp. 36-39]

In this context, if government policy continued to pursue the "old" unemployment targets even though the liberalization of the Unemployment Insurance Act has altered the meaning and magnitude of unemployment, the end result would be a rise in the inflation rate. In retrospect, the "excessively expansionary" government policies in the early 1970s may in part be attributed to a failure on the part of policy-makers to recognize that the measured unemployment rate in the 1970s was no longer comparable to actual unemployment rates in the 1960s.

10 Summary and Conclusions

Almost 20 years have passed since A. W. Phillips first presented empirical evidence to support the proposition that the rate of change of money-wage rates can be explained by the level of unemployment. Phillips' seminal paper provided an important stimulus to the exploration of the wage determination process, and simple variants of the Phillips curve were quickly assimilated into the body of widely accepted economic propositions. Numerous studies established the existence of a Canadian Phillips curve, and policy-makers became almost instant converts to the new Phillips-curve constraint. Structuralist arguments about the causes of unemployment were quickly forgotten, and the concept of a "trade-off" became an integral part of the policy-maker's lexicon.

Chapters 3 and 4 of this study are devoted to a systematic analysis of the theory behind the Phillips curve and the Canadian empirical evidence that has been advanced in support of the Phillips wage relationship. With respect to the theoretical underpinnings of the Phillips curve, all economists would agree that demand pressure in the labour market will cause wages to rise. The key assumption implicit in the Phillips-curve model asserts that the *speed* with which wages increase is a stable function of the *amount* of excess demand pressure in the labour market. While this assumption seems plausible, economists have no theoretical proof that disequilibrium processes actually operate in such a fashion. It is simply assumed that they do.

In reviewing the empirical evidence pertaining to the existence and stability of the Canadian Phillips curve, one encounters a number of important econometric and institutional problems. Perhaps the major empirical problem concerns the specification of a suitable proxy variable to quantify excess labour demand. Traditionally, the unemployment rate has been utilized to proxy labour market conditions within the Phillips-curve model. Canadian Phillips-curve studies of 1970 vintage, however, typically find that the effect of unemployment rates on wages is perverse. Higher rates of wage inflation now appear to be associated with higher rates of unemployment — the Phillips curve slopes up.

Despite these recent perverse Phillips-curve estimates, it can be argued that labour market conditions are still a significant determinant of wage inflation. The problem with the traditional Phillips-curve specification is that the unemployment rate is no longer a consistent measure of demand and supply conditions within the Canadian labour market. Structural changes in the labour market have "rendered the message of the unemployment rate today rather different from that of a decade ago" [Economic Council of Canada (1976)]. Whether these structural changes in the Canadian labour market can primarily be attributed to exogenous demographic shifts or to the 1971 revisions in the Unemployment Insurance Act is perhaps debatable, although most economists would argue that the liberalization of the Unemployment Insurance Act has had an adverse impact on the labour market decisions of secondary workers. Given these major structural changes within the Canadian labour market during the last decade, the unsatisfactory performance of the unemployment variable in the Phillips-curve model is not surprising. The results of a number of wage studies strongly suggest, however, that an alternative measure of labour market conditions, such as

the job vacancy rate or the help-wanted index, is positively correlated with wage changes. As the market for labour tightens (there are more job vacancies), wage inflation accelerates. The Phillips curve exists, but only when the labour market variable is specified in an appropriate manner.

Perhaps the most important finding of the empirical wage studies is the slow responsiveness of wage changes to labour market conditions. The estimated Phillips wage curve is relatively flat, with only a very gentle slope. Unfortunately, the flatness of the estimated Phillips wage curve may have deluded policy-makers into a false belief that lower unemployment rates would generate only modest amounts of additional inflation. To assume that the relatively flat Phillips wage curve also represents the long-run sustainable trade-off between inflation and unemployment fails to consider the important feedback effects associated with the wage/price spiral.

As discussed in Chapter 5, all Phillips-curve wage models also include a second explanatory variable to capture the influence of consumer price movements on wage rates. Consequently, the Phillips wage curve describes various wage-inflation/unemployment-rate possibilities for a *given* rate of price inflation. To the extent that product prices are determined by production costs (including wage rates), then different rates of wage inflation along the Phillips curve must be associated with different rates of price inflation. One cannot choose a different rate of wage inflation from the Phillips curve without causing a different rate of price inflation to emerge. Any attempt to move *along* the Phillips wage equation will generate a new rate of price inflation that will cause the Phillips wage equation to *shift* to a new location.

In Chapter 7, the long-run, sustainable trade-off curve between inflation and unemployment is derived. This long-run trade-off curve allows for all price-wage-price feedback effects and will necessarily be much steeper than the (short-run) Phillips wage curve. In fact, the slope of the long-run trade-off curve depends critically on the amount of price compensation within the wage determination process (i.e. the size of the price coefficient in the wage equation). As the amount of price compensation in wage contracts increases, the long-run trade-off curve becomes much steeper. If *all* price movements are totally reflected in wage rates, then the long-run trade-off possibilities will vanish into a vertical line.

The empirical evidence reviewed in Chapter 5 suggests that most, if not all, of the price inflation is incorporated into wage rates. Thus the long-run Canadian trade-off curve between inflation and unemployment is very steep, if not vertical. Even if this long-run trade-off curve is not quite vertical, a *small* permanent reduction in the unemployment rate will generate a *very substantial* sustained increase in the inflation rate. There is very little flexibility, if any, for governments to lower the unemployment rate permanently via traditional monetary and fiscal policies, and the inflationary consequences of attempting to do so are very great.

The existence of a very steep (or even vertical) long-run trade-off curve between inflation and unemployment does not, however, signal the end of "Keynesian economics." Our economy is continually buffeted by various types of demand shocks (such as a foreign recession that affects Canadian exports). Rather than allow a demand shock to "deflect" the economy from an optimal or target position on the long-run trade-off curve, *temporary* discretionary monetary and/or fiscal policies can be implemented to cancel or offset this demand shock. Once the demand shock is over, the demand management policy offset must be removed in order to avoid a new demand shock arising from the inappropriate old policy offset. While the unpredictability of demand shocks and inherent policy lags seriously limit the application of countercyclical demand management policies (particularly in a "fine tuning" sense), discretionary monetary and/or fiscal policies may still be necessary to provide temporary (not permanent) aggregate demand offsets occasioned by long or persistent demand shocks.

As discussed in Chapter 8, there is a fundamental asymmetry in the welfare costs associated with the adjustment phase arising from positive (expansionary) demand shocks as opposed to negative (contractionary) demand shocks. This asymmetry in welfare costs has undoubtedly tempered the use of demand management policies and has likely produced an inflationary bias to monetary and fiscal policies. The adjustment path accompanying a positive (expansionary) demand shock entails a short-run period of

abnormally low unemployment, with only a very modest increase in the inflation rate. Most of the labour force will be locked into long-term wage contracts, and the immediate effects of an expansionary demand shock are likely to be concentrated in output and employment gains. As more and more workers renegotiate their wage contracts at this lower unemployment rate, however, additional wage inflation will feed into price inflation, and the short-run Phillips wage equation will gradually drift upwards. In other words, this temporary, favourable short-run position cannot be maintained, and the economic system will *gradually* move back up to the steep, long-run, sustainable trade-off curve. In direct contrast, the economic adjustment costs borne by society during a negative (contractionary) demand shock will be very painful, as the short-run adjustment period is characterized by a substantial increase in unemployment but only a slight decline in the inflation rate. The relative insensitivity of wage changes to excess labour supply is now a serious liability, and a considerable period of high unemployment may be required to shift the short-run Phillips wage curve down to a new equilibrium position on the long-run trade-off curve.

Given this fundamental asymmetry in welfare costs associated with positive and negative demand shocks, government policy likely has a strong inflationary bias. While the motivation to offset a negative demand shock is very compelling, governments may resist taking the necessary restrictive measures to offset persistent positive demand shocks, preferring the short-run transitory benefits of relatively low unemployment and only modest increases in the inflation rate. Unfortunately, riding the crest of positive demand shocks (and offsetting negative demand shocks) only postpones the day of reckoning. Each unchecked positive demand shock sends the economy higher and higher up the steep, long-run trade-off curve. Sooner or later, the inflation rate will be generally recognized as being too high, and at such time the government will be forced to institute restrictive policies to move the economy back down the long-run trade-off curve. During this downward adjustment period, society will have to bear the welfare costs of both abnormally high unemployment and inflation rates. Even worse, governments may actually instigate positive demand shocks through expansionary monetary and/or fiscal policy to procure a brief period of economic tranquility. Such "buy now, pay later" expansionary policy forays into the "tempting" region to the left of the long-run trade-off curve must eventually be countered by a dose of slow-working, painful, restrictive demand management policies or tolerated in the form of a permanently higher inflation rate.

As discussed in Chapter 8, the inflationary bias of rolling with the positive demand shocks and pursuing excessively expansionary demand management policies is perhaps the principal lesson to be learned from the early 1970s. A prolonged period of abnormally high unemployment and inflation may be required to bring the economy back down to a lower sustainable inflation rate and to purge the inflationary consequences of earlier "excessively expansionary" demand management policies.

The final analytical chapter in this monograph explores the "supply side" effects of government tax and transfer policies. Perhaps the most dramatic and important structural change in the Canadian economy during the last 20 years has been the extremely rapid growth in the size of government activities. The proportion of Gross National Product spent, or transferred, by governments increased from 25 per cent in 1955 to 40 per cent in 1975, with most of this growth in government activity taking place after 1965. To finance this tremendous growth rate in government fiscal activities, tax rates were increased, and the progressive income tax structure was exploited, with the average rate of personal income taxation having increased from 13.3 per cent in 1955 to 25.7 per cent in 1975.

As argued in Chapter 9, workers will attempt to recoup at least part of their lost income from increased tax rates through higher wage settlements. Such a tax-induced behavioural response will cause the long-run trade-off curve to shift outward to a more undesirable location. Thus, increasing the relative share of government spending can be inflationary from both "demand side" and "supply side" perspectives. Not only does increased government spending cause the economy to move up to a higher point on the long-run trade-off curve (the balanced-budget multiplier effect), continual increases in tax rates may cause the long-run trade-off curve to shift upwards. It is important to point out that this tax-induced deterioration in

the long-run trade-off curve is only present while tax rates are increasing. Once tax rates are held constant, the long-run trade-off curve shifts back to its original location.

The final section of Chapter 9 explores the "supply side" consequences of the 1971 revisions to the Unemployment Insurance Act. It is argued that the liberalization of the Unemployment Insurance Act has adversely affected labour market incentives, particularly for secondary earners in the family unit. Since the cost of unemployment has been reduced, some labour market participants will opt for less employment and will be more selective in the choice of jobs they will accept. Such negative "supply side" effects arising from reduced labour market incentives implicit in the 1971 revisions will generate an outward shift (deterioration) in the long-run trade-off curve, and a higher level of wage inflation will now be associated with a given level of (more heavily subsidized) unemployment.

In conclusion, traditional macroeconomic analysis has focused almost exclusively on the "demand side" implications of fiscal policy and has too often neglected to consider the "supply side" (or microeconomic) ramifications of fiscal expenditure policies. To state the obvious, the benefits attributable to the provision of more public goods and services must be weighted against the potential inflationary consequences of increasing tax rates (to pay for more government spending). Similarly, the desire to achieve a more equal distribution of income and wealth should be balanced against the potential inflationary consequences of a progressive income tax structure and the labour market disincentives that typically accompany government transfer programs. While the government expansionary policies of the 1960s and 1970s have provided substantial benefits to some citizens, it must also be recognized that the "supply side" consequences of these policies have likely aggravated the long-run trade-off possibilities between inflation and unemployment.

Appendix to Chapter 5

In the 1979 study by Auld et al., a wage change model was formulated that combines price expectations ($\dot{P}^e$) and a measure of price catch-up ($\dot{P}^{cu}$). As defined below, the price catch-up variable measures "uncompensated" past inflation and allows for both *unexpected* inflation and for the possibility that all of last period's expected inflation is *not* incorporated into wages *ex ante* (i.e. $\alpha < 1.0$),

$$\dot{W}_t = c_0 + \alpha \dot{P}^e_t + \beta \dot{P}^{cu}_t + \theta \chi_t$$

and

$$\dot{P}^{cu} = \left[\dot{P}^a_{t-1} - \alpha \dot{P}^e_{t-1} \right] * \ell_{t-1} \; / \; \ell_t$$

with

$\dot{W}_t$ — annual percentage change in base wages over the contract period,

$\dot{P}^e_t$ — expected annual percentage change in prices over the contract period,

χ_t — measure of labour market conditions at time of contract signing,

$\dot{P}^a_{t-1}$ — actual percentage change in prices over the previous contract (at an annual rate),

$\dot{P}^e_{t-1}$ — expected annual percentage change in prices over the previous contract period,

ℓ_t — length of current contract (in years),

ℓ_{t-1} — length of previous contract (in years),

α — coefficient for price expectations, and

β — coefficient for price catch-up.

As discussed in the study by Auld et al., if it is well understood by both sides of a wage contract that "uncompensated" past inflation will be included as a bargaining demand at the next wage negotiation, then 100 per cent of future expected inflation may not be included in wages *ex ante*. Given the uncertainty of future price expectations over a two-to-three-year horizon and the opportunity to correct past expectational errors *ex post*, the wage determination process may assign a relatively lower weight to uncertain expectations of future inflation.

Finally, to compute a total or "composite" price effect it is necessary to impose a number of assumptions pertaining to contract length and the nature of the inflation process. For simplicity it is assumed that the

length of contract is constant (i.e. $\ell_t = \ell_{t-1}$), and that the inflation rate is constant *and* correctly anticipated (i.e. $\dot{P}^a_{t-1} = \dot{P}^e_{t-1} = \dot{P}^e_t$). Under these conditions, the composite price effect can be calculated as the sum of the two price coefficients minus their cross-product ($\alpha + \beta - \alpha\beta$).

Appendix to Chapter 8

The purpose of this Appendix is to analyse the wage adjustment process arising from a positive demand shock. It is assumed that this positive demand shock persists throughout the adjustment phase and that the monetary authorities validate the resulting price inflation. Three different temporal specifications for the price change variable in the wage change equation can be distinguished:

1 wages respond to *past* price movements (catch-up);

2 wages respond to *current* price movements (COLA clauses);

3 wages respond to *future* price movements (the expectations approach).

Each of these three different assumptions about the nature of price compensation within the wage equation involves a different temporal adjustment path.

Price Catch-up Specification — To illustrate the nature of the short-run trajectory path following a positive demand shock, let us first consider the case in which price compensation within the wage determination process is based exlusively on *ex post* catch-up for unexpected price inflation. Returning to Chart 8-1, assume that our hypothetical economy is resting in long-run equilibrium at point *A*. To simplify the following hypothetical numerical analysis, it is assumed that the wage rate change associated with point *A* is offset by the growth rate of labour productivity (say, 3 per cent). Therefore, the rate of price inflation will be zero, and the flat, short-run Phillips wage curve that passes through point *A* will be predicated on a zero rate of past inflation. To avoid the difficulties associated with a variable bargaining calendar, we shall assume that all workers simultaneously sign the same wage contract, which extends over the life of an average bargaining cycle (say, two years). Finally, the coefficient of the price catch-up variable in the wage equation is arbitrarily assumed to be 90 per cent.

Now assume that a strong positive demand shock suddenly hits the economic system, pushing the unemployment rate down to U_B. Given this much lower unemployment rate, the Phillips disequilibrium wage equation will generate a higher rate of wage inflation (say, 4 per cent). Assuming labour productivity remains constant at 3 per cent, firms can be expected to increase product prices by 1 per cent to cover the costs associated with this higher rate of wage inflation. As described in Table 8A-1, the first period after the demand shock hits the economic system will be characterized by 4 per cent wage inflation and 1 per cent unexpected price inflation. Moving into the second period of time (i.e. the second bargaining cycle), the price catch-up feature of the wage equation will now "kick in," as labour will bargain for an *extra* 0.9 per cent to compensate for the one additional percentage point of unexpected inflation last period (based on a price catch-up coefficient of 90 per cent). The short-run wage equation in the second period will shift up by 0.9 per cent, and the resulting wage and price inflation rates in that period will be 4.9 and 1.9 per cent, respectively. In the third period, a further price catch-up element is required. The second

period's wage contract was predicated upon the previous period's 1 per cent inflation rate, but 1.9 per cent price inflation actually materialized. The additional catch-up component (90 per cent of 0.9 per cent) will cause the short-run wage equation to shift up another 0.81 of a percentage point, generating wage and price inflation rates of 5.71 and 2.71 per cent, respectively, in the third period.

As illustrated in Table 8A-1, this catch-up-induced inflationary process will keep spiralling along *but* will eventually converge to a nonaccelerating wage inflation rate of 13 per cent, accompanied by 10 per cent price inflation (point *C* in Chart 8-1).[1] Many time periods, each measured in years corresponding to the bargaining cycle, may be required, however, to move the economy back to the long-run trade-off curve. It must be emphasized that the wage/price spiral will only converge to a nonaccelerating rate of inflation if the price coefficient in the wage equation is less than unity (0.9 in our numerical example).[2]

TABLE 8A-1

HYPOTHETICAL ILLUSTRATION OF THE ADJUSTMENT PROCESS FOR A PRICE CATCH-UP PHILLIPS WAGE MODEL

Time period	Wage change	Price change	Increase in rate of price change
0	3.00	0	0
1	4.00	1.00	1.00
2	4.90	1.90	.90
3	5.71	2.71	.81
4	6.44	3.44	.73
5	7.10	4.10	.66
6	7.69	4.69	.59
7	8.22	5.22	.53
8	8.70	5.70	.48
9	9.13	6.13	.43
10	9.52	6.52	.39
∞	13.00	10.00	0

COLA Clause (Wage Indexing) Specification — In direct contrast to the long adjustment period associated with the price catch-up model, COLA clauses (or wage indexing) produce the shortest adjustment period for a demand shock. If wages are automatically adjusted for price movements *and* prices are coincidently adjusted for all wage movements, then the movement from the short-run curve point *B* to the long-run curve point *C* should be accomplished virtually instantaneously (within one bargaining cycle). To the extent that there are modest lags in COLA clause adjustments and pricing decisions, the adjustment trajectory may be slightly prolonged but will clearly be much faster than the adjustment period associated with price catch-up wage compensation.

Price Expectations Specification — The price expectations specification likely has an adjustment time frame somewhere between the slow catch-up and fast COLA clause cases. As discussed in Chapter 5, it is obvious that firms and labour will consider the expected rate of price inflation when they sign a contract that establishes wage rates for a prolonged period of time. Unfortunately, there is no generally accepted way to model the inflationary expectations formation process. Traditionally, inflationary expectations have been assumed to be formed in an adaptive manner — i.e. by considering the past values of the actual inflation rate. The simplest adaptive expectations mechanism assumes that the expected rate of price inflation for a given time period is simply equal to last period's inflation rate. The short-run adjustment path for this simple (static) expectations case would be similar to that described for the price catch-up specification. Such a static expectations assumption, however, would be demonstrably false in *each* time period; consequently, labour market participants would likely build in a "corrective" component to improve their price expectations estimate. The inclusion of a corrective or extrapolative element in the adaptive expectations formation process would lead to a faster adjustment process, since the short-run Phillips curve would shift up at a faster rate.

Some economists have postulated a more sophisticated model of price expectations, based on the long-run properties of the economic system. Since the only rate of price inflation that is consistent in the long run with this lower unemployment rate corresponds to point *C* on the long-run trade-off curve, economic agents may adjust their expectations *immediately* in line with this expected long-run inflation rate.[3] Such a "rational" expectations formation process would cause an immediate upward shift in the short-run Phillips curve to intersect the long-run trade-off curve at the new lower unemployment rate, and the adjustment to this demand shock would be accomplished in one time period (resembling the COLA/wage-indexing case).

At present there is considerable controversy in the economic literature concerning the exact nature of the inflation expectations formation process. Because of the lack of solid empirical information on price expectations, much of the debate is highly speculative and advanced at a rather abstract level. While the adjustment trajectory for the expectations specifications process is unlikely to be as fast as the "rational" expectations hypothesis would suggest, it will certainly not be as slow as the static, adaptive expectations hypothesis implies.

In reality, the wage determination process is a complicated mixture of all three of these price compensation mechanisms. In the two years prior to the introduction of the Anti-Inflation Board, approximately one-half of all new wage contracts contained COLA clauses. The price elasticity of these COLA clauses, however, was only about 40 to 60 per cent, suggesting that the non-COLA part of the wage settlement probably also contained some price considerations as well. As discussed in Chapter 5, there are strong theoretical reasons to believe that both price expectations and price catch-up arguments belong in the wage determination model, and empirical evidence presented by Cousineau and Lacroix, by Riddell, and by Christofides et al. confirm the existence of both price expectations and price catch-up in Canadian wage equations. Complicating this configuration of price effects is the existence of wage spillovers or interdependencies within the wage system. Such interdependencies suggest that any demand shock will take longer to affect wage settlements, as previous wage bargains (within the same regional industry) will continue to affect current wage settlements despite the new economic conditions. All things considered, the adjustment trajectory of the economy to a demand shock is both complicated and prolonged. Although there may be some offsetting factors such as COLA clauses and the tendency of contract length (the bargaining cycle) to shorten serious disequilibrium situations, the adjustment process triggered by a demand shock will undoubtedly persist for a number of years.

Notes

Chapter 1

1 For an analysis of the impact of the AIB on wage inflation, see Christofides and Wilton (1979).

Chapter 2

1 As evident in Chapter 3, there are three important assumptions implicit in this simple Phillips-curve model that are much more debatable.

2 He first suggested a relationship between inflation and output levels in a 1954 paper [Phillips (1954)].

3 The Lipsey model is discussed in greater detail in Chapter 3.

4 Notably those by Kaliski (1964), Reuber (1964), and Vanderkamp (1966).

5 To illustrate the speed with which the Phillips curve was assimilated into economic theory, the 1961 revision of P. A. Samuelson's widely used introductory economics textbook included a section on Phillips' November 1958 paper.

6 Chapters 7 and 8 examine the policy aspects of the Phillips curve in considerable detail.

Chapter 3

1 The amount of excess labour demand (supply) at a given wage rate can be measured as the horizontal gap between the demand and supply curves for that particular wage rate.

2 In the parlance of the econometrician, such multicollinearity may render the excess demand variable insignificant.

3 A review of the literature reveals a long list of intruder variables that have found their way into the Phillips-curve model (e.g. profits, productivity, change in employment, foreign wage changes, industrial price movements, relative wage effects, strikes, union membership — not to mention various kinds of dummy variables, trends, and interaction variables).

4 As noted in Chapter 4, the stability of both of these underlying relationships has been seriously questioned.

5 Average hourly earnings in the Canadian manufacturing sector have been employed by most Phillips-curve analysts using time-series data.

6 The choice of 1969 as a termination point will become obvious shortly.

7 This assumption is explored in considerable detail in Chapter 5.

8 The relationship presented in Chart 3-3 is statistically significant at the 1.0 per cent error level. The band is constructed by adding ±1.0 per cent to the least-squares fitted line in which the dependent variable is the percentage change in real wages and the explanatory variable is the reciprocal of the unemployment rate. Some of this statistical error can undoubtedly be attributed to the restrictive nature of the price assumption (see Chapter 5).

9 See Kaliski (1964), Vanderkamp (1966), Bodkin et al. (1966), and Zaidi (1969).

10 Milton Friedman, in his 1976 Nobel address, observing a similar data scatter, suggested that an upward-sloping Phillips curve may exist during a transitional period, as institutional and political arrangements are adjusted to meet a new reality of higher and more volatile inflation rates and increasing government intervention.

CHAPTER 4

1 For example, comparing the December-to-December change with the September-to-September change makes use of the nine common months, January to September, twice.

2 As discussed in the previous chapter, these extra variables (profits and U.S. wage changes) can be regarded as determinants of the labour supply curve and thus are redundant in the Phillips-Lipsey disequilibrium model, which includes a measure of excess labour demand (the unemployment rate). To include these redundant variables along with the unemployment rate may create statistical problems (multicollinearity) that would affect the significance of this latter variable.

3 During the 1955-68 period, the average contract length in Canadian manufacturing industries rose from 17 months to 29 months [Rowley and Wilton (1977), p. 73]. The next chapter reviews more recent Canadian data on contract length and the theoretical implications of "long" contracts.

4 Over the 1955-68 time period, the "average" three-year contract in the Canadian manufacturing sector contained a first-year raise of 9.8 per cent, a second-year raise of 4.4 per cent, and a third-year raise of 3.2 per cent [Rowley and Wilton (1977), p. 76].

5 For a correctly specified institutional wage-change model, a very complicated set of time-varying distributed-lag weights (to reflect varying contract lengths, deferred increments, front-end loading, and a nonuniform bargaining calendar) must be applied to all explanatory variables. Since this same set of weights also applies to the error term (producing moving-average autocorrelation in the aggregated error term), generalized least squares are required to produce efficient estimates.

6 For the 14 years of data presented by Rowley and Wilton (1977), the average *base* rate in the manufacturing sector rose by 87.4 per cent, while average hourly earnings of *all workers* within the manufacturing sector rose by 88.7 per cent.

7 Nearly all published time-series studies of wage movements are based on the manufacturing or industrial sector, which is highly unionized. Thus any biases attributable to the lack of nonunion representation within the data set apply to all empirical work, be it time-series or "micro."

8 The graphical analysis derived from this study will be presented later in this chapter.

9 It should also be noted that Lipsey's pioneering econometric study, reworking Phillips' 100 years of British data, found a similar result: ". . . the regression coefficients have changed markedly" (p. 483).

10 Auld et al. (1979) also report a similar structural break: "These two temporal sets of estimates are significantly different with the estimated coefficient on the unemployment rate clearly being the most unstable coefficient in the two time periods" (p. 96).

11 "In the literary explanation of the process by which supply and demand are equated, the assumption is usually made that if, at any price, demand exceeds supply, price will rise; if supply exceeds demand, price will fall. Let us state this more precisely as follows:

$$\dot{P} = \frac{dp}{dt} = H\,(q_D - q_S) = H\,[D(p,a) - S(p)], \text{ where } H(0) = 0 \text{ and } H' > 0.$$" [Samuelson (1947), p. 263]

12 The astute reader will have noted that causality has been subtly reversed: unexpected inflation causes lower unemployment.

13 From 1961 to 1974, the percentage of the unemployed who were "heads" of family units fell from 46 per cent to 33 per cent.

14 For example, between 1953 and 1974 the proportion of females within the Canadian labour force increased from 18 to 33 per cent, while the proportion of prime-age males dropped from 51 to 41 per cent.

15 Grubel, Maki, and Sax (1975) and Green and Cousineau (1976) have shown that by encouraging labour turnover and extending unemployment duration, the 1971 Unemployment Insurance Act revisions considerably increased the number of unemployed persons relative to other economic variables, such as the level of job vacancies. Such an unemployment-insurance-induced labour market effect would manifest itself in a shift of the excess-demand/unemployment relationship (see Chart 3-1c), as each level of excess labour demand would now be associated with higher levels of unemployment. The policy implications of the 1971 revisions to the Unemployment Insurance Act will be further explored in Chapter 9.

16 At a minimum, the substantial cyclical discrepancies in the relationship between the unemployment rate and the help-wanted index during the 1970s should produce marked differences in statistical performance for each of these labour market proxies in the Phillips-curve model.

17 This study provides an econometric analysis of 2,338 private sector wage settlements signed during the decade prior to the introduction of the Anti-Inflation Board. Each wage contract is treated as an individual micro-observation pertaining to the Canadian wage determination process, and the dependent variable is defined as the total percentage change in the base wage rate negotiated for the life of the particular contract, expressed at annual rates.

18 The parameter estimate for this price effect is not significantly different from unity. It should be pointed out that the econometric analysis by Auld et al. distinguishes between two separate price effects (price expectations and price catch-up) and finds that for a *correctly* anticipated inflation rate, approximately 70 to 80 per cent of the price change will be reflected in wage rates (see Chapter 5).

19 For example, the help-wanted index is a particularly crude data series, based on column inches of employer want ads in selected newspapers. As depicted in Chart 4-1, this help-wanted index suggests that the Canadian labour market was approximately 50 per cent "tighter" in 1974 than it was in 1966 (a year in which the unemployment rate was only 3.6 per cent). Most observers of the Canadian economy would find this comparison difficult to accept. As one critic put it, "the one thing that can be said in favour of the help-wanted index is that it was high in the post-1973 period when wage settlements took off. Believers in the Phillips curve have latched on to this particular indicator because it enables them to get a statistically significant labour market variable in their wage equations. I am suspicious that they may be falling victim to *post hoc ergo propter hoc*" (an anonymous referee).

Chapter 5

1 As discussed in Chapter 3, such an additional variable would be redundant.

2 This latter option may be open to the worker since different firms sign wage contracts of varying lengths at different points in time. Thus a competing firm may not have experienced a particular burst of unexpected inflation or may have already had the opportunity to "correct" its nominal wage rate to compensate for this unexpected inflation.

3 If, at the next contract negotiation, the firm chooses not to correct this inappropriately low real wage rate, then one would fully expect some workers to quit the firm.

4 If the firm were to adjust the inappropriate nominal wage rate at the next contract negotiation, then any additional workers hired would become redundant.

5 A similar argument can be made for an inflation rate that is less than anticipated. Firms will likely hoard labour during the disequilibrium period rather than release experienced labour, which may have to be replaced by inexperienced labour (if the inappropriate real wage is adjusted downwards at the next contract negotiation).

6 For reasons discussed above, such unexpected inflation is not likely to be reflected fully in a labour market variable.

7 See the Appendix to this chapter for a discussion of how these two separate price effects can be combined into one composite price effect.

8 As discussed in Chapter 7, the exact size of the price effect on wages has important policy implications.

9 All price-coefficient estimates are derived from the sample of 2,338 private sector wage contracts previously analysed by Auld et al. The micro-regressions that were run to generate these price coefficients included a constant and a significant labour market variable (a help-wanted index).

10 The *t*-scores for these 12 coefficients are between 5.7 and 18.8.

11 In those cases where there had been a COLA clause in the previous contract, the COLA clause was typically improved in the new contract.

12 While Marcil does not report what this COLA elasticity is for contracts that previously had COLA clauses, a little arithmetic suggests that this continuing COLA clause elasticity (for 1974) is likely in the order of about 50 per cent.

Chapter 6

1 An even stronger version of this institutional "wage catch-up" hypothesis argues that individual bargaining groups are continually trying to improve their position on the income distribution ladder, leading to a perpetual wage spiral. Implicit in such an argument is the assumption that the Bank of Canada will continually inject more and more money into the economy to prevent the emergence of widespread unemployment (i.e. monetary authorities will "validate" the inflation spiral).

2 For example, key bargains, key groups, pattern-wage setting, wage rounds, wage contours, orbits of coercive comparisons, leap-frogging, tandem relationships, historical relationships, wage relativities, and so on.

3 In fact, the rate of wage inflation is indeterminate in such a model (but fully validated by the monetary authorities).

4 Total labour costs consist of both variable wage payments and fixed turnover costs. The firm could, of course, pay a wage sufficiently high as to reduce the quit rates to virtually zero, but presumably a lower wage rate coupled with some quits (turnover costs) would lower total labour costs.

5 If the firm does not adjust its wages at the next contract negotiation, then these marginal workers will likely change employers in typically Marshallian fashion.

6 There are at least four dimensions to the spillover classification matrix: occupational, industrial, geographic, and temporal.

7 A similar result was also found by Wilton in an earlier, less comprehensive study on wage spillovers [Wilton, 1977].

Chapter 7

1 Notwithstanding the problems discussed in Chapter 4 concerning the changing "message of the unemployment rate," we shall continue to use (for expositional convenience) the term unemployment as if its meaning had not changed in the 1970s.

2 The study by Bodkin et al. uses quarterly time series data, whereas the Riddell study employs micro-wage-contract data. In addition, both studies specify their dependent and explanatory variables in somewhat different forms.

3 Recall that the Phillips curves presented in Chart 7-1 assume a given (zero) rate of price inflation.

4 In somewhat more technical terms, the wage relationship represents but one structural equation of a large macroeconomic model and typically contains several endogenous variables, including labour market conditions and price considerations. The relevant policy equations are *not* the structural equations, but rather the reduced-form equations that associate the endogenous "target" variables (e.g. unemployment and inflation rates) with the exogenous "policy" variables (e.g. money supply or tax rates). The reduced-form equations allow for all feedback effects throughout the economy and do not treat the wage equation in isolation from other important variables and relationships in the economic system.

5 The short-run implications of various temporal specifications for the price effect in the wage determination model are explored in the Appendix to Chapter 8. If one is following the price expectational approach, it is necessary to impose the additional assumption that price expectations are identical to actual rates of inflation for all points on the "feedback-inclusive" trade-off curve. It would be difficult to envision a sustainable long-run position for an economy in which economic agents were consistently incorrect in their expectations of future inflation rates.

6 This slope value represents an approximate linearization of Riddell's wage equation presented in Chart 7-1.

7 The common hypothetical intersection point for these policy trade-off curves is arbitrarily chosen. To avoid any confusion with reality, numerical values for both axes have been suppressed.

8 For example, Rees (1970), Tobin (1972), Solow (1976), and Modigliani (1977).

9 Using annual rates of change in the Consumer Price Index, comparative statistics for the 1955-64 decade in contrast with the 1965-74 decade are as follows:

	1955-64	1965-74
	(Per cent)	
Range	0.2 to 3.2	2.5 to 10.9
Average	1.5	4.8
Standard deviation	0.9	2.6

For the entire 1955-64 decade, seven of the ten years have inflation rates in the very narrow interval of 0.9 to 1.8 per cent.

10 To maintain this slightly lower unemployment rate, the implicit higher rate of inflation must be continually validated by appropriate monetary expansion.

Chapter 8

1 Whether this long-run trade-off curve is very steep as opposed to vertical is inconsequential for the short-run arguments examined in this chapter.

2 If the long-run trade-off curve is vertical, then discretionary monetary policy would be used initially to steer the economy to the "optimal" rate of inflation.

3 Chapter 9 considers the inflation/unemployment implications of several government-related supply shocks.

4 In addition, there are a number of illustrations of demand shocks that can arise from government fiscal activity. The provision of a large-scale public good (e.g. the Seaway or a pipeline) obviously involves an increase in government expenditures that, if not offset by reductions in other expenditure items, would lead to a positive demand shock to the economic system. On the other hand, a deliberate cutback in the level of government expenditures across the board (without compensating tax cuts) would constitute a negative demand shock to the economic system.

5 For example, the current low level of investment expenditures in the province of Quebec is likely linked to recent political developments.

6 If this long-run trade-off curve were vertical at U_A, monetary validation of the demand shock would lead to an ever-increasing rate of price inflation.

7 This constant rate would be consistent with the optimal point on the long-run trade-off curve.

8 In addition to the issues considered above, policy-makers must also consider the costs of changing the instrument settings and the effects of the new demand management policy on other key variables (such as the rate of interest and the foreign exchange rate). Such considerations would also lead to a "cautious" approach in which demand management offsets may not be fully implemented.

9 The reader is reminded that we are assuming that the monetary authorities validate this higher rate of inflation and that the shock persists throughout the adjustment phase.

10 In terms of standard macroeconomic welfare analysis, using community indifference curves to represent society's preferences for inflation and unemployment [see Lipsey (1965)], point *D* in Chart 8-1 would lie on a much worse indifference curve than point *A*, whereas point *B* would lie on a more favourable indifference curve than point *A*.

11 As discussed above, inappropriate demand management policy encompasses both the sins of omission and commission. *In retrospect*, demand management policies (particularly monetary policies) should have been more restrictive in this period, given the other forces at work in the economy. Unfortunately, policy-makers at the time did not have the benefit of current hindsight. The changing nature of the Canadian labour market in the 1970s and the deterioration of Statistics Canada's preliminary estimates of Gross National Product, to name but two factors, contributed to the mistaken impression that the Canadian economy was "underperforming" during the early 1970s.

12 As argued in the next chapter, the supply shocks associated with the tremendous growth in the Canadian public sector during the 1960s and 1970s may also have contributed to a deterioration in the long-run trade-off possibilities between inflation and unemployment.

CHAPTER 9

1 Part of the relative increase in government expenditures can be attributed to the transfer of certain items, such as health-related expenses, from the private to the public sector.

2 In fact, this estimate of 93 per cent is *not* significantly different from 100 per cent forward shifting.

3 Such an implicit measure assumes that all indirect taxes are levied on consumer goods, and it records the average for all consumer goods even though some consumer items may not be subject to indirect taxes.

4 For example, if the α parameter in the wage equation has a value of 0.8, then the upward shift in the long-run trade-off curve attributable to a 0.15 per cent per annum increase in indirect tax rates would be only 0.6 per cent — i.e. $\frac{0.8}{1.0 - 0.8}(0.15)$.

5 In a more neoclassical framework, a change in the rate of income taxation will alter the supply of labour through its effect on the work/leisure choice. Assuming that the "substitution" effect following an increase in the income tax rate dominates the "income" effect, then the supply of labour will be reduced and upward pressure will be exerted on wage rates.

6 In a neoclassical framework, the provision of public goods would reduce the impact on the "substitution" effect. Labour supply would therefore be further reduced, creating even greater upward pressure on wages than existed for the "increased tax rate, no public goods" case.

7 A similar argument can be advanced for increases in indirect tax rates. Workers would not expect to be compensated for the higher price levels associated with higher sales tax rates, because they realize that they are receiving benefits through increased government spending. Since the Consumer Price Index includes sales tax changes, this argument would imply that the coefficient on the price variable in the wage change equation would be less than unity (for time periods that include changes in the rate of indirect taxation).

8 Auld (1974), Auld and Wilton (1980), Bruce (1975), Kotowitz (1979), and Taylor, Turnovsky, and Wilson (1972).

9 For a derivation of the wage-change/unemployment trade-off curve incorporating the 1970 shift in the unemployment/vacancy-rate relationship, see Wilton (1977), pp. 27-32.

10 For further discussion of these two alternative explanations of the changing structure of the Canadian labour market during the 1970s, see Chapter 4.

11 For example, Green and Cousineau concluded that:

> The unemployment rate was at least .5 percentage point higher in 1972 and 1973 than it would have been had there been no change in the U.I. Act, and our best estimates suggest a figure around .7 percentage point. [Green and Cousineau (1976), p. 115]

Appendix to Chapter 8

1 The reader is reminded that throughout this numerical analysis it is assumed that the positive demand shock remains in effect and that appropriate monetary expansion is undertaken to "validate" the price increases.

2 See Chapter 7 for a discussion of the properties of the long-run trade-off curve between inflation and unemployment.

3 Again, it is assumed that all price increases are validated by the monetary authorities and, furthermore, that economic agents correctly perceive this monetary policy.

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