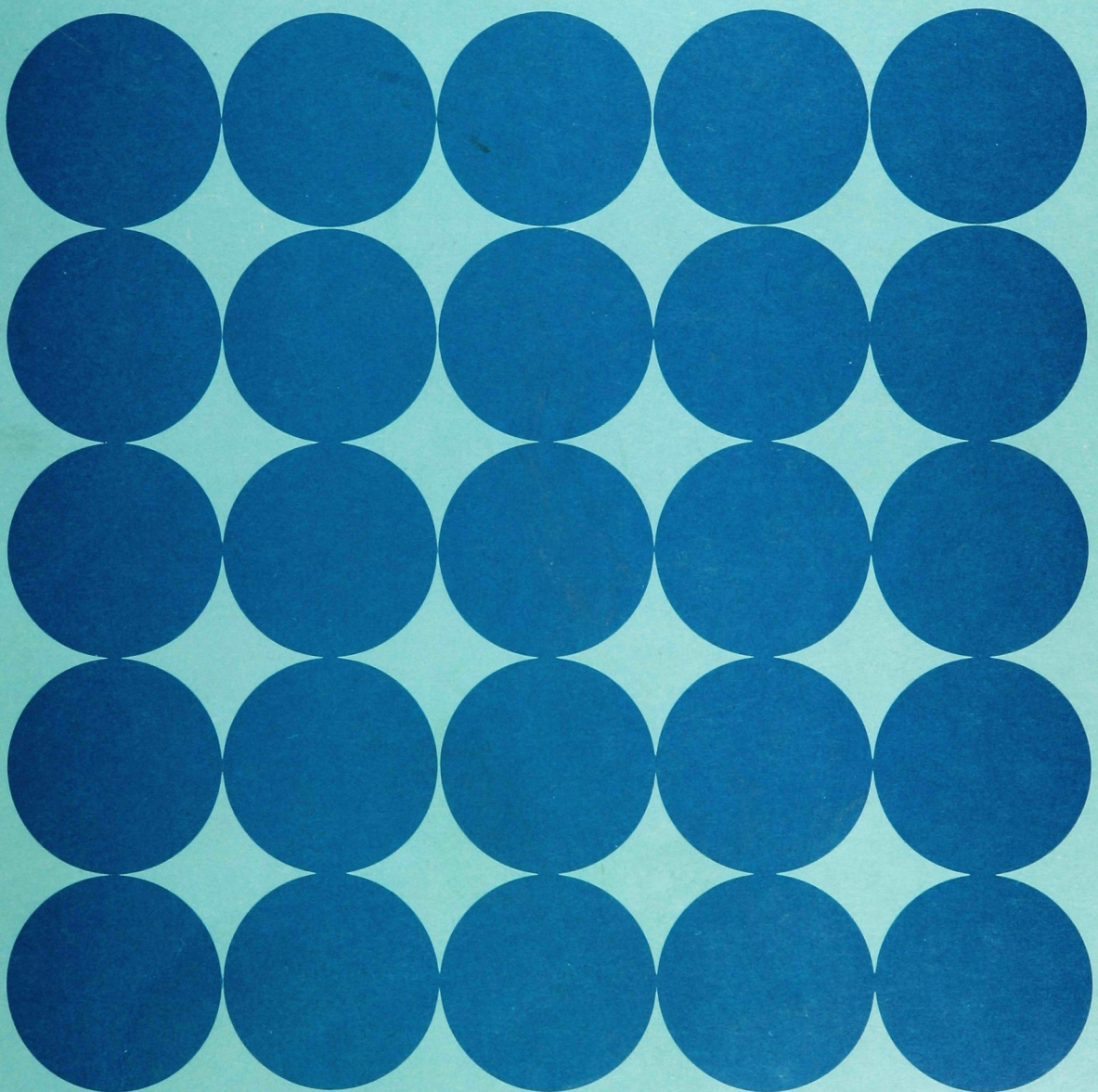
Housing in Canada

By Marion Steele



Census Analytical Study

The Demand for Housing in Canada

By Marion Steele

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FOREWORD

The Canadian censuses constitute a rich source of information about the condition of groups and communities of Canadians, extending over many years. It has proved to be worthwhile in Canada, as in some other countries, to supplement census statistical reports with analytical monographs on a number of selected topics. The 1931 Census was the basis of several valuable monographs but, for various reasons, it was impossible to follow this precedent with a similar program until 1961. The 1961 Census monographs received good public reception, and have been cited repeatedly in numerous documents that deal with policy problems in diverse fields such as manpower, urbanization, income, the status of women, and marketing. They were also of vital importance in the evaluation and improvement of the quality and relevance of Statistics Canada social and economic data. This successful experience led to the decision to expand the program of census analytical studies by entering into an agreement with the Social Science Federation of Canada. The present series of analyses is focused largely on the results of the 1971 Census.

The purpose of these studies is to provide a broad analysis of social and economic phenomena in Canada. Although the studies concentrate on the results of the 1971 Census, they are supplemented by data from several other sources. These reports are written in such a way that their main conclusions and supporting discussion can be understood by a general audience of concerned citizens and officials, who often lack the resources needed to interpret and digest the rows of numbers that appear in census statistical bulletins. For these persons, interpretive texts that bring the dry statistics to life are a vital dimension of the dissemination of data from a census. Such texts are often the only means that concerned citizens and officials have to personally perceive benefits from the national investment in the census. This particular report is one of a series planned to be published concerning a variety of aspects of Canadian life, including income, language use, farming, family composition, migration, adjustment of immigrants, human fertility, labour force participation, housing, commuting and population distribution.

I should like to express my appreciation to the universities that have made it possible for members of their staff to contribute to this program, to authors within Statistics Canada who have freely put forth extra effort outside office hours in preparing their studies, and to a number of other members of Statistics Canada

staff who have given assistance. An Advisory Panel of the Social Science Federation of Canada organized and conducted an author selection process for several studies, and arranged for review of seven manuscripts in their original version. In addition, thanks are extended to the various readers, experts in their fields, whose comments were of considerable assistance to the authors.

Although the monographs have been prepared at the request of and published by Statistics Canada, responsibility for the analyses and conclusions is that of the individual authors.

PETER G. KIRKHAM,

Chief Statistician of Canada.

PREFACE

The intention of this monograph is to use 1971 Census data to determine the influences underlying three housing consumption decisions. The first decision is the separate-dwelling decision, or equivalently, the decision whether or not to be a household head. This decision is generally ignored in housing studies using cross-section data but it is logically prior to the other two decisions examined here, the tenure decision and the quantity-of-housing decision.

The major focus of the analysis is on the economics of these housing decisions and, specifically, on the relative effects of income components and wealth. For this purpose three income variables, permanent income, expected transitory income and unexpected transitory income, are defined and estimated from the Census data base, as is also a wealth variable called opportunity net worth. Constructing these variables constituted a major part of the work for this monograph and an assessment of the contribution of this monograph will depend largely on an assessment of these variables.

A subsidiary aim of this monograph is to explain the differences in housing decisions made in rural areas and in small urban areas as compared with large urban areas. Housing studies usually omit rural areas from the analysis but differences associated with varying urbanization levels should yield useful insights into the workings of the housing market.

I am grateful to many people for their help in this study. My major debt is to Jenny Arnott whose ingenuity and carefulness ensured that work flowed smoothly at the crucial stages of the study. Several others provided research assistance. At the very early stages Donald Heimbecker conducted a useful literature search. Margaret Buckley used initiative and considerable analytical skill helping in the assessment of the quality of the data. In the trying period when there was much exploratory work Karen Dares spent long hours ensuring that the intricate work of editing data, generating tables and estimating regressions was properly done. Jane Forster and Daniel Perrin contributed in small but important ways by their clever computer programming.

John Lewis helped this study immensely by sending a copy of his regression and logit computer programs and helping in their use. These programs are much faster than others I have encountered and without them much of the array of results presented would not have been financially possible. Gillian Leslie made some minor but very helpful amendments to Lewis' programs. She also did the important and demanding programming of the wealth and income variables and indeed aided substantially in their specification.

Clive Southey made a number of suggestions helping espeically in the analysis of Chapter 2. John Bossons and Ronald Bodkin made stimulating critical comments on a paper relating to Chapter 6. Two referees and Leroy Stone made useful comments which materially strengthened the manuscript. David Mosey improved the exposition and helped in other ways. None of these is, of course, responsible for errors of fact interpretation. Sue Patterson typed the manuscript with extraordinary speed and accuracy.

Marion Steele,
University of Guelph,
January, 1979

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CHAPTER 1

INTRODUCTION AND SUMMARY OF FINDINGS

There is seldom a more surprising gap found in Canadian social science literature than that concerning housing. Only one study examines household behaviour in the Canadian housing market at a substantially disaggregated level — an earlier census monograph published nearly four decades ago (Greenway, 1941). As a consequence, there is unnecessary uncertainty about such a basic parameter as the income elasticity of demand for housing. Knowledge of this elasticity is needed both for long-run forecasting purposes and for normative judgments. Those Canadian estimates available are largely derived from time series models. Time series estimates are useful as a guide to the response of aggregate new residential construction to fluctuations in aggregate income. They are not very useful, however, as a guide to the housing response of individual households to an income transfer. They are even less useful as a guide to the response of a particular narrowly-defined type of household, such as those headed by persons over 65. To answer this kind of question requires a cross-section study in depth of individual persons and individual households.

While for Canada little housing literature of this nature is available, there has been a burgeoning of United States studies. These have tended to focus on the problem of housing discrimination against Blacks, however, reducing their relevance to Canada. In the Canadian housing market the interesting cultural dichotomy is between Quebecers and other Canadians and this is far from analogous to United States - White dichotomy. Furthermore, the environment of tax law and transfer payments is very different in the two countries. In the United States, homeowners can deduct mortgage interest and property taxes in determining their taxable income while in Canada they cannot. In the United States, homes are subject to capital gains tax in certain circumstances while in Canada they are always exempt. These differences suggest that it is hazardous to draw inferences for Canada about the relation between such variables as income, age and housing consumption on the basis of U.S. findings.

1.1. Housing Consumption Decisions as a Hierarchy of Decisions

The consumer's housing decisions may be conveniently ordered into a hierarchy of decisions. The first of these is whether or not to occupy a separate dwelling

unit. This is equivalent to the decision whether or not to head a separate household. The next decision is tenure: whether or not to be an owner-occupier. The third decision is expenditure. For renters this is the decision of how "much" housing to rent. For owner-occupiers this is the decision of how much to buy. The tenure and expenditure decisions are frequently studied, sometimes together (Kain and Quigley, 1975; Goldstein, 1971; Morgan, 1965; David, 1962), but the separate-dwelling decision is usually neglected in cross-section studies. When it is not neglected, its purely demographic determinants are generally emphasized to the detriment of economic determinants (Kirkland, 1971). This is especially likely if the decision is characterized as a household-headship decision rather than as a housing demand decision.

The neglect by economists in cross-section studies (except Carliner, 1975) of the separate-dwelling decision and its invariable omission from comprehensive studies such as those of David (1962) and Kain and Quigley (1975) is in striking contrast to the attention paid to it in time series studies. Commonly, in time series analysis the demand for dwelling units, not the value per dwelling and not the tenure decision, is the focus of attention (Smith, 1974; Waslander, 1973). In fact often the value-per-dwelling decision is ignored (Fair, 1971).

In this study we analyse all three levels in the decision hierarchy, using essentially the same multivariate model in each case. This model is specified as the outcome of the analysis of the workings of the housing market given in Chapter 2. Four budget constraint variables are included: permanent income, unexpected transitory income, expected transitory income and opportunity net worth. One would expect permanent income to be dominant in most housing decisions but because the tenure decision and the value of an owned house are investment decisions as well as consumption decisions net worth should play some role. Expected transitory income, which is substantial and negative for the young, highly-educated because of their steep age-earnings curve and unexpected transitory income which roughly is equal to the difference between measured income and the income of the average consumer of the same age and socioeconomic class, are apt to be important because of uncertainty and credit constraints.

Among the other variables of central importance in our model are age, the number of children and the number of adults. Greater age is associated with a lower probability of relocation and so a lower probability of incurring the transaction

costs of a move. It is also associated with less variability in income and expectations of smaller household size. The number of adults in a household is important because of its implications for sharing maintenance activities and expenses.

Contrary to the practice in some recent studies (King, 1972; Goldstein, 1971) we do not confine our analysis to recent movers. We argue in Chapter 2 that there is little reason to believe that the housing consumption of movers is more likely to be in equilibrium than the consumption of non-movers and, in addition, movers may differ importantly in their fundamental characteristics from the rest of the population.

1.2. Urban and Rural Differences and Regional Differences

An important difference between this study and existing studies is the attention paid here to rural areas, smaller urban areas and to regional differences. Most recent micro studies of household behaviour in the housing market have confined their attention to large urban areas (e.g. Straszheim, 1975; Muth, 1969). One reason for this is cost. Data are generally much more costly to collect from rural areas than from urban areas because of the less dense population. This is not a problem here because of the use of census data. Another reason in United States studies for the concentration of interest on large urban areas has been that various problems, especially racial problems, are more severe there.

The omission of rural areas is unfortunate because housing behaviour in less urbanized areas is different from that in more urbanized areas and this difference is in part the result of different values for analytically interesting variables. One such variable is the price of land. The lower price of land in rural areas is a factor of prime importance is explaining the much higher proportion of owner-occupancy there.

Because of the lack of price data, areas of different levels of urbanization are treated separately here that is, are treated as separate samples for estimation. In addition, the full multivariate model is used only for the two Census Metropolitan Areas, Toronto and Montréal. For other analysis we use a truncated model with income as the only independent variable. This model is estimated for samples stratified by urbanization level and province and for samples stratified by urbanization level and age.

There are a number of reasons for using the truncated model. A major reason is the unwieldy nature of a study in which the multivariate model is estimated for all the strata identified above. In addition, for many policy purposes, the parameter of interest is the income elasticity of demand for housing, not the income elasticity of housing, given education of the household head. Specifically, for policy purposes the important question is generally the extent to which property value can be taken as a proxy for income. This is essentially a statistical question, not a behavioural question.

There is another technical reason for use of a truncated model. In aggregate time series models, sociological variables are virtually never used, and demographic variables are quite rare.[1] If there is collinearity and if such variables should be included when they are not, estimates of income coefficients are affected by specification bias. For instance, if income is positively associated with education and housing is positively associated with education, then when education is excluded from the regression equation the estimated positive effect of income on housing is larger than the true effect of income. Thus exclusion of education and other sociological-demographic variables from our cross-section model of individual households should yield income coefficient estimates suffering from specification bias. This will be like the specification bias in time series estimates to the extent that correlations of income and excluded variables are the same across households as they are over time. Thus the parameter estimates from the truncated model should be better for integration into (truncated) time series models than the estimates from the full multivariate model.

1.3. Summary of Findings

1.3.1. Housing, Age and Income

In Chapter 4 we set the data context for later chapters. First we describe housing characteristics as they vary among areas of different levels or urbanization and among provinces. Next we discuss housing characteristics by age of household head. Finally we preview findings in other chapters by describing the relation to income of dwellings per person, the ownership proportion and the expenditure of renters and owners.

See footnote(s) on page 27.

The data in Chapter 4 show that the mean value of owner-occupied single-detached houses in large urban areas[2] is 191% of that in rural non-farm areas while mean gross rent in large urban areas is 165% of that in rural non-farm areas. The difference in the ratios is in large part explained by the large amount of land per single-detached house combined with higher land prices in more urbanized places. An implication is that the housing burden for owners relative to renters is greater in the more urbanized areas than in the less urbanized areas. There is much less variation in rents and values among provinces than among urbanization levels. The difference between the Toronto and the Montréal CMA is, however, very striking, with values in Toronto 169% of Montréal and rents 133% of Montréal. To some extent this is the outcome of the opposite direction of price change in the two places (as shown by Multiple Listing Service data) in the few years preceding the 1971 Census.

Owner-occupancy is much more common in rural non-farm areas than in large urban areas: 70% of households compared with 51%. As in the case of values, provincial differences are much less striking, with one very important exception; in Quebec, only 36% of large urban area households are owner-occupants, as compared with 70% for all Canada. The preference of Quebec households for rental tenure has existed since data were first gathered.

About 19% of owner-occupants in large urban areas live in multiple unit buildings. In Quebec, 40% do so, reflecting the numerous duplexes and triplexes there. This shows that although condominium living was rare before the 1970's owner-occupancy of multiple unit buildings was not. To some extent these data also indicate an immense potential elasticity in the housing stock since owner-occupiers in houses converted to apartments may quite easily convert the house back to single-family use as family needs and income change.

Dwellings in rural areas, although slightly larger than in large urban areas, are in other respects much inferior. Virtually no dwellings in large urban areas lack a flush toilet but more than 20% of rural dwellings lack one. Less than two-thirds of rural dwellings have central heating and a high proportion were built before 1920. Among provinces, dwellings in Quebec and the Maritime provinces are inferior to those elsewhere with Quebec especially notable for a low incidence of central heating.

See footnote(s) on page 27.

A change in the age of the household head is associated with substantial changes in housing characteristics. In large urban areas 24% of heads in their late twenties are owner-occupiers. The ownership proportion rises to reach a peak at 45-54 and then declines quite markedly. Forty years earlier, in 1941, the ownership rate was much lower for the youngest age group but not much different for those 55 and over. The implied great shift down in the age at first purchase is probably largely the consequence of the great liberalization in mortgage terms in recent decades.

Households with heads 55 and over typically occupy nearly as many rooms as younger heads despite their much lower household size and markedly lower income. The fall in rooms with age is not much lower for renters than for owners so that the small size of the fall cannot be due just to the reluctance of owners to sell in the face of substantial real estate brokerage fees and other transactions costs.

1.3.2. The Demand for a Separate Dwelling Unit

The demand for a separate dwelling unit is, to a large extent, demand for the housing characteristics, privacy and control. These characteristics, unlike other housing characteristics, are not always desired; for instance, a husband would typically not wish to live in a separate dwelling from that of his wife even if he were offered one free. For this reason, the separate-dwelling decision depends much more on demographic variables than do other housing decisions, and this is reflected in the sex and marital status distinctions made throughout most of the following discussion.

As a preliminary, it is useful to note some findings for all adults 25 and over (excluding married females). Unlike other housing characteristics, the number of dwelling units per adult - usually called the headship ratio - varies little by urbanization level but does vary substantially by region. In general, the ratio is greater the further west in Canada. Specifically, in Newfoundland, .72 units are demanded per adult (as defined above) while in Alberta .86 are demanded. There is no clear pattern in the effect of income on headship at different urbanization levels and in different provinces. In all areas, income's effect on headship is statistically significant and quantitatively important. In most areas, the effect of a $1,000 increase in income is to increase headship by over three percentage points.

The relation of headship to age is quite different in the more urbanized areas compared to the less urbanized areas. For very young, single males the headship ratio is much greater in large urban areas than in rural areas but with increasing age this differential declines and then changes sign. Thus at age 25-29 the ratio is .30 in large urban areas and only .13 in rural areas, while at 65 and over the ratios are, respectively .45 and .65. At young ages, presumably the pull of family ties in rural areas offsets the low price of housing. The income elasticity is generally over .5 for those under 30 and declines greatly with age. Thus, apparently, the potential for increases in the number of households caused by increased incomes depends greatly on the proportion of the population 21-30. This suggests that the late 1970's may represent the peak period for the effect of rising incomes on household splitting.

While almost all married males are heads, the incidence of headship among other persons is much lower and so the potential for change is much greater. For non-married persons 25 and over, transitory income has about the same effect as permanent income, and both very substantially, affect headship and so dwelling unit demand. At standard values of other variables, the probability in Toronto of headship at $5,000 (1970) permanent income is .66; at $10,000, .79 and at $15,000, .88. The demographic variables, immigration status and mother tongue, also have a strong effect but stimulus to housing demand as immigrants move into their own dwellings is short-lived. For immigrants of more than five years standing, the probability of headship differs little from the native born probability.

Unemployment in Toronto very strongly negatively affects the headship of non-married males, implying a substantial softening in the housing market especially the rental market in times of high unemployment. Increased formal education quite strongly increases the headship for young, single males; but it has a weaker effect for other non-marrieds. This suggests that the effect of formal education may arise not so much because it permanently increases the taste for the housing privacy and control implied by a separate dwelling unit, but because the attainment of higher education requires many young people to leave home and move to another city.

There is a marked difference between the sexes in headship. After standardizing for a wide range of variables, young single females are more likely to be heads than young single males, and are more affected by income in their choice. For the

middle-aged widowed, separated and divorced, females are also much more likely to be heads than are males.

1.3.3. The Homeownership Decision

Homeownership is closely associated with the accumulation of wealth and security. It is thus interesting that the effect of income on homeownership, which is substantial in large urban areas, declines greatly as urbanization declines, so much so that in rural non-farm areas income has a quantitatively insignificant effect. In these areas income affects who become household heads, but not which heads become owners. This is associated with the low price of land and availability of low quality owner dwellings in rural areas.

The probability of ownership is strongly affected by age. In rural areas the increase in the crude probability is monotonic with age but in other areas a peak is reached in the 45-54 age group. This peak is .64 for large urban areas and .79 for small urban areas. When other variables such as income and household size are controlled for, the peak still occurs, but more than ten years later. It is of interest that a peak generally does not show up in United States data, presumably partly because there the capital gains tax acts as a powerful disincentive to selling without repurchasing another house. This suggests that extending the Canadian capital gains tax to residences would reduce the extent to which the old release their homes for young families.

The multivariate ownership model is applied only to Montréal and Toronto samples. It shows that the number of children has a large impact on the probability of owning, especially for households with heads under 45 and especially in Toronto. The lesser impact of children in Montréal is perhaps related to the existence there of much low-rise rental housing suitable for families. In both places the presence of pre-school children shows up as a powerful factor triggering a change in tenure from rental to ownership (i.e. triggering the "purchase" decision).

The other component of household size, the number of adults (defined as persons 18 and over), also exerts a strong influence on the probability of owning. While the number of children matters more for younger than for older households, the number of adults matters more for older households. Furthermore, the number of adults plays little part in the purchase decision but has a large role in the

decision to change tenure from owner to renter (the "sell" decision). This suggests that households tend to give up owner-occupancy when their adult children leave home.

Overall, an increase in income of $5,000 (1970 dollars) increases the probability of owning by about seven or eight percentage points in Toronto and in Montréal. The impact is substantially greater for households with heads under 45. The impact of permanent income is substantially greater than that of transitory income. Surprisingly, it is permanent income, not transitory income, which strongly affects the purchase decision; this suggests that purchase depends importantly on whether certain household characteristics have reached a threshold level, as well as on trigger factors. Income's effect is clearly asymmetric. It has much less effect on the sell decision than on the purchase decision.

In general, income effects found here are somewhat less than those found in U.S. studies. In the U.S. the cost of owning relative to renting is less than in Canada because of the deductibility of mortgage interest and property taxes.

Wealth, as indicated by opportunity net worth, has a negligible effect on ownership. This negative finding is pervasive, showing up in virtually all estimates of the basic model and its variations. It seems fair to conclude on the basis of this evidence that the portfolio balance motive for homeownership is not of great importance. Of course, this conclusion must be somewhat tentative because of the nature of the wealth variable used.

The income of second earners, especially in young households, does not have a great effect on the probability of owning. In fact for all ages on average a second earner would have to earn more than about $4,000 (1970 dollars) for her income to have a positive impact. This is perhaps to some extent associated with institutional lenders' income qualification rules as they existed in 1970.

Unemployment of the head of the household in the week prior to the census has an immense effect in reducing the ownership probability, especially where the head is under 45. For all ages together this characteristics has as great an effect in Montréal as a reduction of over $5,000 in permanent income, and in Toronto as great an effect as a reduction of over $9,000 in permanent income. Because unemployment in the week prior to the census could directly have affected ownership for only a very tiny proportion of the sample, it is reasonable to interpret the effect of this variable as reflecting the effect of endemic unemployment among those actually unemployed just prior to the census.

The ownership proportion differs greatly between Montréal and Toronto, in fact by 20 percentage points. It is thus of great interest to explore the possibility that this is associated with cultural differences. In fact we find that in Montréal the francophone ownership probability is 51% against 59% for non-francophone families which are otherwise similar. Thus most of the Toronto-Montréal ownership difference is apparently explained by other factors than ethnic ones. A more historical perspective, however, suggests that ethnic factors may be the fundamental major source of the difference, to the extent that they have resulted in the large proportion of duplexes and triplexes in Montréal, dwelling types which, once built, ensure a low-occupancy ratio for years to follow. It is of interest that in Montréal the richer and more educated the head of a francophone family the more similar in its ownership proportion it is to a non-francophone family of the same status.

Recent immigrants, according to evidence from the Toronto sample, are less likely to be home-owners than other families. In view of the economic disruption these families have undergone - presumably leaving them in a much worse position with respect to assets than non-immigrants of the same income and age - it is somewhat surprising that the differential, 10 percentage points, is as small as it is. It is also of interest that there is a clear dichotomy between recent married immigrants under 35 and older recent immigrants. The former are very much like the native-born in their ownership; the latter are very much less likely to own.

1.3.4. The Housing Expenditure Decision

The burden of housing expenditure is lower, the lower the level of urbanization. The mean value-to-household-income ratio is 2.4 for the Toronto CMa, 2.10 for large urban areas and just 1.83 for rural non-farm areas. The rent-to-income ratio is .20 for the Toronto CMA, .19 for large urban areas and .15 for rural non-farm areas. The burden of housing expenditure is about the same across age groups until the age group of 65 or over, when it jumps sharply. This is not surprising for the owner-elderly because a paid-off mortgage means that the high ratio of value to income does not represent a high cash flow burden. However, the jump also occurs for renters. The rent-to-income ratio jumps from .17 for those 55-64 to .23 for those 65 and over in large urban areas. This jump is even greater in small urban areas. These high ratios for the elderly reflect a strong preference for space.

The elasticity of house value with respect to income is less than .5 in all areas and is much higher the lower the level of urbanization. This is consistent with the fact that land is cheaper the lower the level of urbanization, and the minimum "bundle" of housing is smaller because of less strict building and zoning bylaws. As a consequence, the value-to-income ratio for the lowest income level is much less in rural areas than in urban areas. The value-to-income ratio at high income levels does not show nearly as much difference. This pattern yields elasticities for owners in rural areas which are much higher than those in urban areas.

The income elasticity is especially great for rural owners relative to urban owners in the case of households under 30. It is these young households, low on their lifetime income curve, who would be most affected by the availability of cheap and low quality housing. Many with low incomes who would be excluded from home-ownership elsewhere are owners in rural areas because of the availability there of cheap housing.

In general, there is no clear, smooth relationship between age and the size of income elasticities for working-age owning households. The elasticities for those owners 65 and over, however, are invariably greater than elasticities for those in the next oldest age group. This is the reverse of King's finding for the U.S. (1972). He found that the value of dwellings purchased was much less affected by income for the elderly than for young households.

The measured income elasticities estimated for Toronto and Montréal using the multivariate model are even lower than those estimated using the simple model. It remains true that elasticities for owners are much higher than those for renters. When measured income is replaced by its components unexpected transitory income, expected transitory income and permanent income the elasticities increase substantially. The effect of expected current income is much greater than the effect of unexpected transitory income for renters as well as for owners. Apparently both groups view their housing expenditure as a fairly long-term commitment.

The source of household income has a substantial influence on the expenditure of owners, an influence remarkably similar to that it has on the probability of a household being an owner in the first place. In particular in Toronto and Montréal a second earner must earn several thousand dollars before her earnings have any

effect on the quantity of housing the household chooses. This phenomenon is especially important for middle income ($7,500 to $14,999) Montréal households and for both middle and upper income Toronto households. For renters, the source of income, as estimated here, is much less important, possibly because the effect for married households offsets that for single "sharers".

For the expenditure decision of owners opportunity net worth has a substantial effect, unlike the case for the tenure decision. The pattern of its effect over different household income classes is remarkable. In both centres an additional dollar of opportunity net worth has a greater effect the higher the income group. For instance for middle income households in Montréal a thousand dollar increase in opportunity net worth increases house value by $88, while for high income households the increase is $152. This pattern is unlike the pattern for the marginal effect of income.

U.S. studies generally find that family size has a negative effect on house value and only a weak positive effect on rent. Here, the number of children has an ambiguous effect on house value but has a very strong positive effect on rent for middle income renters and even has a positive effect for low income renters. This implies that the poor do not cut back on housing in order to finance the greater food and other types of expenditure required as the number of children increases. Whether this behaviour is voluntary - perhaps reflecting the existence of family allowances which do not exist in the U.S. or is instead forced by price discrimination on the part of landlords is open to question.

Finally, a comment is called for on the powerful effect of education on housing expenditure. A year's education adds more to expenditure for both owners and renters than does $500 extra permanent income. This effect, it is to be noted, is quite separate from the effect of education via its influence on permanent income. Some might argue that education increases the quantity of housing that a household chooses because education encourages a preference for housing over other goods. Alternatively, the effect of a well-founded education may reflect the association of education with an income characteristic not explicitly measured here. This characteristic is income stability. The latter explanation for the effect of education is supported by the fact that for owners in both cities and for Montréal renters, the marginal effect of education is greater for the two polar income groups than for the middle income group.

FOOTNOTES

[1]Age, marriage and immigration, however, are all variables that have been used (Maisel, 1965; Waslander, 1973; Steele, 1972).

[2]Areas of 30,000 or more population.

CHAPTER 2

CONSUMER BEHAVIOUR AND THE HOUSING MARKET

In this chapter we provide the a priori underpinnings for the empirical studies in Chapters 4 to 7. In the first section we sketch the pure theory of consumer choice over time under certainty, as applied to housing. This provides a reference point for following sections in which we discuss a number of different issues related to the specification of empirical models of housing demand. First we define an array of income and wealth variables designed to capture some effects of uncertainty. Next we discuss the reasons why housing tenure preferences depend on the bundle of desired housing characteristics and so ultimately on the household's characteristics. The effect of the wealth constraint on tenure choice and on housing expenditure in the context of credit rationing are also discussed. Finally we discuss the related issues of the effects of transaction costs impinging on the optimum housing bundle and the differences between moving households and non-movers.

2.1. Housing Characteristics and the Lifetime Budget Constraint

The standard theory of lifetime consumption choice under certainty (Modigliani and Brumberg, 1954), modified to explicitly include various housing characteristics, is as follows. Assume a consumer at age t chooses a bundle of commodities to maximize utility over the rest of his life, given income and net worth. Assume some of these commodities are housing services. Specifically, assume that "housing" consists of K different characteristics (e.g. rooms, bathrooms, parking facilities, privacy) and the service of each is an argument in the utility function. The utility function is given by

$$U(t) = f(H(1,t), \ldots, H(K,t), \ldots, H(1,L), \ldots, H(K,L), X(t), \ldots, X(L)) \tag{2.1}$$

where $U(t)$ is utility at age t

$H(i,j)$ is consumption of housing service i at age j

$X(j)$ is consumption of the amalgam good, non-housing, at age j

L is the age at which death occurs.

The consumer of age t maximizes (2.1) subject to the constraint that

$$A(t) + \sum_{j=t}^{R} W(j)(1+r)^{-(j-t)} = \sum_{j=t}^{L} \sum_{i=1}^{K} H(i,j)P(i)(1+r)^{-(j-t)} + \sum_{j=t}^{L} P(x)\, X\, (j)(1+r)^{-(j-t)} \qquad (2.2)$$

where A(t) is non-human wealth at the end of t
W(j) is labour income at age j
P(i) is the price of housing service i
P(x) is the price of X
r is the interest rate
R is the age of retirement.

A(t), non-human wealth, is more commonly called net worth. Note that P(i), P(x) and r are invariant over time in this simple model. Note also that implicit in (2.2) is the assumption that net worth is zero at death.

The solution to the constrained maximization yields demand functions for the various housing attributes in which the prices of present and future goods (P(1), ..., $P(1)(1+r)^{-(L-t)}$, ..., $P(K)(1+r)^{-(L-t)}$, ..., $P(x)(1+r)^{-(L-t)}$), net worth, and the discounted stream of labour income all enter as arguments. Such socio-demographic variables as the number of children, education and immigration status affect tastes and so determine the parameters of the utility function and ultimately the demand equations. At the same time variables such as education and immigration status affect future labour income so that these variables affect the demand equations also via their effects on the budget constraint, the supply side of the consumer's calculus.[1]

See footnote(s) on page 50.

2.2. The Specification of Income Variables and Net Worth in the Context of Uncertainity

The theory in the previous section, because it assumes certainty, implies that demand equations should include non-human wealth and human wealth, and no income variables. Instead, we use in our empirical models three income variables and just one wealth variable. This is done partly because of the importance of uncertainty. A highly-educated consumer of thirty may expect to receive a rapidly rising income for 15 years but he may be sufficiently uncertain about this prospect to be unwilling to make a mortgage commitment based on it. Additionally, mortgage lenders may lend largely on the basis of current income. As a consequence, current income may be of great importance in housing decisions.

The basic building block of our income and wealth variables is EY, expected current (1970) income:

$$EY = \hat{y}(t)$$

where t is the age of the head in 1970. EY is assumed to be a function of age, occupation, education, major source of income, labour force status and marital status. Its estimation is described in Chapter 3.

From EY is derived a wealth variable, "opportunity net worth", ONW:

$$ONW = s \sum_{j=6+E}^{t-1} \hat{y}(j) \left(\frac{1+r}{1+g}\right)^{t-j}$$

where s is the assumed saving rate
g is the assumed rate of growth of real income
r is the assumed real interest rate
E is the number of years of formal education completed.

ONW is net worth if the consumer each year has saved the proportion s of his income, if he started receiving income at the end of his formal schooling, if his savings have yielded a return equal to the real rate of interest and if he has received no bequests. ONW does not depend on the consumer's actual experience. In contrast, actual net worth does, and indeed actual net worth will generally be

much greater for owners than for renters. As Kain and Quigley (1975) and Birnbaum and Weston (1974) have pointed out, this endogeneity makes the use of actual net worth in a housing tenure choice model highly questionable.

From EY are derived three income variables in the Friedman-Modigliani tradition. Permanent income, PY, is defined as follows:

$$PY = r \left(\sum_{j=t}^{D} \hat{y}(j) \left(\frac{1+r}{1+g}\right)^{-(j-t)} + (Y-EY) \right)$$

where D is expected age of death and Y is measured current (1970) income. Inside the brackets is wealth, the sum of current income and discounted expected future income. It is important to notice that, here, income at any age includes unearned as well as earned income, so that the wealth term includes non-human as well as human wealth. It understates wealth, however, because it ignores bequests and the imputed rent of durable goods including housing. It is a discounted gross cash flow indicating, to use a felicitous expression of Bossons (1973), financial capacity.

Transitory income, YT, is given by:

$$YT = Y - PY$$

Furthermore, transitory income is divided into two components. The first component is unexpected transitory income, UTY:

$$UTY = Y - EY$$

This is the windfall concept of Friedman and is consistent with Friedman's famous assumption that a consumer will save all transitory income (1957, p. 30) and with Friedman's usual identification of "permanent" income with expected current income (our EY, not our PY). UTY also is the transitory income concept captured in time series models. The other component of transitory income, expected transitory income, ETY, is:

$$ETY = EY - PY$$

This is the concept of transitory income which Friedman uses at the beginning of the development of his theory (1957, pp. 7-10) when the model is a two-period Fisherian one assuming certainty. It is the concept of transitory income associated with the division of adult life into working and retirement years and with the humped pattern of income within the working years. This transitory income might be called Modigliani transitory income.[2]

It is of some interest to compare PY with the concept of permanent income used in some earlier housing studies. Kain and Quigley (1975) estimate permanent income as the average income of those in the same race and education class. Unlike PY, this includes past income, does not correct for variations in year of entry to the labour force, does not discount future income and does not vary by age. Thus Kain and Quigley's permanent income for the highly educated young would be too high relative to that of the less educated young, because the highly educated's lifetime income pattern is much more sharply humped and they enter the labour force later. Struyk's permanent income (1976) suffers from much the same problem. His permanent income estimated using regression parameters is EY, expected current income, assuming the age of 45-54. Morgan (1965) suggests but does not use a scheme rather like the one estimated here, defining UTY, ETY and permanent income. Like Kain and Quigley, Morgan defines permanent income as the average over all age groups. This concept is akin to the sum of PY and ONW, assuming a zero discounting factor and assuming equality of s and r.

2.3. The Decision Unit

A thorny problem in any empirical cross-section demand study is the specification of the agent making the maximizing decision. Often, this is taken as the family. A difficulty with this is the fact that family decisions are not the primary decisions but, rather, result from individual preferences and intra-family bargaining. At the same time, most housing data are data for a household or a family and we cannot directly observe the housing decisions of individuals within the family. It clearly makes a great deal of sense to collect housing data on this basis because housing, unlike, say, women's clothes, is consumed jointly by all members of the family so that housing consumption is not easily attributable to any particular member of the decision unit. In the census the main observation

See footnote(s) on page 50.

unit, the household, is defined simply as that group which occupies a dwelling unit. Taking housing decisions as group decisions, there is still the problem of determining precisely what persons' expenditures and incomes are relevant to the maximizing decision. For instance, is the income of a teenager remaining at home to be included in total income and, if not, is the rent that he pays appropriately deducted from the total rent the family pays?

We handle this problem in the following way. Assume that, in the first instance, each adult (defined as a person 18 or older) makes the decision whether or not to occupy a separate dwelling unit. Put more formally, characterize one attribute of housing as privacy so that choosing a given number of bedrooms, bathrooms, etc. within a separate dwelling unit amounts to choosing to consume privacy. Alternatively, we might characterize this attribute of housing as "control". Control is perhaps the most appropriate characterization because in our empirical work the decision we analyze is the decision to become a household head, i.e., to control a separate dwelling unit. In the case of non-family households the selection of which adult member of a household to call the head is almost random. This is not a problem here, however, because people tend to live with others like themselves, and our purpose is merely to determine the probability that a person with a given set of characteristics will control a dwelling unit.

The household headship or separate dwelling unit decision is very greatly affected by marital status. We expect the headship decision to be much more sensitive to income and prices in the case of non-family adults than for adults in families. Marital status itself, however, is affected by whether or not potential marrieds can afford a separate dwelling unit. This plays an important part in the analysis of housing fluctuations of Maisel (1965) and Lewis (1965). The choice of marriage and a separate dwelling unit are to some extent joint choices, just as the choice of living with another unmarried person and occupying a separate dwelling unit with that person are also joint choices. For this reason, we estimate household headship for a sample including persons of all marital statuses, as well as for subsamples of persons of the same marital status.

After the decision to occupy a separate dwelling unit or, identically, the decision to head a household, the next levels of the housing decision hierarchy are all decision made given that a household has been formed. In principle,

the best way to cope with the spending unit problem at this level would be to assume that each adult in the household had a separate utility function and budget constraint and include in the demand, function taste variables and income variables for each. The parameters of the resulting equation would reflect both the taste of each adult and the weight of each in the household decision process. This is more satisfactory than the practice of including total household income or expenditure as the only income variable (e.g. Straszheim, 1975, and the classic in consumer expenditure, Prais and Houthakker, 1971, p. 101). King (1972) and Kain and Quigley (1975) make some allowance for variation in the make-up of the adult part of the household by variables indicating the number of earners in the household. We follow that practice here by including a dummy variable to distinguish households with more than one income earner. In addition, we separate the household size variable into two - number of children and number of adults - to capture the different influence adults have on the housing decision. The adult composition of a household is much more likely to be a matter of current choice than the number of children. This is most obviously the case when adults live together just to achieve economies of scale in their housing expenditure.

The effect of a second earner in a household is apt to be quite different for renters than for owners. A renting household frequently consists of single sharers who prorate housing expenses. Each individual in such a household is apt to be a separate spending unit. If each spending unit has an income inelastic demand for housing then, for a given household income level, housing consumption will be greater the more spending units there are in the household.[3] The presence of more than one earner in a non-family household is an indication of the presence of more than one spending unit.

Owning households are much more apt to be families than are renting households. In the case of a family household the presence of more than one earner is unlikely to indicate the presence of more than one more spending unit. Instead, it often indicates that a high proportion of household income is transitory because the second earner is the wife. Her income is relatively transitory because of her lesser attachment to the labour force and because family decisions like that to move to another city may be taken because they improve the husband's job, even

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See footnote(s) on page 50.

though it results in a lower income for her. In this case, the presence of a second earner will tend to reduce housing expenditure at a given household income level. This tendency is reinforced by the practice of mortgage lenders to weigh the wife's income less heavily than the husband's.[4]

2.4. The Heterogeneity of Households and Housing, and Home Ownership

It is often asserted that the housing consumption and housing tenure decisions are entirely separate and independent decisions. Under this view, the decision to own the housing one lives in is an investment decision no different in principle than the decision to own housing and rent it to others. This is the view held by Muth, in his elegant and monumental work on American residential location (1969). The most fundamental objection to this view is the fact that owning one's own home itself confers utility. In the utility function (2.1), one housing commodity is ownership. Ownership means more security and no eviction; when the home is owned, the housing bundle H(2), ...H(K), consumed at age t, can also be consumed in the following L-t periods with relative certainty. The protests usually heard against expropriation at market value suggest that this security is of substantial utility.

At a less fundamental level is the important fact that some housing services are unavailable in rental dwellings. To consume the services of a single-detached house of good quality it is generally necessary to buy. The few units available for rent are apt to be available only for a limited period while their owner-occupier is temporarily absent. In 1971, only 13.5% of all single-detached dwellings were rented and, in urban areas of 500,000 or more, only 10.9% were (1971 Census, Vol. II.3, Table 4). While 23.0% of urban owned single-detached units were valued at more than $27,500 only 1.5% of rental units rented at more than $250 per month.[5] Why this unavailability of single-detached and high quality accommodation for rent? Partly, the answer lies in the high cost of supplying some rental housing bundles, relative to the owner-occupier's supply price. A landlord incurs costs in attracting and selecting tenants, in carrying vacancies, and in protecting his capital by controlling tenants' use of it and by maintaining it. All these costs are higher for single-detached housing than for high density housing, essentially because of the economies of scale enjoyed by managing units

See footnote(s) on page 50.

at a single location. An owner who "rents" a single-detached house to himself does not incur the first three costs at all. A condominium apartment owner-occupier does not incur the first two but has some control costs analogous to those of the landlord because of common ownership of some elements.

Maintenance costs are affected by owner-occupancy in two ways. First, the owner-occupier can usually choose precisely how much maintenance he wishes to purchase.[6] He can either hire others to shovel his snow, clean his halls and mow his grass, he can do it himself, or he can leave it undone. The tenant has much less choice. Secondly, the owner bears precisely his user cost while a tenant does not. The tenant's rent can only imperfectly reflect differential wear-and-tear and other operating costs. The owner-occupier pays only for his own user cost; while the tenant pays in his rent for the average user cost of all tenants. Rents generally vary according to the dwelling unit but not according to the occupants.

This market imperfection makes it pay for landlords to refuse to make housing available to occupant groups who impose high costs. One such group is households with children. These households are above average in size and so, for that reason alone consume more electricity and water often paid for by the landlord. Children also cause more damage than adults. They impose an additional cost on the landlord to the extent that their noise and damage reduces the attractiveness of his building to more profitable tenants. For these reasons, many housing bundles cannot be rented by families with children - and by various other high cost households - although they are available to others. That is, the unavailability problem that requires owner-occupancy if the desired housing bundle is to be consumed is more severe for high-cost households than for others. The type of housing most likely to be unavailable to these households is high-quality-per-square-foot housing. The possible cost to a landlord of renting such accommodation to a damage-prone household is greater than if it were lower quality: more is lost if a $3,000 decorating job is ruined than if a $200 one is. The implication of this unavailability constraint is that the observed income elasticity of expenditure on rental housing will be dampened for households with children. The argument in this section leads to the hypothesis that the income elasticity of households with children relative to the income elasticity of other households will be less for renters than for owners.[7]

See footnote(s) on page 50.

It is of interest to note that in Quebec, where the percentage of the total stock that is rented is much higher than in Canada as a whole, the availability of rental housing of a type (duplex and triplex) and size (four to six rooms) suitable for families is especially noticeable (see Table 2.1). The conditions on which housing are rented in Quebec also make it less likely that landlords will attempt to exclude high-cost tenants, because, in Quebec, tenants pay directly many of these costs often even heating fuel - which vary according to the tenant.

TABLE 2.1. Selected Characteristics of Urban Occupied Dwellings, Canada and Quebec, 1971

Characteristics	Canada	Quebec
Ratio of rented to owner-occupied dwellings	.84	1.43
Ratio of rented to owner-occupied dwellings by number of rooms		
1 - 3	12.74	19.42
4	2.51	5.50
5	.72	1.16
6	.31	.56
7	.19	.30
8+	.16	.16
Rented dwellings whose rent includes refrigerator	48.5%	27.9%
Rented dwellings which are single-detached, single-attached or duplex	44.3%	51.3%

Source: 1971 Census of Canada, Vol. II.3, Tables 4, 9 and 44.

2.5. Taxation Effects, Uncertainty Effects, Credit Availability and Home Ownership

It is convenient at this point to summarize some of the preceding discussion in terms of prices and availability of specific housing characteristics. Let H(1) refer to the security derived from owner-occupancy, H(2) refer to quality narrowly defined and H(3) refer to control. Then, without owner-occupancy, H(1) is unavailable; and, for some households, H(2) is also unavailable; H(2) and H(3) are cheaper under owner-occupancy.

Now let us consider the prices of other characteristics such as space. It may be argued that these prices are probably higher under owner-occupancy than under tenancy because of the provisions of the Canadian tax law.[8] It is true that the return to the owner-occupier in the form of imputed rent is not taxed, unlike the yield on other capital goods, and so this lowers the P(i)'s. It is also true, however, that the yield on such property held for investment is not taxed. This arises because buildings, under the Income Tax Act, are depreciable property, and a capital cost allowance of 5% of the declining balance may be deducted annually from income.[9] Thus, typically, a new building creates a large tax loss. To the extent this can be deducted from employment income the tax treatment favours recently purchased investment property over recently purchased owner-occupier property. In 1970, this tax treatment prevailed for old and new residential buildings and at present it exists for new residential buildings.[10]

There is no further, subtle reason why P(4)...P(K) will tend to be higher for owner-occupants than for renters. Owner-occupants, by the nature of the situation, cannot enjoy economies of scale in purchasing. They buy their single-detached dwelling or condominium apartment "retail" while the investor buys wholesale.

We now examine the effects of uncertainty. Consider first the effects of uncertain P(i)'s. It is clear that cash flow uncertainty is much greater for the renter than for the owner-occupier. Past t the owner-occupier's property taxes, heating, utility, and - if the mortgage term is less than the amortization period - mortgage interest expense may rise but the original capital cost, the most

See footnote(s) on page 50.

important component of cost, clearly cannot.[11] On the other hand, the increase in cash flow certainty with the purchase of a dwelling is accompanied by capital risk. If the consumer has a low net worth he is in a relatively exposed position. This is exacerbated if he has purchased the dwelling on the basis of a large permanent income at a time when current income is low. Typically, this is the income situation of the young highly-educated because of their steeply rising age-income curve. In these circumstances the house must be financed by a large mortgage so that a large unexpected drop in income or even a failure of income to rise as expected may not only change the optimizing bundles $H(i,j)$, $i=1, \ldots, K$; $j=t, \ldots, L$, requiring for utility maximization a move to another house, but may also force the sale of the house at a lower than long-run equilibrium price. Only a vendor with a large net worth or with a high current income has the financial capacity to ride out a temporarily depressed market. Thus, the lower is net worth and the more negative is transitory income, the less the risk-averse consumer will prefer ownership.

Even if the consumer is not risk-averse, lenders are, and the consumer with a low net worth and variable expected future income may find credit unavailable. Typical of the rating schemes is one used by the Royal Bank in 1968. A prospective borrower needed a minimum of 36 points to qualify, with 55 points the approximate maximum obtainable. Of these 55 only 20 points related directly to current income, while 15 points related to net worth and 20 to the variability of future labour income.[12] The wealth constraint as formulated in (2.2) does not recognize the fact that a consumer may not be able to borrow an amount corresponding to his permanent income. A third equation should be added, to capture the constraint that cash outlay in t on commodities consumed in t and on durables such as housing yielding commodities for consumption in t and later years must be less than or equal to net worth plus current income plus available credit. Clearly, the importance of the credit constraint diminishes with age because net worth rises relative to permanent income. It is also probably true that current income becomes less variable with age.

The arguments suggest the hypothesis that increasing age will be associated with a higher incidence of home ownership. In fact, this association is commonly

See footnote(s) on page 50.

observed, although it has not been well explained and is often linked to the possibilities of tastes changing with age rather than to the change in the composition of wealth with age.[13] We hope we have gone some way to respond to David's challenge: "Future studies of the behaviour of families ... must be used ... to establish a theoretical basis for the effect of age on consumption." (1962, p. 100)

2.6. Transaction Costs and the Changing Optimum Housing Bundle

An implicit assumption of the wealth constraint (2.2) is the costlessness of changing the housing bundle consumed. That is, the price vector in period j does not depend on whether the vector H(i) is the same in j as in other periods. In housing markets, however, transactions costs are high, and are much higher for the owner-occupier sector than for the rental sector. In the rental sector, transaction costs include direct moving costs and the imputed cost of the consumer's time spent in searching for new accommodation, moving, and adjusting to the new location. This is probably under 15% of annual housing expenditure. In addition, for owners there are other charges, totalling, for purchase plus sale, about 8.5% of property value: real estate brokerage fees under the Multiple Listing Service are typically 6%; legal fees, appraisal fees for securing a mortgage, land tax and other transfer costs are probably about 2.5%. Now, under the common assumption that a residential property is worth 100 times its monthly gross rent, annual housing expenditure is 12% of the property value. Taking moving costs as 15% of annual expenditure, and so 1.8% of property value, implies that the transaction costs of changing the housing bundle for owners is 10.3% of property value, or 86% of annual housing expenditure.[14] Transaction costs for owners are thus close to six times those for renters, under these assumptions.[15]

An obvious implication of this, but a point that has been missed by most analysts, is that an owner will not move because of an evanescent change in the needs of the household. Consider, for instance, the following possible moves undertaken to adjust fully to changes in family composition: buy a small first house of six rooms at the birth of the first child, buy a larger house of seven rooms when the third child arrives, and then move back into a six-room house when

See footnote(s) on page 50.

the children leave home. Suppose that a seven-room house costs 15% more than a six-room house (this is slightly less than one-sixth more, because of efficiencies of scale in building and because it is assumed no more plumbing is added). Also assume that transaction costs for owners are, as computed above 10.3%, of property value. Then, assuming the second move is after three years, the third move after 18 years and r, the real rate of interest is 5%, the discounted value of the transaction costs is at the time of the first move equal to 13.2% of the value of the smaller house.[16] Thus, it costs very little more to live in the larger house for the whole period than to fine-tune housing size to family needs. More important, only a very implausibly high interest rate would make it worthwhile not to buy a large house in the first instance, rather than move after three years.[17] A rational household head, other things being equal, will purchase a house large enough to fill household needs which may not arise for many years to come. If a purchase is made in t, the actual vector H(t) will be greater than $\bar{H}(t)$, the optimum H(t) which would prevail in the absence of transaction costs, if $\bar{H}(t)$ is less than $\bar{H}(j)$, where $j>t$. These conclusions hold, a fortiori, if housing prices, in real terms, are expected to rise.

This argument suggests the hypothesis that the number of children in particular and household size in general should have little effect on the housing consumption of owners. Because of the asymetric way the transaction costs affect the housing decision, these variables should have more effect on the consumption of older households (where a smaller size is apt to indicate a permanently smaller size) than on younger households.

Before leaving this discussion it is worth linking it to the earlier discussion of credit. Common observation suggests that many households do not behave in the "rational" fashion indicated above. The explanation for this probably lies in their concern, or lenders' concern, for risk. Generally, lenders will only issue mortgages on condition that monthly payments include some amortization. Certainly it is rare for monthly payments to be less than the interest due, i.e. it is rare for lenders to allow the principle of the loan to increase over the life of the loan. This means that the current cash flow of the consumer that is devoted towards housing is directly linked to the price paid for

See footnote(s) on page 50.

the house; the drain on current income cannot be postponed to the time when income is greater. Thus, the purchase of a larger house than needed at present may reduce non-housing consumption below its optimum, because of the cash flow requirement. In fact, whatever the consumer's optimum, lenders typically will constrain the consumer's optimum allocation of cash flow. In 1970, National Housing Act (NHA) regulations required gross debt service (interest plus amortization plus property taxes) to be 27% or less of income.[18]

If this constraint were effective and other things were equal the observed income elasticity of demand house value by purchasers would be one. In fact, other things are not equal. Property taxes, interest rates and the amortization term all vary, as does the coverage of income and the gross debt service ratio allowed. In 1970, 50% of the wife's income could be included for CMHC loans but one institutional lender was probably typical in allowing only 20% (Royal Bank, Form 3358, 1968). In addition, the Royal Bank's maximum gross debt service ratio was 25% on its conventional loans. For NHA housing in 1970, 38% of all loans had a ratio of 23.1-27.0% of the borrower's income and 23% had a ratio of over 27%. The amortization period of 85% of all loans was 25 years (CHS, 1972, Table 102, p. 80). Our analysis suggests that the constraint would be much more important for younger borrowers than for older ones. In 1970, 40% of NHA borrowers were less than 30 (CHS, 1972, Table 91, p. 75). We conclude that the gross debt service ratio constraint biases the observed income elasticity towards one, especially for younger purchasers, but the quantitative importance of this is not clear.

The two institutional constraints on borrowing - a monthly payment covering at least interest on the morgage and a minimum income requirement linked to the price of a home - imply that current income will have a very substantial influence on the consumption of owned housing.[19] This influence will be greater the younger the consumer because of association of net worth with age. The higher net worth the less likely current income will constrain the optimum purchase because of the opportunity to use assets to reduce the required size of mortgage.

See footnote(s) on page 50.

2.7. Movers and Non-movers

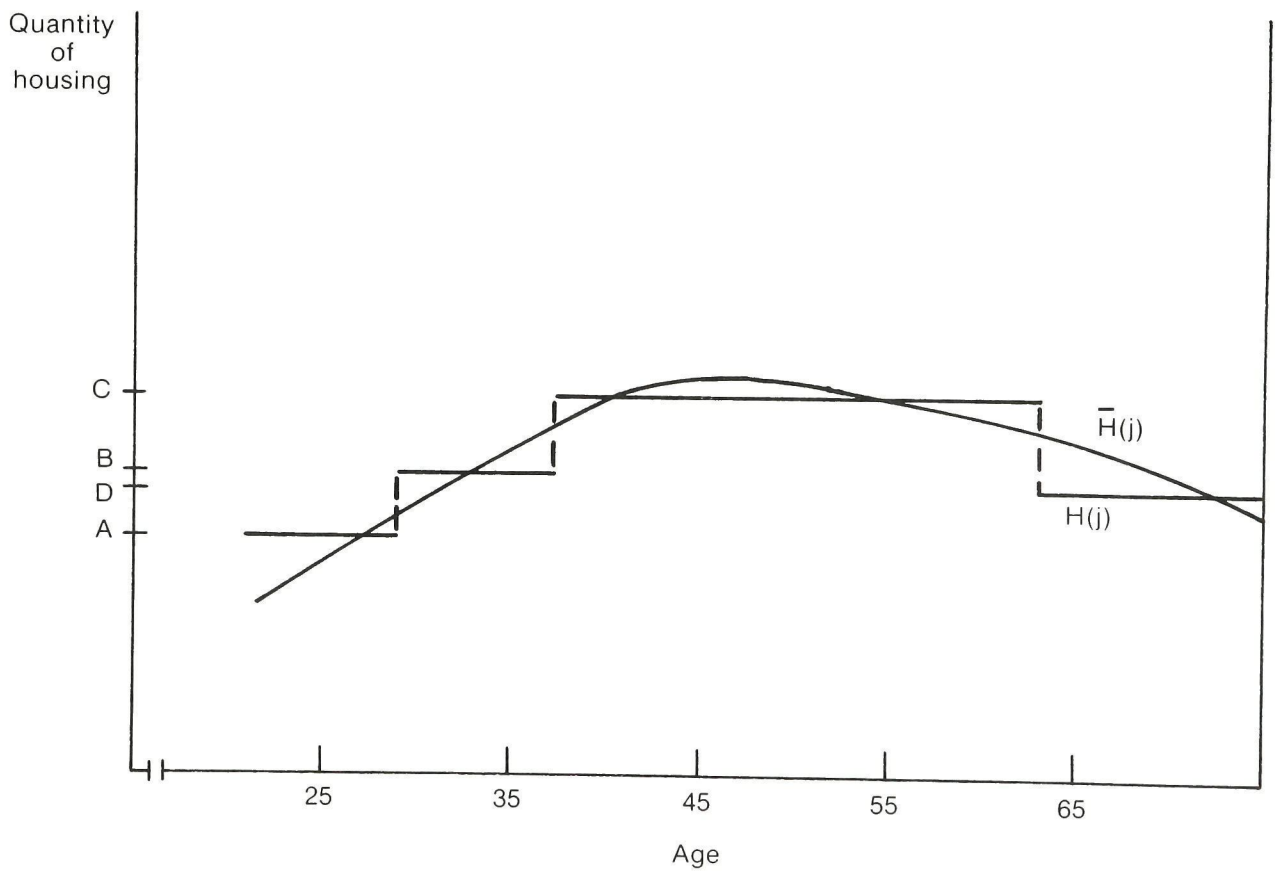
An ongoing controversy among housing analysts is whether housing demand is better modelled by examining all households or by examining only recent movers. The argument for examining recent movers is that only households who have had the opportunity to make an active choice recently can be assumed to be in equilibrium (Winger, 1963; Kain and Quigley, 1975; King, 1972).[20] In this section, we will extend the argument of the previous section to show that in general the argument of Kain and Quigley and others is incorrect, because of the interacting effects of transaction costs, credit availability, increasing net worth with age and increasing labour income with age to a peak at around 45 or 50.

In the diagram below, we show equilibrium housing consumption - where equilibrium consumption is here defined as the optimum housing when transaction costs and credit availability are excluded from consideration - as a function of the age of the head of the household, $\bar{H}(j)$. Actual housing consumption is given by the step function H(j). "Actual" here is optimum housing when transaction costs and credit rationing are included in the consumer's calculus. We assume that movements between housing levels A, B, C, D require residential relocation. We now justify the general relation of these two functions. Suppose the consumer is at housing level A. What will determine when he moves to another level of housing consumption? The benefit of the new housing must be weighed against the cost of the new housing. One of these costs is the costs of moving, i.e. transaction costs. Transaction costs per year of housing consumed at the new location will clearly be less the longer the consumer intends to stay at the new location. It is also true that the longer the consumer stays at level A the greater the new housing level he can attain, because his net worth grows with age and his annual income grows with age to a peak at about 45. The benefit of waiting and consuming less housing than the equilibrium level (as is shown by the section of A to the right of its intersection with $\bar{H}(j)$) is an increase in the jump B-A. The greater this jump, the more likely it is that he will stay at the second level a longer time and so reduce transaction costs per year. A long enough wait might allow the consumer to jump directly to level C, thus saving entirely the moving costs associated with the interim period of consumption at level B.

See footnote(s) on page 50.

Chart — 2.1

Housing Consumption and Age of Household Head, for Owners



Now there is no reason in principle why the consumer should be at equilibrium at the point when the switch is made between any two housing levels such as B and C. In fact, if this were true it would imply that the consumer was always below housing equilibrium until his peak income age, except in the year the move was made. It would imply that consumers, when purchasing, do not consider expected increases in income and family size, buying ahead of demand in view of transaction costs. Accordingly, there is no reason to expect that the sample of purchasers whould give a better picture of equilibrium housing demand than a sample of all owners.[21]

We now examine the way credit rationing interacts with transaction costs and the age-income-net worth pattern to affect the timing of moves. First, credit availability affects the number of moves. If credit were freely available (at the interest rate r), with postponable interest payments, there would be fewer moves. In the diagram, the consumer would tend to move initially to level B or C because of the tranaction costs required for interim adjustment. The credit constraint introduces the possibility that until an age close to the peak-income age the step function H(j) may always be below $\bar{H}(j)$; that is, housing consumption may never be as high as its equilibrium level during these years. This is the strongest justification for analysing a sample of purchasers rather than owners. Unfortunately, this justification is somewhat nullified by the fact that the credit constraint operates differentially from year to year. In late 1969, for instance, lenders were short of funds and so required larger downpayments and interest rates than in 1973, when money was easy. Varying credit conditions mean that the results from a study of purchasers will be rather sensitive to the particular year the sample was taken. The parameter estimates from a sample of all owners will to some extent average out these varying conditions and so will be more stable and useful for prediction.

So far we have assumed that the (pure) price of housing does not change over time. Now we drop this assumption and replace it with the assumption that prices rise. This implies a capital gain to owners increasing their net worth and so lessening the effect of the credit constraint. This implies fewer moves and a higher average level of housing consumption over one's life span. To see this,

See footnote(s) on page 50.

consider the following numerical example. Suppose a consumer earning $12,000 purchases a house in year t at $25,000 with a downpayment of 4%. Suppose this purchase were constrained by the unwillingness of lenders to allow a mortgage more than twice his income. Suppose his real income increases by 5% per year. Then, after five years, his income is $15,315 and he still will not be able to borrow enough to purchase a $40,000 house. Now, consider the alternative situation in which everything is the same except that there is an annual rate of inflation of 10%. Then, after five years, his income is $24,666 and the $25,000 house he has purchased has risen to $40,263, so that even without amortization his equity is now $16,263. The $40,000 house has now risen to $64,420 but because of the equity in his first house he need only borrow $48,157, which is less than twice his income. So, under inflation, the consumer moves sooner and may move fewer times over his lifetime. Note that this result depends crucially on the assumption that lenders allow a mortgage equal to twice the consumer's income no matter what the rate of inflation. This assumption is only plausible to the extent that interest rates do not adjust to the rate of inflation. Note also, however, that the result does not assume a rise in the real price of housing. If housing prices rise faster than other prices the result is clearly less sensitive to deviations from the assumption of a constant mortgage-income ratio.[22]

This analysis suggests an additional problem in studying purchasers rather than all owners. In any year, the immediately preceding rate of increase of house prices will substantially affect both who moves and the amount of housing purchased by those who do move, so that the results of analysis are, for this reason, rather sensitive to the year in which the sample is taken.

2.8. Concluding Comments

In this chapter we have discussed a number of diverse issues. If there is a theme connecting these discussions it is the importance of taking into account market imperfections in empirical modelling of the housing market. One such imperfection is the unavailability of certain housing bundles in the rental market because of their lower supply price for owner-occupiers than for landlords. This imperfection legitimizes our view of the tenure decision as one level of the housing consumption decision hierarchy, contrary to the neoclassical view that the tenure decision is merely an investment decision. A quite specific implication of

See footnote(s) on page 50.

the associated analysis, in Section 2.4, is that landlords will tend to refuse to rent to high-cost households, such as those with children, or will charge a higher rent to such households. As a consequence, the presence of children will tend to increase the probability of a household owning and, if the household does not own, will tend to increase the rent it pays.

Another imperfection is the existence of uncertainty. To capture the effects of this imperfection, our model includes two transitory income variables: (a) expected transitory income and - an income component associated with the variability of expected current income over the life span; and (b) unexpected transitory income. These income components plus permanent income equal measured income. The size of transitory income matters because a risk-averse household may be unwilling to make financial commitments based on an expected (but not sure) rise in income in the future. Additionally, mortgage lenders make credit available largely on the basis of current measured income, not permanent income.

The existence of uncertainty suggests also that age should be associated with an increased probability of homeownership because of the different kinds of risks faced by owners as compared with renters. Cash flow risk is greater for renters but capital risk and liquidity risk are greater for owners. As a person ages, especially as retirement approaches, income becomes more predictable and the likelihood of moving to a new job becomes less, so that cash flow risk increases in importance and capital risk and liquidity risk decline in importance. Thus the balance of risks changes with age so as to increasingly favour home-ownership. This suggests that age is an important variable in explaining home-ownership.

Transaction costs are another important empirical fact ignored by the pure theory. Transaction costs are especially great for owners. This suggests that evanescent changes in household needs should have little effect on owners' expenditure. More specifically, this suggests that households will tailor the size of their house to their expected family size not their current family size, implying that the current number of children in a household should have little effect on expenditure.

Finally, the importance of transactions costs has determined a major aspect of the research strategy of this monograph. In particular, the samples used for estimation include both movers and non-movers. As argued in Section

2.7, the size of transaction costs inhibits frequent moving and accordingly means that it cannot be assumed, contrary to Winger (1961), Kain and Quigley (1975) and King (1972) that movers are in equilibrium and non-movers are not.

FOOTNOTES

[1]In general, the distinction between economic analysis of the housing market and sociological analysis is that in the latter the focus is on the utility function, not on the constraint. Furthermore, the utility function is often interpreted in a normative way, with the sociologist often discussing needs, not tastes.

[2]Some justification for also associating this transitory income concept with Friedman may be found in his discussion of the life cycle of income (1957, p. 23ff). Friedman there suggests a permanent income might be taken as a kind of average of our EY and our PY (1957, p. 25). This interpretation of Friedman permanent income, however, is inconsistent with the notion of transitory income as "an accidental and transient addition to or subtraction from income" (p. 27) and with Friedman's correlation assumptions (p. 30).

[3]This can be seen as follows. Assume for any spending unit that the elasticity is less than one, i.e. assume

$$\frac{dh}{dy}\, y/h < 1$$

where $\frac{dh}{dy}$ is the first derivative of housing consumption of the spending unit with respect to the income of the spending unit. Then

$$\frac{h}{y} > \frac{dh}{dy} \qquad \text{and } \frac{h}{y} \text{ declines as y increases.}$$

Now if there are n spending units, each with the same income, y, housing consumption of the household, H, as a ratio of household income, Y, is given by

$$\frac{H}{Y} = \frac{nh}{ny} = \frac{h}{y}$$

That is, the ratio of H/Y does not decline when household income increases as a result only of an increase in the number of spending units, although it does decline if household income increases as a result of an increase in the income of any given spending unit. Thus, for a given household income, housing consumption will be greater the greater the number of spending units.

[4]Only in 1971 were National Housing Act regulations changed to allow a wife to be regarded as the homeowner (CHS, 1971, p. xx). And under NHA "in establishing the borrower's income, the lender may include a portion or all of the spouse's income" (CHS, 1972, p. xx, underlining ours). From 1968 to 1972 authorized NHA lenders were only allowed to count 50% of a wife's salaried income (CHS, 1968, p. xviii).

[5]1971 Census, Vol. II.s, Tables 34 and 44. Rent is cash rent. Average gross rent, which includes an allowance for payments for water, electricity, gas and other fuel when these are not included in cash rent, is 11% more than average cash rent.

[6]This and the following comments apply to owner-occupiers of a single-detached house. They apply with some modification to the owner of a duplex or triplex building who occupies one unit and to an owner-occupier of a single condominium unit.

[7]We note a crucial distinction between discrimination against households with children and racial discrimination. Blacks may be regarded as costly tenants because of the aversion of other (white) tenants to them. This implies that the unavailability will not be concentrated in the high quality segment of the market. It is also an empirical fact that Blacks in the United States face unavailability in the ownership sector. For an extensive analysis of the implications of the aversion hypothesis, see Muth (1969).

[8]In England and the United States, unlike Canada, mortgage interest and municipal taxes on owner-occupied dwellings are deductible from income for tax purposes.

[9]Your 1975 Tax Guide, Guide item 17. The actual depreciation rate (in real terms) is probably about 1.5% (Steele, 1972, pp. 180-184).

[10]Your 1975 Tax Guide, Guide item 13 and Summary of 1971 Tax Reform Legislation, 1971, p. 51. We note that even where a loss created by capital cost allowance cannot be deducted from non-rental income, a loss created by mortgage interest and property taxes can. This perhaps more than offsets the effect of the application of the capital gains tax to rental (but not owner-occupied) property, especially since this tax does not take effect until the property is sold and there are not the "control" reasons for selling a rental property when the owner moves as there are with owner-occupied property.

[11]Essentially, here, our discussion is in terms of cash outlay, not user cost. In particular, in the future the market value of the capital (although not the original cost, obviously) may change and so the opportunity cost of holding equity in the house.

[12]Forms 3358 and 3308, Royal Bank. The two future labour income categories were "Type of Employment" (with, for instance, two points given for "high seasonal variation", e.g. building trades, and 10 points for "public utilities, teachers, Civil Service") and "Length of Employment" (with two points given for "under two years" and 10 points for "over 15 years").

[13]Kain and Quigley (1975, esp. 125 ff) and more especially Bossons (1973) are among the exceptions.

[14]De Leeuw shows figures for U.S. Federal Housing Administration homes, 1967, giving transaction costs per year (that is transaction costs per move amortized over the number of years between moves) as 2.2% of market value for existing houses valued at $14,000 to $15,999 (1971, p. 2).

[15]It immediately follows that a rational consumer will not move as often if he is an owner as if he is a renter. This point is never mentioned in the paper by the sociologist Pickvance (1974), which has as its main aim the determination of whether or not tenure has an independent effect on mobility. Not surprisingly, he finds it has.

[16]This is calculated as $.103\ (1+r)^{-3} + 1.15 \times .103\ (1+r)^{-18}$ where $r = .05$. Here .103 refers to the transaction cost ratio and 1.15 to the ratio of the cost of the larger house to that of the smaller one.

[17]Assume a very high real interest rate, 10%. Then the discounted transaction cost of moving in 3 years is $.103\ (1.10)^{-3} = .077$. The opportunity cost of living in the larger rather than the smaller house for those years is

$$[(.15x.10)/1.10]+[(.15x.10)/1.10^2]+[(.15x.10)/1.10^3] \quad .037$$

The difference between these costs is .077 - .037 = .04. Thus there is a net gain of 4.2% of the value of the smaller house if the decision is taken to purchase the larger house in the first instance.

[18]CHS, 1972, p. xx. This ratio was raised to 30% in 1972.

[19]Richardson (1971) goes so far as to hypothesize that these constraints will totally determine the value of dwelling purchased. This is more plausible in the British and U.S. contexts where mortgage interest and property taxes are deductible from income for tax purposes. These contraints make untenable the assumption of Bossons (1973) that credit rationing affects the probability of ownership but not the value of the dwelling.

[20]Kain and Quigley, in addition, make the astonishing assumption that the probability of a move is independent of the tenure decision (1975, p. 123). Clearly, many moves are made in order to purchase, for the portfolio balancing reasons given above.

[21]Struyk (1974a) also notes that owner-movers may differ from their populations. Those who, for labour force reasons, are most likely to be in the mover group (e.g. executives in large corporations), are also more likely to expect to have to move again in the near future. Contrary to Struyk, this appears to be an argument in favour of using the mover sample, because this group will not be so likely to buy a house with future housing requirements in mind; that is, this group's purchases may be close to equilibrium purchases. On the other hand, this group's equilibrium, given income, etc., may be unrepresentative of the equilibria of the population.

[22]Consider the situation in which interest rates do fully adjust to the rate of inflation. Then, in the case where the real price of housing is constant, net debt service (gross debt service minus property taxes) assuming no amortization as a proportion of income is where r is the real rate of interest, y is income, and x is the size of the mortgage. Now if $x = 2y$, this ratio is

$$r2y/y = 2r$$

If r is 5% and the nominal interest fully adjusts to the rate of inflation of 10%, then net mortgage service as a proportion of income is

$$3rx/y = 6r$$

Thus, to keep the mortgage service ratio constant, the mortgage in the inflationary situation can be only 2/3 income, not twice income, and so clearly our results would not hold.

In fact, mortgage rates over the last 10 years have not very fully adjusted to the rate of inflation. In addition, mortgage lenders have increased the allowable mortgage service ratio by increasing it per se and by allowing a spouse's income to be included in y. And house prices have risen by much more than the general rate of inflation.

If inflation persisted for any length of time, if house prices rose at the same rate as the rate of inflation and if interest rates fully adjusted it is clear that current institutional constraints would have to change. In particular,

mortgage payments would have to be indexed, so that they represented the same real burden over the term of the mortgage rather than a very heavy burden initially, eroded by inflation to a very light burden by the end of the term.

CHAPTER 3

DATA AND ESTIMATION PROCEDURES

In this chapter we discuss the data and the statistical models used in this study. First, we discuss 1971 Census procedures and the quality of some census items such as income and house value which are of central importance for this study. We describe data editing for this monograph. Most editing is done to make the sample less heterogeneous. Next, we discuss the Public Use Sample tapes and sample size. Then we discuss the estimation of income and wealth variables used in our models. The chapter ends with a brief discussion of the logit model used in Chapters 5 and 6.

3.1. 1971 Census Procedures

The 1971 Census was carried out in May and June of 1971, with respondents requested to answer the questionnaire on June 1. The basic census unit is the dwelling. This is defined as "a separate set of living quarters with a private entrance from outside or from a common hallway or stairway inside the building". The respondent was told that "if you have to pass through anyone else's living quarters to reach your own, yours is not a separate dwelling".[1]

A household is the group of people occupying a dwelling. This definition of a household, while perhaps not appropriate for other demand studies, is ideal for housing analysis because it groups together the people who have made the joint housing decision.

Before 1971, censuses were conducted using interviews. In 1971 the switch was made to self-enumeration. Enumerators dropped off questionnaires and respondents read them, completed them and mailed them back;[2] enumerators, however, were responsible for ensuring that the questionnaires were completed. Self-enumeration is cheaper than interviews. In addition, respondents are able to respond to the questionnaire at their leisure, so that they may consult records and other, more knowledgeable, members of the household. In contrast, under the interview system the respondent is the adult who happens to be available when the interviewer calls.

See footnote(s) on page 73.

That person may be a housewife in a household where only the husband knows the rent because he pays the bills. There are other advantages of self-enumeration. It should reduce respondents' concern about confidentiality and so yield better results for income. It reduces the chance that the respondent will be affected by the personality of the enumerator.

A disadvantage of self-enumeration is the requirement it imposes on the respondent to be literate in English or French, although a respondent who is completely illiterate in these two languages presents little problem: the enumerator will interview this person. A greater problem is posed by persons of a low but not zero literacy level. They are likely to misunderstand certain census questions. Even this is not as great a problem as it appears at first sight because of the possibility of consulting other members of a household. For instance, many immigrant households would have one school-age child able to read easily and also at least one person in the labour force able to read English or French.[3]

Most of the 1971 housing questions were answered on a one-third sample basis essentially stratified by enumeration area, the very small geographic area covered by a single enumerator. This sampling ratio is very conservative for housing data; in the 1970 U.S. Census, the sampling ratio for most questions was 20% or 5% (1971 Census Users' Guide Part I, p. 46). The 1941 Canadian housing sampling ratio was .10 (1941 Census, Vol. IX, Introduction).

3.2. Some Comments on the Quality of Certain Census Items

We have discussed aspects of census procedures which affect response error and sampling error. Other sources of error are later processing operations such as the machine-reading of completed questionnaires and editing. We now examine some evidence on the quality of some crucial data items.

3.2.1. Dwelling Unit

First consider "dwelling unit". One problem with this item is the possibility that rooms in a rooming house entered from a common hall were counted as dwelling unit and should not be included. The evidence in Table 3.1 suggests that few were.

See footnote(s) on page 73.

Table 3.1 shows that in 1971 very few households shared a flush toilet or occupied only a single room. In fact, the very sharp decline from 1961 in the incidence of shared toilets suggests that under self-enumeration fewer dwellings were incorrectly included than under the interview system. The increase in one-room dwellings to 3.3% of urban rental dwellings in 1971 from 2.9% in 1961 is very slight indeed in view of the boom in high rise apartment construction in the late sixties. It suggests that the increase in the incidence of bachelor apartments was partially offset by a reduction in the number of small dwelling units in converted houses.[4]

TABLE 3.1. Dwellings of One Room and With Shared Flush Toilet, Canada Urban and Rural, 1961 and 1971

Item	Dwellings with shared flush toilet				Dwellings of one room	
	Number		Per cent of all dwellings		Per cent of all dwellings	
	1961	1971	1961	1971	1961	1971
Urban						
Total	239,925	70,005	7.31	1.48	1.28	1.57
Rental	..	62,305	..	2.88	..	3.26
Rural						
Total	41,119	4,790	3.23	.37	1.54	1.33
Rental	..	2,640	..	1.13	..	2.31

.. not available

Source: 1961 Census of Canada, Vol. II.2, Tables 20 and 40; and 1971 Census of Canada, Vol. II.4, Table 6 and Vol. II.3, Table 9.

3.2.2. Income

We now discuss the quality of the crucial independent variable in our analysis, income. In the 1971 Census, respondents were asked to give the 1970 income, in dollars, of each individual in the household, in each of ten categories. A. Rashid has produced (1976) a major study comparing these data by income category with data generated from the National Accounts and from the Survey of Consumer Finances. The evidence of this study suggests that census individual income data are of very high quality; there is evidence of a downward bias but this bias is

See footnote(s) on page 73.

very slight. In particular, aggregate personal income given in the National Accounts and adjusted so far as possible to the census conceptual basis is just 2% greater than the estimate yielded by the census (Rashid, 1976, p. 46). The details of this aggregate are of some interest. First, census employment income is greater than N.A. employment income by 1.7%. Within this category, wages and salary income is greater by 2.3%, while the much smaller component, non-farm self-employment income, is less by 6.8%, so that non-farm employment income overall is 1.6% greater. This pattern is probably partly caused by census respondents reporting some self-employment income as wages and salaries; the census question asks for "total wages and salaries, bonuses, tips, ETC. (before any deduction)" (the underlining of etc. is ours.) (Rashid, 1976, p. 57).

It seems very plausible that in fact the National Account (N.A.) estimates of employment income for 1970 are understated by at least 1.6%, because of the difficulty of capturing small income earners. The N.A. estimates depend to a substantial extent on income tax data. Legal changes in 1972 increasing the coverage of tax data produced a new relationship between incomes estimated from the tax data and from other sources, so that wage and salary income for 1973 was revised upwards by 2.1% (National Income and Expenditure Accounts, Cat. No. 13-001, Second Quarter, 1976). For 1970, the census figures show 1,313,000 individuals reporting wage and salary income less than $1,000, aggregating $609 million, or 1.3%, of all census wage and salary income (Rashid, 1976, p. 13).

While it is likely that there is virtually no bias in the census employment income data other components of income are very substantially downward biased. The pattern of this bias is illuminating. The downward bias is greatest for income items received infrequently or sporadically. Thus, the downward bias as indicated by N.A. comparisons is 30.5% for bond and deposit interest and dividends but just 23.4% for other investment income, including rents. The distinctive aspect of the first type of income is that it often would not be noticed as it is earned. For instance, the interest on savings deposits is indicated by a bookkeeping entry. The downward bias is a remarkably low 2.1% and 2.5% for the regularly received family and youth allowances and old age pensions, respectively. Miscellaneous government transfers, including unemployment insurance and workmen's compensation payments, are biased down by 39.4%. None of these items, however, accounts for more than 5% of personal income; employment income accounts for more than 85% of census income.

Some comparisons of the census income data with that from the Survey of Consumer Finances for 1969 and 1971 - a survey conducted using interviews - support the census' use of self-enumeration. Although the SCF indicates that there were 130,000 individuals earning more than $20,000 in 1969 and 177,000 in 1971, the Census turned up 180,000 in 1970 (Rashid, 1976, p. 32), suggesting that the privacy of self-enumeration is of some importance in getting high income earners to properly report their income. Consistent with this, the data suggest that the census did markedly better than the SCF in capturing interest and dividend payments. On the other hand, it did somewhat worse on other income including other investment income - a category which includes rents - and substantially worse on other government transfers, a category which includes unemployment insurance (Rashid, 1976, p. 39). These are income items relatively frequently received by people of a low education level.

This analysis suggests that income coefficients in the regressions in the following chapters are slightly biased upward because of the slight downward bias in measured income. On the other hand, the existence of measured error variance implies an offsetting downward bias. This latter bias is unlikely to be of any quantitative importance. It seems unlikely that the error standard deviation is greater than 15%. This combined with, for instance, the standard deviation of 82% for the income of renter household heads in Manitoba urban areas of 30,000[5] or more implies an asymptotic downward bias of less than 4% (Johnston, 1972, p. 282). (Unfortunately, an assumption underlying this computation is independence of measurement error and the true value of income, while we have suggested that, in fact, measurement error will be greater for the poor and recently unemployed.) In general in our analysis, however, the sample will be so dominated by employment income earners that this error is of little concern.

3.2.3. Gross Rent

The dependent variable in our housing consumption equations is gross rent in the case of renters. In the census, renters were asked to report the dollar amount of their cash rent and were also asked the amount they paid for water, electricity, gas and other fuel. Gross rent is the monthly sum of all these payments. In our analysis, we use gross rent rather than cash rent because the coverage of cash rent is so variable. In Toronto, for instance, cash rent much more frequently covers heating than it does in Montréal so that the difference between mean gross rent and mean cash rent is only $7 in Toronto as compared with $17 in Montréal. In rural

See footnote(s) on page 73.

areas the difference is $21 and in urban areas of 500,000 or more it is $12 (1971 Census, Vol. II.3, Tables 47, 44).

There are two quite minor objections to the use of gross rent. First, tenants may in fact regard cash rent as the decision variable because cash rent is the amount necessary to gain access to the dwelling space. Against this, a tenant whose landlord does not provide heat and light clearly has to pay at least something for these out of his own pocket. Secondly, it is quite likely that gross rent in some cases is understated. This arises from the fact that renters were asked to report monthly gas payments but were asked to report oil, coal, wood and kerosene on a yearly basis. Where these latter payments were clearly misreported on a monthly basis a correction was made at the editing stage, but some understatement probably remains. This error is of little concern, however, because utility payments as indicated by the difference between gross rent and cash rent noted above are not a large proportion of gross rent. The size of utility payments, however, has provided us with a guide for rejecting households who are very obviously not paying a market rent. We have excluded all renters paying $10 or less gross rent from our regression analysis in Chapter 7 (but not elsewhere).

3.2.4. House Value

The dependent variable in our housing consumption equations is house value, in the case of owner-occupants of single-detached dwellings. In the census, owner-occupiers were asked "If you were selling this dwelling now, for how much would you expect to sell it?" (question H22). Respondents were provided with twelve possible categories, from "under $3,000" to "$62,500 or more".

To assess the quality of these data, census statisticians matched Multiple Listing Service (MLS) single-detached sales occurring in August and September - two to four months after Census Day, June 1 - to census records. This yielded a sample of 1,140 observations located in Montréal, Toronto, Vancouver, Hamilton, Windsor, Saskatoon, Edmonton and Victoria (Priest, Alford and Bailey, 1973). Our analysis of these data yield some interesting findings.[6] First, there is very little overall bias in these data; the mean difference in percentage terms, census owner-estimated value minus MLS value, is just 5.8%.[7] At the same time, the bias is reduced by 5.3 percentage points for each $10,000 increase in house value; in particular, our regression results indicate that while the bias for this sample

See footnote(s) on page 73.

is 11.2% for a house with an MLS value of $20,000, it is just .6% for a house with an MLS value of $40,000. This tendency for owners' valuations to be biased towards the value of the average house means that there is less variance in census house values than in true house values. Accordingly, parameter estimates in our regressions will be biased slightly towards zero: this fact must be kept in mind when interpreting our results.

3.3. Data Editing for this Study

The general editing rule for this study is to be comprehensive, excluding observations only when this is unequivocally called for. As indicated above, we have excluded households paying less than $10 gross rent from the Chapter 7 analysis. We have also excluded military households, collective households and overseas households. Military households, i.e. households whose head has a job in the Armed Forces, are excluded because they are apt to have housing provided at concessionary terms. A collective household is a group of people occupying a building such as a university residence, logging camp, convent, hospital or jail.

The rent and house value variables used here are transformations of the census data. In particular, rents and values in the census are identified only by the class in which they fall and the variables used here are in dollar values. These are estimated from the census data by assuming that the midpoint of a class is also the mean of the class. To determine a reasonable assumed mean for open-end classes we plotted the distribution of the remaining categories and examined the extrapolations. The assumptions resulting from this are for house values less than $3,000 and $62,500 or more, $2,000 and $67,500 respectively; for gross rents less than $20 and $600 or over, $10 and $625, respectively. Finally, where income (of the household or head of household) is less than $100 it is set equal to $100. An arbitrary procedure such as this is required in order to perform log transformation in the presence of data taking zero or negative values.

A number of other variables are transformations of the variables defined for the Public Use Sample Tapes. For "years of schooling" we have assigned numbers to census categories as follows: no schooling, 1; below Grade 5, 3; Grades 5-8, 7; Grades 9-10, 9.5; Grade 11, 11; Grade 12, 12; Grade 13, 13; some university but no degree; 15; bachelor or first professional degree, 17; advanced degree, 19. These are values for the categories for schooling given on the household tape. The

family and individual tapes give slightly more detail. For categories given there the numbers assigned are as follows: university 1-2, 14.5; university 3-4, without degree, 16; university 3-4, with degree, 17; university 5+, without degree, 16.5; university 5+, with degree, 19. "Number of children" refers to the census category, number of persons under 18; where the number is 10 or greater we have assigned the number 10.

The logit models used in Chapter 5, 6, 7 include both a linear and a quadratic term in age. These terms are transformed for ease in computing probabilities to (age-45) and $(age-45)^2$ respectively. This transformation implies that the constant term represents the logit for a person age 45 and having a number of other characteristics which can be inferred from the various tables.

3.4. The Public Use Sample Tapes

The analysis in this study is very largely based on the census Public Use Samples.[8] These are 1% samples of the census universe of individual records. We use the individual file in Chapter 5. In this file each record refers to a single person. We use the household file in Chapters 6 and 7. In this file each record refers to an individual household.

The advantages of using micro data such as this are now well recognized. Only micro data allow the modelling of complex relationships. When averages are used instead the data set is apt to become too highly collinear to allow stable parameter estimates. In earlier years, micro data were not used, primarily because of the prohibitive computing cost (see Prais and Houthakker, 1971). The situation has changed only in the last 15 years. Another great advantage of the Public Use Samples may be less obvious. They make it possible for the researcher easily to obtain special tables. Without the Samples, these tables could only be produced using the Master File at Statistics Canada and because of confidentiality problems these files may not be accessed directly by the researcher. This makes obtaining special tables a time-consuming and difficult procedure. It is also true that tables produced using the Public Use Sample cost much less in computing time. The increase in the standard error of estimate for elements of our tables is a small price to pay for these advantages.

See footnote(s) on page 73.

The samples yielded by the one-in-a-hundred ratio usually are large by any standard. For instance, for the Toronto Central Metropolitan Area, the household sample is 7,743 records, 4,251 owners and 3,484 renters. In contrast, two of the more prominent recent U.S. studies used samples of 995, for St. Louis (Kain and Quigley, 1975, p. 159) and 3,332, for Pittsburgh (Struyk, 1976, p. 56). The large size of the Public Use Sample for various geographic areas allows us to do analysis on sub-samples defined by such variables as age. It is fairly clear that obviously desirable subsampling in the Kain and Quigley study was precluded by the small size of their sample.

3.5. Estimation of Income Components and Opportunity Net Worth

In Chapter 2 are defined the following income and wealth variables:

Y = income as measured by the census

$EY = \hat{y}(t)$ = expected current income

ONW = opportunity net worth =

$$.05 \sum_{j=6+E}^{t-1} \hat{y}(j) \left(\frac{1+r}{1+g}\right)^{t-j}$$

PY = permanent income =

$$r \left(\sum_{j=t}^{D} \hat{y}(j) \left(\frac{1+r}{1+g}\right)^{-(j-t)} + (Y-EY) \right)$$

TY = transitory income = $Y-PY$

UTY = unexpected transitory income = $Y-EY$

ETY = expected transitory income = $EY-PY$

where

.05 is the assumed saving rate

g is the rate of growth of real income

r is the real interest rate

E is the number of years of schooling

D is the expected age at death

The first, major step in the estimation of EY and, accordingly, in the estimation of the other constructs defined above is the estimation of equations explaining income. The results for households heads are given in Tables 3.2-3.5. As can be seen, following Holmes (1974), the regression equations are estimated separately for different sex and education classes, thus following fully for interactions

TABLE 3.2. Estimates of the Income Model, Male Household Heads, Toronto CMA, 1971

Variables	Education level				
	Below Grade 9	Grades 9-11	Grades 12 and 13	Some university	University degree
Age: Over 65[1]	3.54[2]	6.94[2]	7.57[2]	10.30[3]	25.34[2]
Did not work 1970-71	-3.85[2]	-2.99[2]	-1.57[4]	4.78[4]	3.64
Age: 65 or less[1]					
Age	.22[2]	.46[2]	.46[2]	.74[2]	1.14[2]
Age - squared	- .0026[2]	- .0052[2]	- .0045[2]	- .0070[3]	- .0099[2]
Not in labour force	-2.26[2]	-2.73[2]	-2.92[3]	-2.14[3]	-4.12[4]
Unemployed	-2.84[2]	-2.89[2]	-2.57[3]	-4.51[3]	-7.69[2]
Did not work 1970-71	-3.24[2]	-4.11[2]	-3.90[3]	.64	-8.57[4]
Education: Grade 11		.28[4]			
Marital status					
Widowed, separated, divorced	.079	-1.22[3]	.39	-3.24[4]	-5.75[3]
Single	- .97[4]	-1.64[2]	-1.71[2]	- .052	-2.77[3]
Investment income[5]	2.08[2]	7.29[2]	6.98[2]	11.50[2]	13.58[2]
Self-employed	1.05[2]	.88[3]	.26	1.21	9.57[2]
Occupation[6]					
Managerial	13.93[2]	5.43[2]	7.63[2]	5.58[2]	8.64[2]
Professional	- .71[4]	- .13[4]	1.30[3]	.77	5.01[3]
Clerical	- .67[4]	- .47[4]	- .50[3]	.34[3]	.88
Sales	.71[2]	1.06[2]	1.35[3]	2.29[3]	1.38
Service	-1.42[2]	- .63[4]	- .78[4]	-1.58	-3.83
Primary	-3.07[4]	-3.31[2]	-3.30[4]	-6.04	-11.18
Other	- .46[4]	.27	- .64	- .99	2.22
Not stated	- .51	- .45	.72	1.23	6.58[4]
Constant	3.28[3]	- .85	-1.27	-8.04[4]	-17.65[2]
$\bar{R}^2$	.253	.213	.233	.212	.326
Number of observations	1804	1834	1573	453	684

[1] Age as of 1970.

[2] Significant at 1% level.

[3] Significant at 5% level.

[4] $|t| \geq 1$.

[5] Investment income is major source of household income.

[6] Occupations defined to include 1971 Census occupation classification numbers as follows: Managerial (11); Professional (21, 23, 25, 27, 31, 33); Clerk (41); Sales (51); Service (61); Primary (71, 73, 75, 77); Other Occupations (91, 93, 95, 99); Not stated (00).

Source: 1971 Census of Canada, Public Use Sample Tapes.

TABLE 3.3. Estimates of the Income Model, Male Household Heads, Montréal CMA, 1971

Variables	Education level				
	Below Grade 9	Grades 9-11	Grades 12 and 13	Some university	University degree
Age: Over 65[1]	6.04[2]	10.76[2]	12.67[2]	10.25[2]	39.90[2]
Did not work 1970-71	-4.07[2]	-5.35[2]	-7.73[2]	.41	-1.92
Age: 65 or less[1]					
Age	.30[2]	.48[2]	.40[3]	.59[2]	1.75[2]
Age - squared	- .0034[2]	- .0050[2]	.0036[4]	- .0067[2]	- .018[2]
Not in labour force	- .46[4]	-1.15[2]	- .45[2]	-2.07[4]	-1.87[4]
Unemployed	-1.21[2]	-2.82[2]	-3.43[2]	-2.97[3]	-3.33[4]
Did not work 1970-71	-3.98[2]	-4.67[2]	-3.97[4]	-4.22[4]	-2.09
Education: Grade 11		.64[2]			
Marital status					
Widowed, separated, divorced	.94[2]	-1.12[3]	.026	1.72[4]	.25[4]
Single	.81[3]	-1.22[2]	-1.46[4]	-1.89[3]	-1.36[4]
Investment income[5]	1.38[3]	4.70[2]	4.71[3]	6.06[2]	-2.80[2]
Self-employed	.59[3]	2.16[2]	.76	.86	5.59[2]
Occupation[6]					
Managerial	10.11[2]	5.90[2]	7.03[2]	5.83[2]	5.12[3]
Professional	.059	.21[4]	1.33[4]	.88	2.61[4]
Clerical	.36[4]	- .39[4]	- .69	- .16[2]	2.01
Sales	1.45[2]	.52[4]	.64	2.80[2]	- .041
Service	-1.07[2]	.22[4]	.15	- .20[4]	-1.53
Primary	-1.16[4]	-2.63[4]	-3.14	-5.94[4]	2.75
Other	- .15[3]	.66[4]	.20	.85	1.34[4]
Not stated	- .65[3]	.26	.20	- .62	3.12[4]
Constant	.73	-2.26[4]	.99	-3.73[4]	-27.40[2]
$\bar{R}^2$	.261	.246	.206	.245	.253
Number of observations	2680	2018	733	500	604

[1] Age as of 1970.

[2] Significant at 1% level.

[3] Significant at 5% level.

[4] $|t| \geq 1$.

[5] Investment income is major source of household income.

[6] Occupations defined to include 1971 Census occupation classification numbers as follows: Managerial (11); Professional (21, 23, 25, 27, 31, 33); Clerical (41); Sales (51); Service (61); Primary (71, 73, 75, 77); Other Occupations (91, 93, 95, 99); Not stated (00).

Source: 1971 Census of Canada, Public Use Sample Tapes.

TABLE 3.4. Estimates of the Income Model, Female Households Heads, Toronto CMA, 1971

Variables	Education level			
	Below Grade 9	Grades 9-11	Grades 12 and 13 or some university	University degree
Age: Over 65[1]	- .00024	5.50[2]	2.82[3]	20.31[4]
Last worked before 1970	-3.41[2]	-3.10[2]	.13	
Never worked	-2.49[2]	-1.59[3]	5.13[2]	-5.86
Age: 65 or less[1]				
Age	- .0098	.21[4]	.17[3]	.53[3]
Age - squared	- .00021	- .0020[3]	- .0014	- .0021
Not in labour force	-1.44[4]	-1.07[3]	-2.54[3]	-8.27[3]
Unemployed	-2.64[2]	-1.42[3]	-1.15	-7.04[3]
Did not work 1970-71	-1.50[3]	- .69	- .52	3.03
Education				
Grade 11		.88[2]		
Some university			.092	
Marital status				
Widowed	.16	.94[4]	- .50	-3.39
Separated, divorced	.13	- .81[4]	- .29	-1.14
Major source of income				
Government transfer payment	- .60[3]	-1.15[4]	-3.27[2]	-9.25[3]
Investment income	3.40[2]	2.44[2]	3.97[2]	1.05
Other[5]	1.72[4]	5.31[2]	1.51	6.07[3]
Self-employed	.16	-1.08[3]	6.24[2]	-11.21[3]
Occupation[6]				
Managerial	2.33[3]	1.03	4.28[2]	5.78[2]
Professional	.43	.19	.71[3]	4.27[4]
Sales	- .057	- .46	-1.05	--
Service	-1.10[3]	- .34	-1.81[3]	-2.90
Primary	--	--	-4.40	--
Assembler	.63	1.09[3]	1.08	--
Other	.47	-1.23[3]	- .20	2.14
Not stated	1.30[3]	- .33	- .27	2.92
Constant	5.20[3]	.67	1.85	-9.73[3]
$\bar{R}^2$	.297	.248	.198	.325
Number of observations	394	409	505	67

[1] Age as of 1970.

[2] Significant at 1% level.

[3] $|t| \geq 1$.

[4] Significant at 5% level.

[5] Excludes wages and salary, self-employment income, retirement pensions, government transfer payments and investment income.

[6] Occupations defined to include 1971 Census occupation classifications as follows: Managerial (11); Professional (21, 23, 25, 27, 31, 33); Sales (51); Service (61); Primary (71, 73, , 75, 77); Assembler (81, 82, 83, 85, 87); Other Occupations (91, 93, 95, 99); Not stated (00).

Source: 1971 Census of Canada, Public Use Sample Tapes.

TABLE 3.5. Estimates of the Income Model, Female Household Heads, Montréal CMA, 1971

Variables	Education level			
	Below Grade 9	Grades 9-11	Grades 12 and 13 or some university	University degree
Age: Over 65[1]	3.10[2]	7.82[3]	6.42[4]	24.36[3]
Last worked before 1970	-3.94[3]	-5.61[3]	-4.69[2]	
Never worked	-4.05[3]	-5.83[3]	-4.18[4]	-4.65[4]
Age: 65 or less[1]				
Age	.11[4]	.20[4]	.16	.79[2]
Age - squared	- .0013[4]	- .0019[4]	.0011	- .0082[2]
Not in labour force	- .32	- .34[4]	.35[4]	1.20[4]
Unemployed	- .39[3]	-1.30[4]	-2.22[4]	-2.97[4]
Did not work 1970-71	-3.00[3]	-1.98[2]	-1.56[4]	-1.80
Education				
Grade 11		.79[2]		
Some university			1.72[3]	
Marital status				
Widowed	.54[2]	- .37	-1.70[4]	.083
Separated, divorced	.18	- .45	1.59[4]	.46
Major source of income				
Government transfer payment	- .32[4]	-1.31[2]	- .25[3]	-4.74[4]
Investment income	1.63[3]	4.20[3]	7.93[3]	1.83[4]
Other[5]	1.81[3]	1.31[4]	- .90	- .76
Self-employed	2.90[3]	.19	.88	--
Occupation[6]				
Managerial	7.93[3]	3.57[3]	4.07[3]	1.43[3]
Professional	.46[3]	.42[4]	1.30[4]	3.84[4]
Sales	-1.69[3]	-1.34[2]	.38[4]	3.41[4]
Service	-1.84[3]	-1.62[2]	-2.47[4]	1.97[4]
Primary	--	--	--	3.67[4]
Assembler	- .71[4]	- .62	-3.61[4]	--
Other	-1.25[4]	.085	9.15[4]	6.71[4]
Not stated	-1.40[3]	- .60	.024	3.10[4]
Constant	2.58[4]	.39	.62	-12.12[2]
$\bar{R}^2$	.380	.192	.225	.426
Number of observations	662	480	284	83

[1] Age as of 1970.

[2] Significant at 5% level.

[3] Significant at 1% level.

[4] $|t| \geq 1$.

[5] Excludes wages and salary, self-employment income, retirement pensions, government transfer payments or investment income.

[6] Occupations defined to include 1971 Census occupation classifications as follows: Managerial (11); Professional (21, 23, 25, 27, 31, 33); Sales (51); Service (61); Primary (71, 73, 75, 77); Assembler (81, 82, 83, 85, 87); Other Occupations (91, 93, 95, 99); Not stated (00).

Source: 1971 Census of Canada, Public Use Sample Tapes.

between sex and education and characteristics explicitly included in the equations. It can be seen that the differences in parameter estimates for a number of characteristics strongly justify this stratification (although this is not subjected here to formal structure tests). The effect of age on income, for instance, varies greatly by sex and education class. The age-income relation is much more sharply peaked for the highest education class than for the lowest and for males than for females. In addition, for males, having the occupation "manager" adds much more income for the lowest education class than for any other class, and being a professional and self-employed adds substantially more income for the highest education class than for any other.

It should be noted that the income explained here is total income, not just labour earnings. As can be seen, if the major source of income is investment income, income is substantially greater than otherwise.

To compute EY for any household head the values of the variables for that head are simply plugged into the appropriate regression. An exception to this procedure is made in the case of the two labour force variables, "not in the labour force" and "unemployed". There are grounds for arguing that these characteristics are only transitory (Struyk, 1976). There are also grounds for the view that these are to some extent more permanent characteristics, because a currently unemployed person, say, will have a higher probability of frequently being unemployed than the typical person of the same age and sex. For instance, those working in construction will have an expected unemployment rate much higher than those employed in most manufacturing industries. For this reason, the compromise is adopted of setting these variables equal to the average of the individual value and the age-sex-education-class average value.

In order to compute ONW and PY assumptions must be made about the real interest rate and the rate of growth of real income. The assumptions made here are .05 for the real rate of interest and .03 for the rate of growth of real income. The value of .05 for the real rate of interest is probably too high for the middle and late 1970's but is perhaps about right for 1971 (see discussion in Holmes, 1974), especially when it is noted that the relevant real rate of interest here is that for households. Putting this in context, when the rate of inflation is 9% and the real rate of interest is 5%, the implied nominal rate of interest for households,

is 14%, and this is less than the rate often charged on consumer loans. The .03 rate of growth of real income is about that experienced in Canada in the 1960's according to the data from the National Accounts.

In order to compute PY the expected age at death is required. This age is taken from actuarial tables for each sex. For the permanent incomes used in Chapter 5 (estimated on the basis of regressions, not shown here, using the Public Use Sample Tape) the expected age at death varies with the current age of the individual. For the PY used in Chapters 6 and 7 the expected age at death is a constant. The procedure used for Chapter 5 is preferable to that used for Chapters 6 and 7 but tests showed that using it made little difference to the results.

In Chapters 6 and 7 the decision examined is a household decision and so the appropriate income variables should be household income variables. In principle, then, permanent income and other income components should be estimated for each income recipient in the household and then aggregated. Unfortunately, the Public Use Sample household tapes do not allow this. Only the income of the household head is given separately from total household income, and only characteristics of the household head are given. The household income variables used here are obtained simply by multiplying ONW and PY respectively by the ratio of average measured household income of the sample (i.e. all Toronto households and all Montréal households) respectively to the average, measured income of the head of the household. Additionally, in deriving the transitory income components, Y is defined as measured household income. It is worth noting that this estimation procedure means that the size of a wife's income directly affects the size of the household's transitory income, not its permanent income. To the extent that married women have only a tenuous attachment to the labour force this implication of the estimation procedure is not objectionable.

3.6. The Logit Model

The estimation of the probability of a separate dwelling (Chapter 5) and the estimation of the probability of ownership (Chapter 6) assume that the logit model holds. In the logit model, P_i, the probability that the ith household owns is given by

$$P_i = \frac{1}{1+e^{-Z_i}}$$

where $Z_i = X_i\beta$ and where X_i is a vector of regressors. An attractive property of this expression is that its bounds are zero and one. This means that the probability of owning can never be estimated as negative or greater than one as it can be with the linear probability model. It is worth noting that the P_i is .5 when Z_i is zero. An equivalent expression for the logit model is[9]

$$\ln\left(\frac{P_i}{1-P_i}\right) = -Z_i$$

The first derivative of P_i with respect to x_{ij}, a component of X_i, is $P_i(1-P_i)\beta_j$, where β_j is the j^{th} component of the vector β. It will be noticed that the effect of a change in a variable depends on the probability level, and that this effect is symmetric about P = .5; thus this expression is .05 β_j, .09 β_j, .16 β_j, .21 β_j, .25 β_j, .21 β_j, .16 β_j, .09 β_j, .05 β_j when P is respectively .05, .1, .2, .3, .5, .7, .8, .9, .95. As these numbers illustrate, the first derivative changes very rapidly at extreme probability levels and very little from about .3 to .7. To aid in interpretation of the results, most tables give 25 times the estimated coefficients, thus giving the effect in percentage terms of a small change in a variable when the probability is .5.

See footnote(s) on page 73.

FOOTNOTES

[1]1971 Census of Canada, Form 2B.

[2]In lightly-settled areas questionnaires were picked up. In addition, these procedures were not used for people in special circumstances, such as those living in remote northern areas and in institutions. Further details on census procedures is available in 1971 Census, Dictionary of the 1971 Census Terms.

[3]In 1971, there were 339,740 household heads (4.9% of all heads) who had immigrated in 1961 or later (1971 Census of Canada, Vol. II.4, Table 54). Many of these had English or French as their mother tongue. There were 265,115 families headed by 1961-71 immigrants; 73.5% of these included a child and 56.8% of the children in these families were over six (1971 Census of Canada, Vol. II.2, Table 69). In over half the husband-wife families with 1961-71 immigrant head the wife was in the labour force.

[4]A separate kitchen is counted as a room, but bathrooms, clothes closets, pantries, halls and rooms used solely for business purposes are not counted as rooms. Partially divided L-shaped rooms are counted as separate rooms if they are considered such by the respondent (1971 Census of Canada, Vol. II.3). Some occupants of bachelor apartments, we presume, did not regard their kitchen as a separate room, and so their dwelling unit would be regarded as consisting of one room.

[5]Computed from the Public Use Sample Tape.

[6]Reported in detail in Steele and Buckley (1976). This analysis uses earlier analysis reported in Priest, Alford and Bailey (1973).

[7]We note that these results are remarkably like results from two disparate U.S. samples.

[8]Full information about the sampling procedure is available in 1971 Census, Public Use Sample Tapes User Documentation. This indicates procedures used to ensure the maintenance of confidentiality.

[9]For a more detailed but very accessible account of the logit model see Pindyck and Rubinfeld (1976, 247 ff.).

CHAPTER 4

HOUSING, AGE AND INCOME: AN OVERVIEW

4.1. Introduction

In this chapter we present a broad picture of housing demand and housing characteristics. This establishes the data context for the succeeding analysis and also is of interest in its own right. We begin the chapter by discussing rural-urban and interprovincial variation in housing characteristics. Then we examine the relation of tenure, rent, house value and number of rooms to the age of the household head. We conclude by examining the relation of housing consumption to income. In later chapters of this monograph we examine the structure of demand for housing in some detail, focussing attention to a substantial extent on the Montréal and Toronto CMAs.

4.2. Housing Characteristics and Location

Perhaps the central economic prediction about urban areas is that they are characterized by a steeply-sloped land price gradient from the centre of the fringe (see for instance Muth, 1969). Thus more densely settled the urban area, the higher the average price of land. This prediction is strikingly supported by the 1971 data for Canada in Table 4.1. This shows the value of an owner-occupied, single-detached dwelling averaged $25,500 in large urban areas (those with a population of 30,000 or more) but just $17,300 in small urban areas (those with less than 30,000 population) and $13,400 in rural areas. Average gross rent shows a quite similar pattern with rent in large urban areas 165% of that in rural non-farm areas. This ratio is surprisingly close to the 191% ratio for single-detached value, in view of the fact that gross rent includes utilities payments (which vary relatively little between urban and rural areas) and rental housing uses less land per dwelling unit.

As Table 4.1 also shows, the variation among provinces is much less than the rural-urban variation. The regions with the lowest values and rents are the Prairies and the Atlantic Region, areas of relatively slow population growth and low incomes. Within these regions there are exceptions, however, with Nova Scotia rents second only to those of Ontario, and Alberta rents and values much higher than those of the other two Prairie Provinces. Most remarkable, however, are the values and rents of Quebec. For large urban areas these are far below the Canada average despite the

TABLE 4.1. Housing and Income by Area, 1971

Area	Home ownership rate	Single-detached ownership	Mean number of persons per household		Mean gross rent	Mean value single-detached owner-occupied	Mean household income		
			Renters	Owners			Renters	Owners	
								All	Single-detached
	per cent						$		
Canada									
All areas	60.6	51.8	2.91	3.84	119	20,626	7,952	10,302	10,683
Urban 30,000 or more	50.8	40.9	2.77	3.80	127	25,481	8,208	12,368	12,685
Urban under 30,000	67.2	58.7	3.22	3.78	104	17,262	7,377	9,604	9,700
Rural non-farm	78.8	71.9	3.51	3.80	77	13,369	6,737	7,356	7,305
Rural farm	92.9	90.0	3.83	4.32	..	..	..	6,855	..
Urban 30,000 or more									
Newfoundland	60.6	39.8	3.92	4.27	112	24,700	8,172	11,040	12,295
New Brunswick	52.0	42.8	3.05	3.85	102	18,555	7,217	10,443	10,816
Nova Scotia	50.8	43.3	3.17	3.89	138	23,618	8,105	12,760	13,190
Quebec	36.0	21.7	3.00	4.11	112	20,940	8,126	12,598	13,462
Ontario	57.0	46.8	2.67	3.78	143	28,315	8,837	12,847	13,165
Manitoba	59.2	54.9	2.49	3.50	113	18,937	7,221	10,946	11,202
Saskatchewan	60.4	56.9	2.51	3.58	111	17,451	6,380	10,049	10,058
Alberta	56.1	51.4	2.68	3.75	131	24,309	7,846	12,428	12,632
British Columbia	56.9	53.0	2.27	3.51	136	27,768	7,362	11,594	11,736
Montréal CMA	35.3	21.0	2.95	3.96	116	20,651	8,280	12,549	13,210
Toronto CMA	55.0	41.2	2.67	3.84	154	34,893	9,331	13,778	14,545

.. not available.

Source: 1971 Census of Canada, Public Use Sample Household Tapes. Households with military and inmate heads and overseas households are excluded in all cases. For columns 5, 6, 7 and 9, farm households are also excluded.

fact that Quebec includes the largest CMA in Canada, Montréal. This contrast between Quebec and the rest of the country is strikingly emphasized by the enormous difference between the Montréal and Toronto CMA's: a) the average value in Toronto, at $34,900, is 69% greater than that of Montréal; and b) Toronto rent at $154 is 33% greater than that of Montréal.

4.2.1. Regional Differences in House Prices

A question of fundamental importance for the interpretation of these data is the extent to which regional and rural-urban differences reflect differences in the "quantity" of housing embodied in a dwelling unit rather than differences in the price of a unit of housing. The value of a house is, of course, equal to this price times this quantity. Another way of expressing the question is: do value and rent differ because the number of rooms differs or because the price of rooms differs? "Quantity" of housing, of course, in this context depends not just on the number of rooms but rather on an amalgam of characteristics as diverse as the quality of construction, the number of toilets and the quality of the neighbourhood environment. For simplicity, we measure the "quantity" of housing embodied in a house as the sales value of the house divided by the sales value of a "standard" house.

From the Central Mortgage and Housing Corporation there are data on new houses which allow us to gain some insight into the variation in the price of the existing stock. It seems plausible that except in the short run the price of housing is determined by the price of new construction (see Muth, 1960). This is so because there is easy entry into the residential construction industry, yielding a very elastic supply curve of new residential construction, and so long as new houses are close substitutes for an existing house the price of the existing stock must be determined by the price of new houses.[1]

Table 4.2 displays the CMHC data: land and construction costs for new single-detached houses with loans approved under NHA. Note that land cost is not standardized for the amount of servicing. This cost in Quebec is therefore probably understated because of the prevalent practice of financing roads, sewers and other services via local improvement levies (Derkowski, 1976). Note, also, that these "prices" are not precisely the pure prices we seek since the average quality per square foot may vary from city to city. Some limits, however, to the extent of this variation are suggested by Toronto trade data that identify "speculative NHA"

See footnote(s) on page 96.

TABLE 4.2. The Price of New Single-detached Dwellings Financed Under the National Housing Act, by Urban Area, 1971

Urban area	Land cost	Cost per square foot	Cost of a 1,000 square foot house[1]
		$	
Newfoundland			
St. John's	5,113	15.63	20,743
Nova Scotia			
Halifax	5,434	17.58	23,014
Sydney-Sydney Mines	764	14.48	15,244
Province mean[2]			21,862
New Brunswick			
Saint John	3,714	15.58	19,294
Moncton	3,704	14.63	18,334
Province mean[2]			18,899
Quebec			
Montréal	2,179	14.12	16,299
Chicoutimi-Jonquière	1,400	14.61	16,010
Québec City	2,418	15.21	17,628
Drummondville	1,695	13.65	15,345
St-Jean	1,438	13.34	14,778
Shawinigan	1,233	14.11	15,343
Sherbrooke	1,958	14.58	16,538
Trois-Rivières	1,324	12.44	13,764
Valleyfield	1,414	14.14	15,554
Hull	3,537	15.07	18,607
St-Jérôme	1,403	14.48	15,883
Province mean[2]			16,382
Province standard deviation[2]			768
Ontario			
Toronto	12,107	14.79	26,897
Hamilton	10,851	14.74	25,591
Kitchener	6,999	15.04	22,039
London	6,233	15.45	21,683
Ottawa	7,349	15.17	22,519
Sudbury	6,490	17.88	24,370
Thunder Bay	6,391	16.99	23,381
Windsor	6,285	19.69	25,975
Brantford	6,981	15.21	22,191
Guelph	7,944	15.12	23,064
Kingston	6,485	16.43	22,915
Oshawa	10,254	14.07	24,324
Peterborough	5,102	15.15	20,252
Sarnia	6,421	16.32	22,741
Sault Ste. Marie	4,176	16.94	21,116
Cornwall	2,692	16.35	19,042
North Bay	6,419	18.23	24,649
St. Catharines-Niagara	7,020	16.44	23,460
Timmins	3,843	17.97	21,813
Province mean[2]			25,146
Province standard deviation[2]			2,131
Manitoba			
Winnipeg	4,534	15.78	20,314
Saskatchewan			
Regina	3,033	14.35	17,383
Saskatoon	3,066	14.25	17,316
Province mean[2]			17,351
Alberta			
Calgary	5,848	15.14	20,988
Edmonton	6,663	15.16	21,823
Lethbridge	4,234	17.03	21,264
Province mean[2]			21,420
British Columbia			
Vancouver	8,179	15.55	23,729
Victoria	7,502	17.70	25,202
Province mean[2]			23,964

[1] Cost in the third column is the total of land cost and cost per square foot times 1,000; "other" costs and the mortgage insurance fee are excluded.

[2] Province means and standard deviations weight urban areas by the number of dwelling units in the urbanized core or, in the case of urban centres, the number of units in the urban centre.

ource: Data are from Canadian Housing Statistics, 1972, Table 86, p. 70. The data are for metropolitan areas, urban agglomerations and urban centres; i.e. the geographic basis is not determined by the boundaries of administrative units.

as a particular type of standard low-quality construction. These data also cite costs per square foot for Toronto in January, 1971 at $14.45 for split-level and $14.75 for single-storey brick (The Toronto Real Estate Board, Schedule of Unit Costs, 1976 (Toronto: 1976) p. 22) and about $0.50 higher than this for January, 1972. This compares well with the average of $14.79 for Toronto in Table 4.2.

The most striking fact in Table 4.2 is the enormous range in land prices as compared to the rather narrow range in construction prices. For instance, the cost of land in Regina is a mere 25% of that in Toronto, and 37% of that in Vancouver, but construction cost in Regina is 97% of that in Toronto, 92% of that in Vancouver, and 82% of that in Halifax.[2] We also note that while higher land prices are strongly associated with city size they are also quite strongly associated with particular provinces. In any case the price of land very largely explains variations from urban area to urban area in the price of the total house-land package.

Comparing the data in Tables 4.1 and 4.2 it is clear that variations in the price of housing explain a very large part of the variations in house value (i.e. the variations in price-times-quantity of housing) observed in the census. It is also true, however, that house values in two of the Atlantic Provinces, Nova Scotia and New Brunswick, and in two of the Prairie Provinces, Manitoba and Saskatchewan, are much lower relative to Ontario and Quebec than could be explained by their lower pure price.

4.2.2. Regional Differences in Housing Characteristics

Table 4.3 enables us to see whether various indicators of housing quantity in large urban areas are consistent with this pattern of variation in the price-census value relation. In fact Table 4.3 shows that dwellings in Nova Scotia and New Brunswick are slightly smaller and those in Manitoba and Saskatchewan substantially smaller than those in Ontario. In addition, dwellings in the Atlantic Provinces are much less likely to be centrally heated - 80% in New Brunswick compared with 96% in Ontario. They also have fewer bathrooms; only 10% of dwellings in New Brunswick have two or more toilets as compared with 21% in Ontario. Finally, typical dwellings in Manitoba, New Brunswick and Nova Scotia are older than those in the three "high quantity" provinces; for instance, only 23% of dwellings in Nova Scotia were built in 1961 or later, against 31% in Ontario, 33% in British Columbia, and a remarkable 40% in Alberta.

See footnote(s) on page 96.

TABLE 4.3. Dwelling Characteristics by Area, 1971

Area	Mean number of rooms			Frequency of specified characteristics								
					Period of construction				Flush toilet[1]			
	Rented	Owner-occupied		Single-detached	1970-71	1961-71	1946-60	1920 or before	None	One	Two or more	Central heating[2]
		All	Single-detached									
				per cent								
Canada, all areas	4.32	6.16	6.21	59.7	3.6	28.6	33.1	19.9	5.5	78.5	14.8	81.2
Urban 30,000 or more	4.19	6.37	6.43	46.2	3.6	31.5	35.3	15.4	.5	80.2	17.8	88.2
Urban under 30,000	4.54	6.03	6.09	69.4	3.7	26.3	32.3	23.2	2.8	82.8	13.6	80.7
Rural non-farm	4.96	5.63	5.71	86.9	4.2	26.5	29.9	25.2	20.4	71.8	7.4	61.6
Rural farm	5.95	6.50	6.53	96.1	1.0	11.5	21.8	44.2	26.4	64.6	8.7	63.1
Urban 30,000 or more												
Newfoundland	4.63	6.69	6.61	46.0	4.4	32.3	35.4	18.1	3.5	88.5	6.6	77.9
New Brunswick	4.78	6.46	6.42	48.8	2.5	27.5	27.1	28.1	2.0	85.7	10.2	80.5
Nova Scotia	4.56	6.34	6.41	48.8	5.0	23.5	31.7	25.1	1.2	84.3	11.1	87.0
Quebec	4.19	6.30	6.55	24.8	3.3	31.0	35.7	15.8	.5	86.4	12.1	71.9
Ontario	4.25	6.47	6.51	51.7	3.3	30.8	34.6	16.3	.4	76.9	21.3	95.9
Manitoba	3.94	5.88	5.87	63.0	3.8	25.3	34.2	20.4	.9	81.8	14.8	97.3
Saskatchewan	4.22	6.14	6.13	67.3	2.1	34.2	34.6	12.4	.2	79.2	16.9	97.3
Alberta	4.20	6.47	6.51	61.1	5.9	39.9	41.4	8.5	.5	74.3	22.1	95.3
British Columbia	3.84	6.29	6.31	60.2	4.4	33.0	34.6	10.4	.3	77.1	20.7	93.9
Montréal CMA	4.20	6.25	6.45	23.6	3.7	32.4	35.7	15.4	.6	85.6	12.7	71.2
Toronto CMA	4.16	6.68	6.79	45.7	3.3	34.4	34.5	14.5	.5	73.7	24.2	98.2

[1] "Flush toilet, shared use" is not included in any flush toilet category.

[2] "Central heating" includes installed electric heating as well as furnace heating.

Source: 1971 Census of Canada, Public Use Sample Household Tapes. Overseas households and households with military and inmate heads are excluded.

The very high proportion of new dwellings in Alberta results partly from its rapid population growth. Probably, also in the 1960's construction in Alberta was also stimulated by demand for better housing than could be satisfied by the relatively low-quality housing in existence in 1961. Much of this was originally built in the early days of prairie settlement, when prairie houses were much smaller than those built elsewhere; indeed, even in 1931, the average size of urban owner dwellings in Manitoba, Saskatchewan and Alberta was 6.0, 5.4 and 5.5 rooms, respectively, compared with 7.1 in Quebec and 6.8 in Ontario (Greenway, 1939, Table 8, p. 149). By 1961 this differential was much less but the average was still 5.4 for the Praries as against 5.9 for Ontario. For almost all provinces during the 1960's the size of single-detached stock increased very markedly; this was especially so for Alberta where the average size of urban owner-occupied, single-detached dwellings rose 15% to 6.3 rooms in 1971.[3]

The relation of values in Quebec to various housing characteristics, and indeed virtually all aspects of housing in Quebec, is so different from that for the rest of the country that this province demands special comment. For large urban areas, the proportion of owning households is 36% in Quebec compared with at least 50% in every other province. The proportion of single-detached dwellings is in even more dramatic contrast 25% in Quebec compared with at least 46% in every other province. The incidence of central heating for large urban areas is only 72% in Quebec as against 96% in Ontario. Land costs are much lower in Quebec than elsewhere; for instance, in Montréal the average price of a lot in 1971 was $2,200 compared with $12,100 in Toronto. Average values and rents are among the lowest in Canada.

These are not unrelated or new phenomena. Urban Quebecers have traditionally shown a greater preference for high-density housing than the rest of the country. Typically they have been housed in duplexes or triplexes, with the owner occupying one of the units, while in the rest of the country land-intensive housing in the form of single-detached and double houses has been typical. Thus, in 1931, in cities of 30,000 or more, only 27% of Quebec dwellings were single-detached while the lowest percentage for any other province (New Brunswick) was 51%; in Ontario, 19% of dwellings were doubles compared with 9% in Quebec (Greenway, 1939, Table 5, p. 146).

See footnote(s) on page 96.

The low demand for single-detached dwellings by Quebecers implies their demand for land has been relatively low. It is difficult not to infer that this lower demand for land has played an important role in holding down land prices in Quebec. There are two objections to this inference. At a purely statistical level it is clear that the land price just cited for Montréal is several thousand dollars below the supply price on a similar basis in Ontario because in Quebec local-improvement costs (for roads, sewers, etc.) of this amount are not paid for by the land developer but instead by the municipality; the purchaser then pays for these services through local taxes.[4] Property tax data, however, suggest that the required adjustment to the demand price is rather slight; CMHC data show taxes for new houses in Montréal in 1971 very little higher than those for Toronto ($645 versus $571 (CHS, 1972, Table 104, p. 82)).

At a more fundamental level, it has been argued that because of the immense quantity of raw land available at city fringes, in long-run equilibrium the supply of land for housing is close to perfectly elastic so that the price of raw land for housing must be just the price of land for agricultural purposes (Muth, 1969). This would suggest that the difference between the price of land in Montréal and Toronto is just the difference in the cost of developing the land in Toronto, including the carrying charges the developer must pay while awaiting subdivision and other approvals. This certainly accounts for a large part of the Toronto-Montréal differential (and perhaps for all the differential between other places in Ontario and other places in Quebec) but there is still a large part of the differential unexplained. It seems plausible that this remaining differential is explained by the fact that throughout Montréal's history any sharp increases in the demand for housing has had relatively less impact, in the short run, on land prices, because of the relatively little land used and the absence of substantial government constraints on supply. This in turn has meant that speculative price expectations have not become embedded in Montréal prices over the longer term.[5]

Given the lower land prices in Quebec, and so the lower pure price of housing, it is surprising to note that consumers have not reacted by purchasing much more housing. In particular, the average number of rooms occupied by owners of singles in large urban areas in Quebec is only .04 higher than for Ontario and Alberta (Table 4.3) despite slightly higher Quebec incomes (see Table 4.1). Furthermore, in terms of toilet facilities, central heating and age, housing in

See footnote(s) on page 96.

Quebec is distinctly inferior to that in Alberta and British Columbia, despite household incomes which are very similar.[6]

4.2.3. Rural/Urban Differences in Housing Characteristics

As is the case with values and rents, the differences in housing characteristics between urban and rural areas are greater than the differences between provinces (omitting Quebec). On every dimension, except the size of rented units, housing in large urban areas is superior to that in small urban areas and that in small urban areas in turn is markedly superior to that in rural non-farm areas. It is not surprising, even ignoring differences in land costs, that rural non-farm houses are valued at just 52% of those in large urban areas and that rents are just 60% of rents in large urban areas (Table 4.1); 20% of rural non-farm dwellings lack a flush toilet and 38% lack central heating.

It is of some interest that the proportion of very new dwellings (i.e. those built in 1970-71), is higher for rural non-farm areas than for more urbanized areas. These new dwellings were probably largely located in areas being developed in 1971 for urban workers just outside the fringe of Census-defined urban areas. In fact in 1971 (using 1966 Census area definitions) 42% of all single-detached starts were outside urban areas of 10,000 (CHS, 1975, Table 12, p. 12). Very old houses are also more frequently found in rural non-farm areas than in urbanized areas; 25% of dwellings were built before 1920. Even this high incidence is much exceeded by that for farm areas, where 44% of dwellings were built before 1920.

As Table 4.1 shows, variation in tenure is also much greater among rural and urban areas than it is among provinces (omitting Quebec). The percentage of dwellings owner-occupied is 79% in rural non-farm areas as against just 51% in large urban areas. The relatively low ratio for large urban areas is not surprising, given the strong association of owner-occupancy with low-density housing, because low-density housing is less likely to occur when land costs are high. The strength of the association of owner-occupancy and the single-detached structure is revealed by comparing the owner-occupancy ratios in the first two columns of Table 4.1. These show that 91% of owner-occupants in rural non-farm areas live in single-detached dwellings as against only 81% in large urban areas.

See footnote(s) on page 96.

The ratio for large urban areas is of particular interest in the context of the great rise in importance of apartments and townhouses ("single-attached" in census terminology) held under condominium and co-operative tenure. Before 1971 condominiums were of little importance in the housing market. One indication of their low importance is the fact that there are no data on them in the 1971 Census. More solid evidence is provided by data on lending under the National Housing Act. Because of the unfamiliarity of condominium tenure, it seems likely that a high proportion of condominiums before 1971 were financed through NHA. Yet loans were approved under NHA for only 4,665 codominium dwellings which could have been completed by Census date 1971 (i.e. with approvals granted in 1966-69 (CHS, 1970, Table 65, p. 58)). (This contrasts with NHA condominium approvals for 21,674 units in the single year 1975 (CHS, 1975, Table 71, p. 63)). Thus condominiums were too rare in 1971 to account for many of the 19% of owner-occupants not living in single-detached dwellings. In fact, 69% of these owners lived in duplexes and doubles. The condominium phenomenon then can be regarded as just an extension of a well-established tradition of owner-occupancy in multi-family buildings - an adaption to accommodate the increase in scale of such buildings in the 1960's. It is of interest to note, in view of this, that the average income of owner households living in single-detached units is noticeably higher than that of other owner households (Table 4.1). That is, multi-family buildings were the owner-occupancy choice of the relatively low income in 1971, just as is true currently for condominiums.

4.3. Housing and Age

In Chapter 2 we argued that there is good reason to expect a quite marked pattern of changing housing characteristics with changing age. In particular, we expect young people to be constrained in their house purchase by the unwillingness of lenders to lend on the basis of permanent income, which for young people is substantially larger than current income, especially in the case of the highly educated. On the other hand, because of transaction costs, we would not expect people to change their housing with every change in their equilibrium demand. In particular, we expect people to purchase housing ahead of need, so far as lending constraints allow. For instance, it makes little sense for a family with one child but planning two more to purchase a house suitable for its current size while planning to sell and purchase a large one when family size increases. Real estate fees, legal fees and moving costs would more than offset the saving on mortgage-interest charges for the period of ownership of the smaller house. As the transaction costs for renters are

much less, we would expect renters to adjust their housing consumption more frequently.

In Table 4.4 we see the effect of age on the hierarchy of housing decisions. We see that in the youngest age group, the 15-24 year olds, a substantial proportion choose the privacy and control embodied by a separate dwelling unit. Consumption of this type of accomodation by the young is higher in large urban areas than in the rest of Canada, with a 12% headship rate as against a 10% rate for Canada as a whole. It should be pointed out that this is a rate for all persons, male or female, in the age group and that the male headship rate is necessarily much larger than the female because husbands are always regarded as the head of a married household.

The really big increase in consumption of a separate dwelling comes in the mid-twenties as people get married and leave parents, rooming houses and college residence. There is a substantial further increase from 43% to 48% between 25-29 and 30-34, as single sharers split up and marriages break down. There is then a further upward drift with age until at 65 and over 58% of persons in large urban areas head their own households. Many of the people in this age group are widows and widowers. We note that there is an asymmetry in the relation of these headship rates for large urban areas to those in all Canada: while for younger groups the headship rate in large urban areas is higher than for all Canada, the reverse is true for the oldest age group. Widowers and widows apparently more frequently control their own house in less urbanized areas than elsewhere.

For ownership rates the big increase occurs at an older age than that for the headship rate, rising in large urban areas from 24% for people in their late twenties to 46% in the early thirties. The peak ownership rate - 65% in large urban areas and 72% in all Canada - is reached at 45-54. Unlike the headship rate, the ownership rate declines quite markedly after this age, dropping in large urban areas to 55% for those 65 and over. This pattern is very different from that in 1931. Then the ownership rate was only 19% for the 25-34 age group in urban areas, and rose quite steadily to 61% for those 55 and over.[7] Thus while indications are that the proportion of households who sometime in their lifetime owned was about the same in 1971 as in 1931, in 1971 ownership was first attained at a dramatically earlier age.

See footnote(s) on page 96.

TABLE 4.4. Housing Characteristics by Age of Household Head, Canada and Urban 30,000 or More, 1971

Age of head and area	Head-ship rate	Home ownership rate		Mean gross rent	Mean value owner-occupied single-detached	Mean household income			Mean number of persons per household		Mean number of rooms		
		All[1]	Single-detached[2]			Renters	Owners All[1]	Owners Single-detached[2]	Renters	Owners	Renters	Owners All[1]	Owners Single-detached[2]
	per cent					$							
Canada, all areas													
15-24	10.3	14.4	10.5	117	15,390	6,649	7,584	7,562	2.37	2.91	3.81	5.28	5.46
25-29	41.6	33.3	26.8	126	19,414	8,600	9,813	9,740	2.89	3.61	4.23	5.73	5.84
30-34	46.8	53.9	45.3	127	21,636	8,698	10,602	10,602	3.55	4.41	4.54	6.11	6.19
35-44	49.3	68.2	58.6	126	23,150	8,641	11,555	11,688	3.94	5.02	4.77	6.44	6.49
45-54	51.9	72.6	63.5	122	22,309	9,160	12,180	12,227	3.23	4.39	4.73	6.45	6.49
55-64	56.3	70.8	60.6	113	19,791	8,303	10,237	10,195	2.35	3.08	4.30	6.09	6.11
65+	59.0	68.0	58.4	99	16,364	5,312	6,521	6,352	1.74	2.23	3.85	5.73	5.74
Urban 30,000 or more													
15-24	12.2	7.5	5.3	124	21,164	6,740	9,085	9,004	2.29	2.82	3.70	5.71	5.88
25-29	43.2	24.0	18.6	133	23,544	8,940	11,339	11,447	2.77	3.55	4.10	5.97	6.01
30-34	48.0	46.0	37.0	135	25,524	8,908	12,000	12,155	3.31	4.27	4.37	6.36	6.46
35-44	50.3	61.4	50.3	133	27,128	8,754	13,070	13,476	3.68	4.81	4.59	6.61	6.69
45-54	52.4	64.5	53.6	130	26,682	9,421	14,378	14,714	3.14	4.20	4.57	6.64	6.70
55-64	56.1	60.2	47.9	121	24,930	8,723	12,844	13,117	2.29	3.01	4.17	6.25	6.27
65+	57.7	55.0	42.5	109	22,107	5,743	8,294	8,253	1.71	2.26	3.77	5.89	5.88

[1] "Owners, All" refers to all owner-occupiers, i.e. owner-occupiers of any type of dwelling.

[2] "Owners, Single-detached" refers to owner-occupiers of single-detached dwellings.

Source: 1971 Census of Canada, Public Use Sample Household Tapes, except for column 1, Public Use Sample Individual Tapes. For all columns households with military or inmate heads are excluded. For columns 4 and 5 overseas and farm households are excluded. For columns 2, 3, and 6 to 13 overseas households are excluded.

The great shift down in the typical age of first purchase arises partly because of the greater incomes and wealth of young households now than in 1931, but probably the fundamental source of the shift is the change in mortgage practices. In the 1920's and earlier the standard downpayment was 40% of house value (Woodard, 1959). The introduction of government insured mortgages in the 1930's, however, ushered in the era of 5% and 10% downpayments for mortgages held by big institutional lenders such as insurance companies and trust companies. The ready availability of this credit no longer made it necessary to spend years after entry to the labour force accumulating the necessary savings for a large downpayment, but instead allowed purchase at an early age in anticipation of future earnings. Some indication of the extent to which households have taken advantage of the low-downpayment requirements is shown by data for NHA houses. In 1970 the average downpayment ratio was just 19% for Canada and in some areas it was substantially lower even that this: in Montréal, it was just 15% (CHS, 1970, Table 104, p. 83).

The quantity of housing also increases with age, as Table 4.4 shows. For both renters and owners, the average number of rooms increases substantially, from 3.8 (renters) and 5.3 (owners) for the youngest age group, to 4.5 (renters) and 6.1 (owners) at age 30-34. Taking renters and owners together,[8] the number of rooms occupied increases by one-third from the earliest age to 30-34. This is associated with a large increase in household size but we note that for heads 55 and over, typically heading households with children no longer present, the average number of room is not very much less than for 45-54 year-old heads. That is, aging households do not adjust their housing very much to reflect reduced household size. This is especially remarkable in view of the markedly lower income of elderly households: while household income drops by 47% as heads of households age from 45-54 to 65 or over, the number of rooms occupied declines by only 17%.[9] Another way of highlighting the strong taste of the elderly for size is to contrast their consumption with that of households headed by 25-29 year-old households. The elderly consume more rooms than these young households despite a considerably lower income. This higher consumption is not just the result of transactions costs, for the fall after age 45-54 is not very large even for rooms consumed by renters.

See footnote(s) on page 96.

The strong taste of the elderly for size is not accompanied by a similar taste for quality. The value per room of owned single-detached houses occupied by the elderly is lower than the value per room of houses occupied by any but the very young; and per-room rent paid by the elderly is less than per-room rent paid by all age groups under 45.[10] We note that the general pattern of housing consumption by age as indicated by rent and value is quite like that for dwelling size, though the peak is reached earlier - at 35-44 for owners, and at 30-34 for renters.

4.4. Housing and Income

The pre-eminent influence on housing choices is income. We illustrate this in the following charts. At the first level of choice, we see (Chart 4.1) that while at the lowest income the proportion of males controlling a separate dwelling unit is less than half, the proportion increases sharply as income increases until an income well above the median income is reached. After $9,000 the headship rate continues to increase steadily but very slowly until a maximum headship rate of about 96% is reached at incomes of $14,000 or more. As Chart 4.2 shows, income has an especially strong influence on the headship rate of those under 30. The effect of income changes above an income level of $4,000 (1971 dollars), wanes greatly as age increases beyond 30. This suggests that the increases in the overall headship rate observed in the 1960's and 1970's, when the number in the under-30 age group greatly increased, will not be matched in the 1980's.

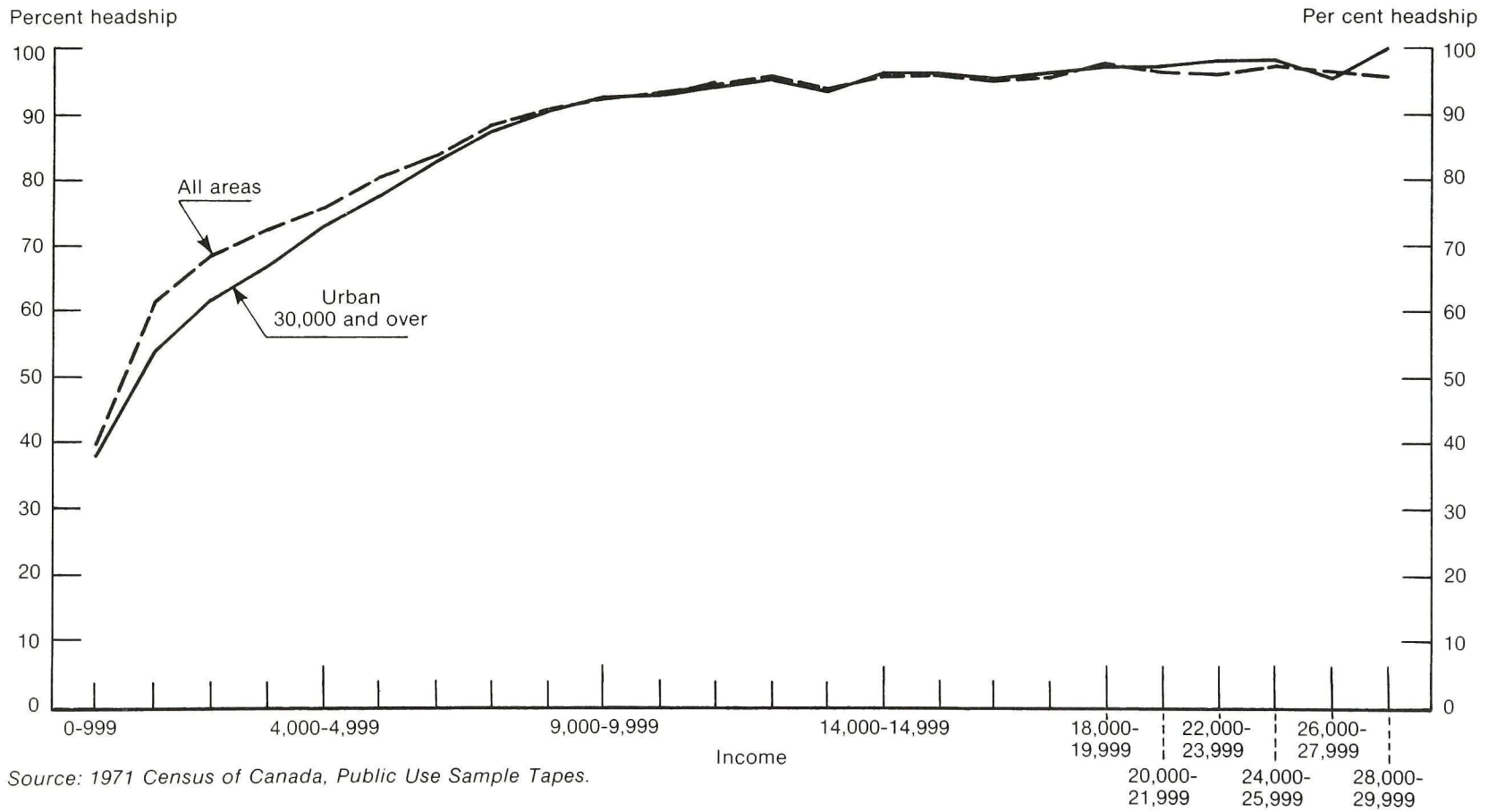
At the same time both charts show that the budget constraint indeed has a strong influence on household formation and emphasize the importance of incorporating income as well as demographic variables into estimates of household formation. Chart 4.1 suggests that if all males received an income of $7,500 and this was then increased to $9,500, the number of dwellings demanded would increase by 5.2%; yet all housing starts in 1971 equalled only 3.8% of the 1971 housing stock (CHS, 1972, Table 1, p. 1 and 1971 Census, Vol. II.3, Table 1).

As Chart 4.3 shows, the influence of income on tenure choice is also very great. In large urban areas the ownership ratio rises from about 30% at incomes under $4,000 to more than double that at the highest incomes. The quite high ratio at very low incomes is largely a permanent income effect. A substantial proportion

See footnote(s) on page 96.

Chart — 4.1

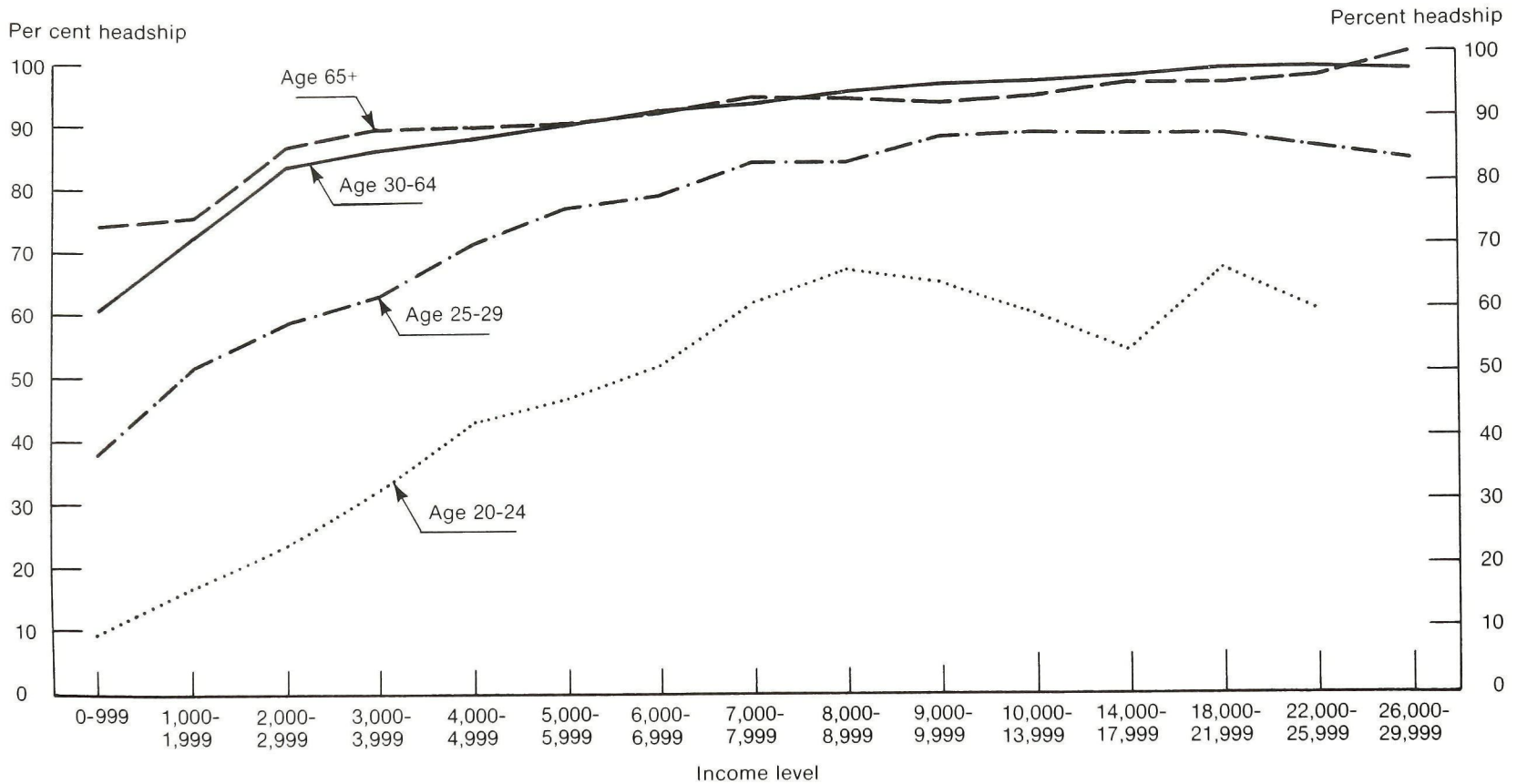
Headship Rate for Males by 1970 Income, Canada Total and Urban Areas of 30,000 Population and Over



Source: 1971 Census of Canada, Public Use Sample Tapes.

Chart — 4.2

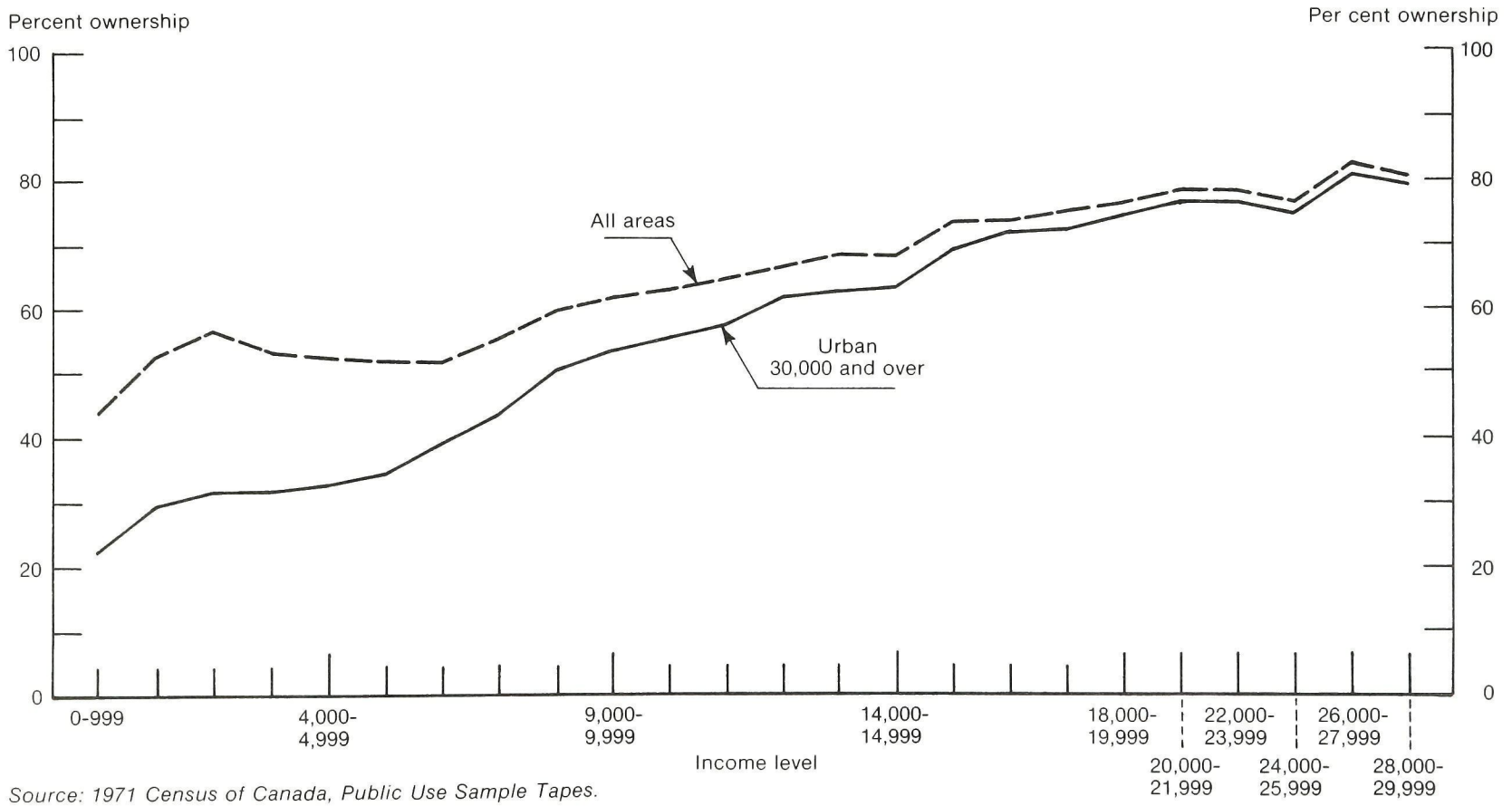
Headship Rate for Males, by Age and 1970 Income, Canada



Source: 1971 Census of Canada, Public Use Sample Tapes.

Chart — 4.3

Ownership Rate by 1970 Income, Canada Total and Urban Areas of 30,000 Population and Over



Source: 1971 Census of Canada, Public Use Sample Tapes.

of those at the lowest money-income level are retired households whose mortgage was paid off during their working life.

The difference between the ownership-income pattern in large urban areas and in the rest of Canada suggests that the influence of relatively high prices in keeping down the ownership level in large urban areas is an important one. While the ownership ratio in large urban areas at incomes under $5,000 is 20 or more percentage points less than the ratio in all Canada, this differential rapidly declines so that by $13,000 it is less than six percentage points.

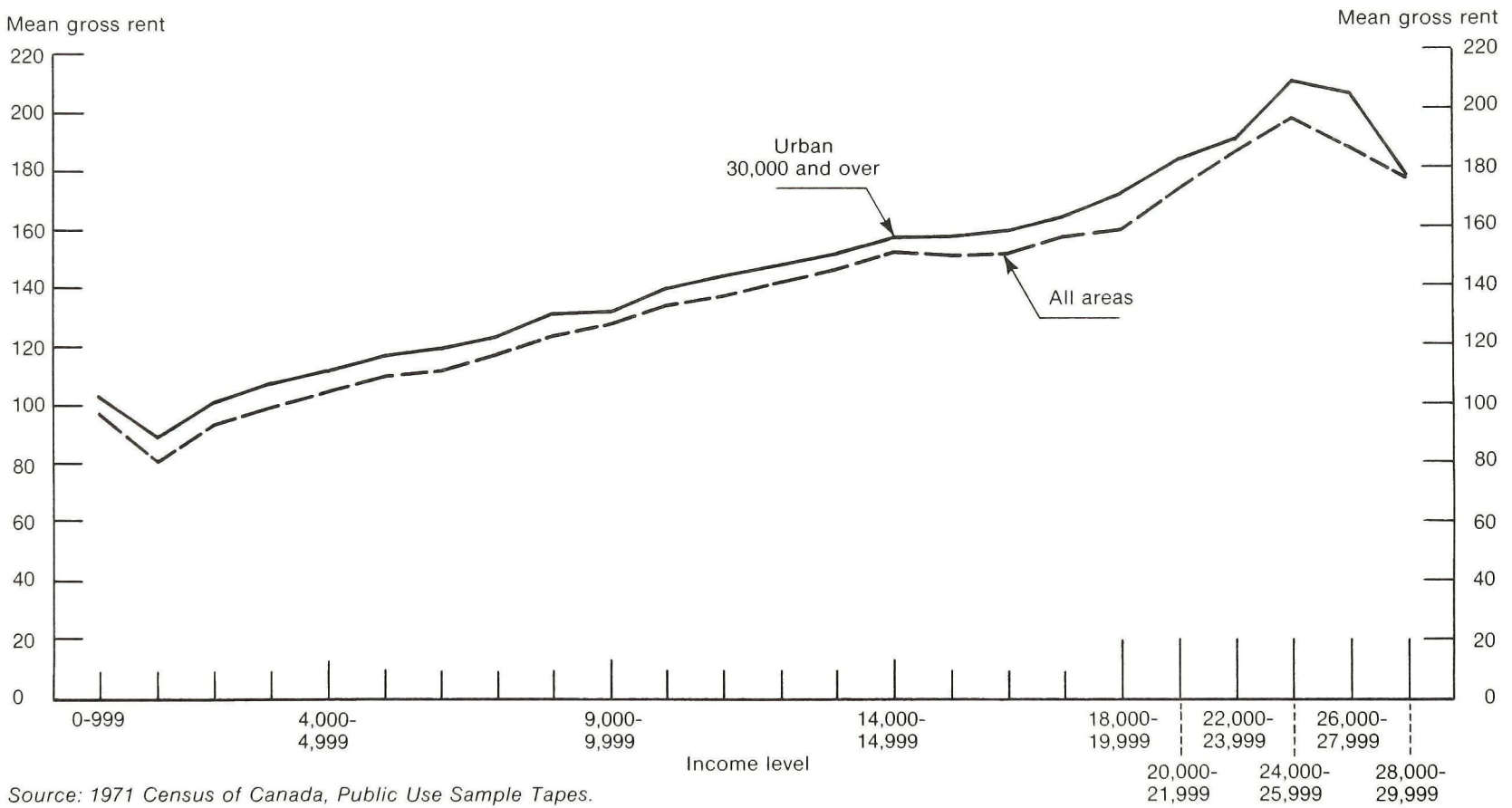
Comparison of the Canadian pattern in large urban areas with the pattern in U.S. metropolitan areas is enlightening in view of the very different tax treatment of homeowners in the U.S. There is a considerable tax incentive to homeownership in the U.S. because of the deductibility of mortgage interest and municipal property tax from income, for tax purposes. This provision is clearly more advantageous the higher the household's income, because of the increasing marginal tax rate. Thus it is not too surprising that while U.S. and Canadian ownership rates are very similar for incomes of $8,000 to $10,000, U.S. rates are substantially higher than Canadian rates for incomes from $10,000 to $20,000 (Struyk, 1976, p. 11). At the highest incomes, there is again very little difference, perhaps because the tax incentive even in Canada becomes so very great at very high marginal rates as a consequence of the exclusion of imputed rent from taxable income. We finally note that the Canadian rates at the very lowest incomes are much below the U.S. rates.

In the final two charts, we show the relation to income of the quantity of housing consumed as indicated by rent and value. The relation is quite strongly linear in each case. However, for incomes less than $7,000 in large urban areas and for incomes less than $3,000 in Canada as a whole, average house values are roughly constant partly because the consumption of low-income retired households is higher than current income would warrant. The difference between the large urban area threshold and Canada threshold suggests that there is another potent influence at work - legal restrictions. In large urban areas, building codes and zoning do not allow the poor who live in a single-detached dwelling to choose to live in a very low-quality dwelling. Thus at an income of $4,000 to $5,000 the average house value in large urban areas is $19,900, or $6,100 more than in all Canada. At an income of $10,000 to $11,000 the average house value in large urban areas, at

$23,900, is only $2,300 more than in all Canada. Rents do not show this pattern. The differential for rents between large urban areas and elsewhere is not much lower at high incomes than at low incomes.

Chart — 4.4

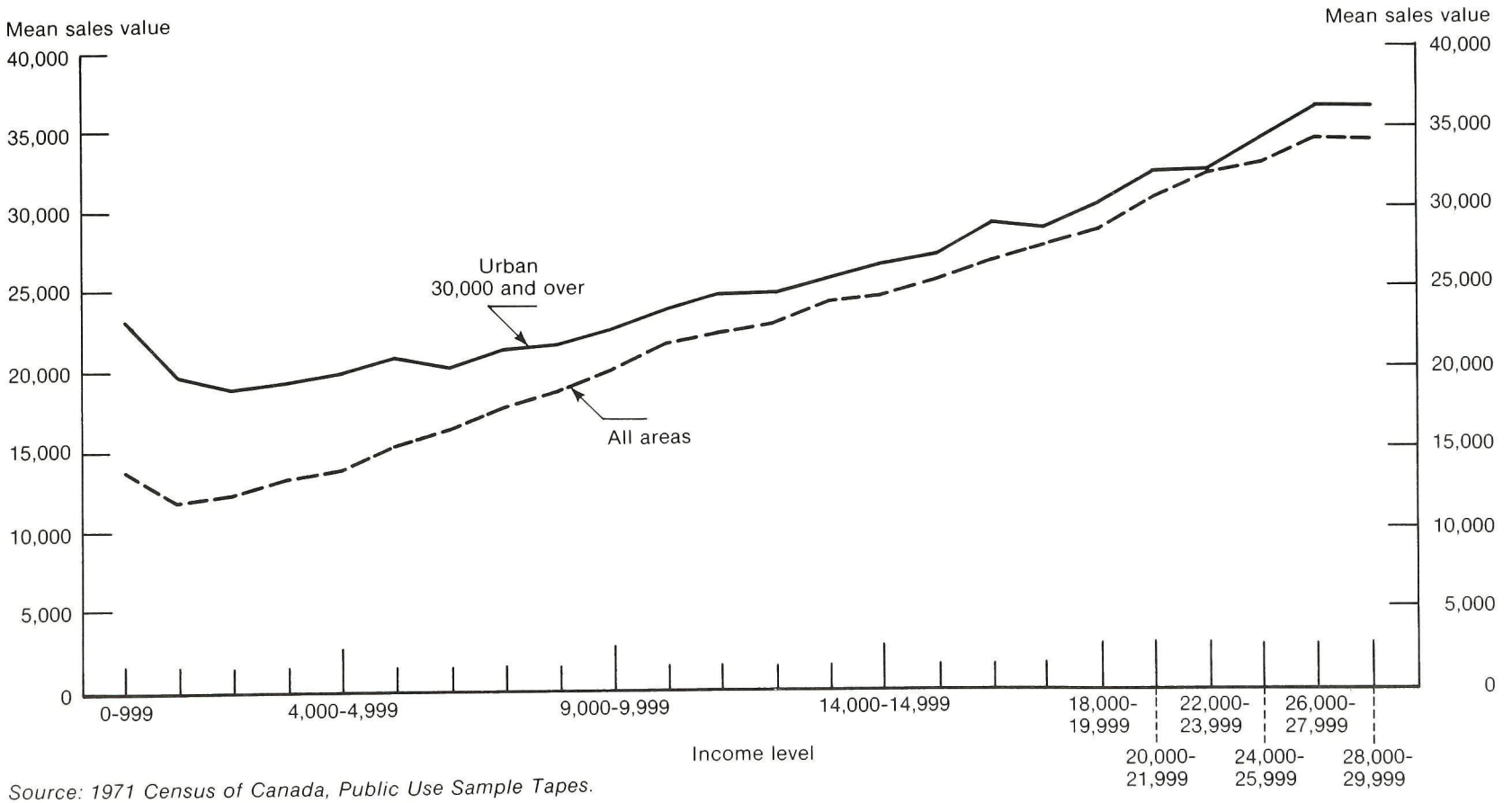
Mean Gross Rent by 1970 Income, Canada Total and Urban Areas of 30,000 Population and Over



Source: 1971 Census of Canada, Public Use Sample Tapes.

Chart — 4.5

Mean Sales Value of Single-detached Houses, by 1970 Income, Canada Total and Urban Areas of 30,000 Population and Over



Source: 1971 Census of Canada, Public Use Sample Tapes.

FOOTNOTES

[1]We note that in periods of very strong demand and manifest supply limitations such as in 1972-74, the short-run analysis may be more appropriate, because builders can obtain a short-run monopoly price determined by demand as reflected in the price of existing houses. These conditions did not exist at the time of the 1971 Census.

[2]These ratios of land costs had changed very little by 1974 and 1975. See Derkowski (1976, p. 32ff) for 1974 prices and CHS, 1975, Table 88, p. 74 for 1975 prices. (The 1975 prices are based on a small and biased sample of houses in some cities, because of the constraints of financing under NHA).

[3]These data (1961 Census of Canada, Vol. II.2, Table 76 and 1971 Census of Canada, Vol. II.4, Table 27) refer to owner-occupied, single-detached dwellings in all urban areas; as Table 4.3 indicates, in large urban areas, sizes are slightly larger.

[4]For elaboration of this see Derkowski (1976, p. 66ff). He cites a figure of local-improvement costs to the municipality of $5,455 in Montréal in 1974. Because construction costs in 1974 were much higher than in 1971, local-improvement costs were probably well under $4,000 in 1971.

[5]For analysis sympathetic to the point of view see Markusen and Scheffman (1977).

[6]Household income may be computed from Table 4.1 by taking the weighted average of the average income of owners and tenants.

[7]These figures from Greenway are for families; the overall ownership ratio is somewhat greater than this for households (1939, pp. 90, 98). The pattern in 1941 for households is quite like this 1931 pattern for families. That is, there is a monotonic increase in ownership with age (1941 Census of Canada, Vol. IX, Table 50, p. 232).

[8]That is, weighting the average number of rooms for the renters and owners by the proportion renters and owners, respectively.

[9]Computed by taking a weighted average of renter and owner income and rooms figures from Table 4.4.

[10]We compute value per room and rent per room using data excluding farmers, for internal consistency. Source is Public Use Sample household tape.

CHAPTER 5

THE DEMAND FOR A SEPARATE DWELLING UNIT

The first housing decision confronting an individual is whether or not to occupy a separate dwelling unit. If that individual decides to share a dwelling unit with others, he must decide on the number of others. This decision is primarily about the housing characteristics of privacy and control. Obviously there is greater privacy for a person occupying a dwelling alone than with others and there is greater control over environmental aspects such as noise, odour, dirt and untidiness. A separate dwelling brings with it greater availability of certain facilities because of the way most accommodation is designed. This applies most importantly to kitchen facilities. Few houses or apartments are built with more than one kitchen. This means that anyone proposing to share accommodation must be prepared for substantially constrained meal preparation and clean-up activities. This constraint is clearly of lesser importance if the sharers eat together.

A crucial distinction must be made between the separate-dwelling-unit decision and the quantity-of-housing decision. In the latter case it can be assumed that an additional amount of housing is always desired, i.e. if a household were offered more rooms or higher-quality housing for a rent no higher than current rent, the offer would always be accepted. It is not true, however, that two people offered two separate dwellings at the same rent as one dwelling would always accept the offer. In other words, more separateness is not always desired. Some people prefer the companionship of others to the privacy of living alone. This relative preference is institutionalized in the legal status of marriage.

In this monograph the primary concern is to explore the effects of income and other economic variables on housing decisions. The above discussion makes it clear, however, that the effect of these variables will depend very much on marital status. Setting out a traditional view of the pattern of housing decisions over the life cycle helps further discussion of this point. According to this view, a young person leaves his family's dwelling only at marriage. He then occupies his own dwelling unit. A woman at marriage occupies the dwelling unit of her husband. If one of the couple dies the remaining spouse may retain the home, especially if there are children at home. Alternatively, the widowed spouse may move into the home of grown-up children, perhaps after some interval of time. In any case when the couple, or one of them, become infirm they move into their children's home.

Even in this scenario income and the price of housing have some effect. They will determine when and whether marriage takes place. Income thus affects the separate dwelling unit decision albeit indirectly, by its effect on the marriage decision. Departing from this scenario and allowing marriage to occur separately from leaving home allows income and prices to affect the housing decision directly. Census data in fact show that not all married males have their own dwelling unit (i.e. in census terminology, not all are household heads). There is a presumption, however, that the preference for a separate dwelling is so strong among this group that they will become heads at very low income levels, greatly sacrificing other kinds of consumption if necessary. For this reason, in this chapter we almost always separate married males from other individuals for analytical purposes.[1]

The separate-dwelling unit decision is much more interesting for non-married than for married individuals because of the presumed greater role of income. Contrary to the traditional scenario, some individuals do leave home when still single. Indeed, it has always been true that young single people would leave their parents' home to migrate to areas of greater opportunity. Fifty years ago when they migrated, however, they almost always lived as roomers or boarders in a family home. Increasingly, it has become the case that young people who migrate occupy their own dwelling unit or share with other singles. Increasingly they also leave the parental home even if they remain in the same city.[2] Older, previously-married individuals also are increasingly likely to live in their own dwelling unit rather than with relatives. The data from recent censuses give evidence of these trends. In 1971 the proportion of the population 15-24 who headed a household, i.e. controlled their own dwelling unit, was 10% as compared with 7% in 1961. In 1971, 56% of the population 65 and over controlled their own dwelling unit compared with 54% in 1961 (1961 Census of Canada, Vol. I.2, Table 22 and Vol. II.1, Table 23; 1971 Census of Canada, Vol I.2, Table 7 and Vol. II.1, Table 44). There is a substantial presumption that the increase in dwelling units per person 20 and over from .39 in 1951 to .43 in 1961 to .46 in 1971 is strongly associated with the increase in income per capita over these two decades. The analysis in this chapter will help answer the question of whether this trend may be expected to continue.

See footnote(s) on page 121.

5.1. Urbanization, Income, Age and the Separate Dwelling Decision

In this section the separate-dwelling decision is examined in a broad brush way, by applying the logit model with income the only independent variable to different geographic areas. There are some reasons for expecting the separate-dwelling decision to vary by area. First, the price of a given bundle of housing characteristics is generally less in the less densely-settled the area because of the lower cost of land. At the same time the minimum housing bundle is also generally less in less densely-settled areas because of looser zoning rules and building bylaws. As a result the minimum outlay to gain occupancy of an apartment in Toronto is much greater than the minimum outlay required in rural Saskatchewan. This means that ceteris paribus a young person is less likely to leave the family home in Toronto, and, if he leaves he is more likely to share with other singles rather than to live alone.

There are a number of offsetting influences. First, in rural areas and small urban areas young people staying at home are apt to face a much cheaper trip to work than young people staying at home in the big centres. In big cities family homes are apt to be located in suburbs far from the core because of lower land prices on the outskirts. A young adult without the high preference for the land-intensive housing of his parents may find it pays to share a dwelling close to a job in the core because of the saving in commuting cost. It is also true that in rural areas households deciding between renting and owning tend to choose the latter (see Table 4.1 and Chapter 6) and so the market is too thin to be very attractive to landlords. As a consequence the availability of small apartments and rental accommodation generally is more limited than in urban areas. This discourages those who are on the margin between sharing with parents or others and living on their own, from choosing the latter option.

Finally, there is a presumption that traditional family ties are stronger in rural and small urban areas than elsewhere. Reinforcing this, the population of young people remaining in these areas instead of migrating is a population biassed towards living at home. Putting it another way, in large urban areas for many young unmarried people, the option of living with parents does not exist because their parents live elsewhere. These young migrants will either head a household or perhaps share with other young migrants. The flow of young migrants to more

urbanized places thus results in a built-in tendency towards a greater headship ratio in more urbanized places than in less urbanized places.

In Table 5.1 are the results of the estimation. The sample includes only individuals eligible to be in control of a dwelling unit. That is, it excludes those under 25, most of whom are in school, and it excludes married females, because these are excluded by census definition. As Table 5.1 shows, there is a remarkable uniformity in the headship ratio among urbanization levels. Only in Ontario and British Columbia is the headship ratio in rural non-farm areas noticeably different from the ratio in large urban areas, in each case the headship ratio being five percentage points higher in the rural areas. These are both provinces with high urban house prices (see Table 4.1 and 4.2).

In all areas income has a very substantial effect on the headship decision. All income coefficients are significant at the 1% level, and when income is such as to yield a probability of headship of .5, an increase in income of $1,000 would increase headship by about five to six percentage points.[3] The elasticity calculations show that at the average income for this sample of $6,489 (1970 dollars), a 1% increase in income increases headship by about .2%. If this sample group received an increase in the real income per capita like that which actually occurred overall between 1961-71 (something like 30%), its increase in headship would be about 6%. This is roughly the percentage increase in dwelling units per capita which actually occurred. If the cross-section elasticities estimated here were used for projection, one would conclude that over the period 1976-81 the percentage increase in dwelling units per capita should slow considerably, because of much reduced increases in real earnings.

Our results also suggest that the price of housing has a very substantial effect on the separate-dwelling decision. This can be seen by examining the computed income at which the probability of headship is .81. This income is lower the lower is price (under the assumption that the probability of a separate dwelling depends only on income and the price of housing, and that parameters do not vary

See footnote(s) on page 121.

TABLE 5.1. Summary Statistics for the Separate-dwelling Decision by Area,[1] 1971

Area	Elasticity[2]		Coefficient (times 25) of income ($000)[3]	Income at which probability of headship is .81	Proportion heads
				$	
Toronto CMA	.28	(.18)	5.56	6,600	.79
Montréal CMA	.26	(.18)	6.00	5,800	.78
Urban 30,000 or more					
Newfoundland	.23	(.09)	3.78	8,300	.72
Nova Scotia	.33	(.18)	6.06	6,900	.73
New Brunswick	.27	(.20)	7.57	5,100	.78
Quebec	.26	(.17)	5.73	5,900	.78
Ontario	.25	(.17)	5.50	6,000	.80
Manitoba	.22	(.15)	5.84	5,100	.81
Saskatchewan	.20	(.18)	7.39	4,100	.83
Alberta	.18	(.14)	5.51	4,100	.86
British Columbia	.22	(.16)	5.64	5,200	.81
Canada	.24	(.17)	5.64	5,700	.80
Urban under 30,000					
Newfoundland	.18	(.08)	4.22	5,300	.79
Nova Scotia	.24	(.15)	6.38	5,200	.77
New Brunswick	.24	(.17)	7.10	4,900	.76
Quebec	.24	(.17)	6.61	5,100	.79
Ontario	.18	(.16)	6.29	3,900	.85
Manitoba	.16	(.12)	5.52	3,700	.84
Saskatchewan	.14	(.19)	8.74	2,800	.85
Alberta	.12	(.10)	4.77	2,300	.88
British Columbia	.16	(.12)	4.91	4,000	.85
Canada	.20	(.15)	6.13	4,400	.82
Rural non-farm					
Newfoundland	.15	(.03)	3.17	6,100	.74
Nova Scotia	.18	(.08)	5.23	4,300	.78
New Brunswick	.18	(.11)	7.39	3,600	.79
Quebec	.17	(.08)	5.11	4,200	.79
Ontario	.15	(.11)	5.33	3,200	.85
Manitoba	.15	(.11)	6.31	3,000	.82
Saskatchewan	.12	(.06)	4.48	2,600	.83
Alberta	.08	(.03)	2.39	1,900	.84
British Columbia	.15	(.11)	4.96	3,400	.86
Canada	.16	(.10)	5.10	3,700	.82

[1] Computed for those 25 or over, excluding married females.

[2] The elasticity is computed at the Canada average income, $6,489. It, and the income coefficient, are estimated from the simple logit model with income as the only independent variable.
The number in brackets is the pseudo-R^2 given by $\frac{1 - (\tilde{P}/ML^{1/T})^2}{1 - \tilde{P}^2}$ where $\tilde{P} = \bar{P}^{\bar{P}} (1-\bar{P})^{1-\bar{P}}$, $\bar{P}$ = proportion household heads, ML = likelihood of the sample using the maximum likelihood estimates of the parameters, T = number of observations. (See Uhler and Cragg, 1971, p. 344.)

[3] This shows in percentage points the first derivative of the probability of a separate dwelling (i.e. headship) with respect to income (in thousands of dollars) at the probability level .5. All coefficients are significant at the 1% level or better.

e Sample Individual Tapes.

amongst areas); and thus the greater the difference in this computed income between low- and high-priced areas the greater, is the price coefficient, i.e. the greater is the effect of a one dollar change in price.[4] In fact, for large urban areas this income is $5,700; for small urban areas, $4,400; and for rural non-farm areas, just $3,700. For the Toronto CMA it is $6,600 but for large urban areas in Saskatchewan, just $4,100. The Quebec results stand out as exceptions to this pattern. Despite relatively low house prices there, the probability of headship of .81 is not attained until an income of $5,900 in large urban areas.

Relatively unstratified samples such as those used for Table 5.1 often conceal interesting patterns.[5] For this reason Table 5.2 and Chart 5.1 show the headship results for single males by age group. Chart 5.1 shows - contrary to the very uniform pattern shown in Table 5.1 that for young males the headship rate increases greatly with level of urbanization but the differential declines with age until for those 65 and over the rural non-farm headship rate is a remarkable 65% compared with a rate of 45% in urban areas.[6] Apparently, single males are much more likely to remain living with parents in less urban areas but when their parents die they are much less likely to move in with relatives, to share with other singles or to live in a bedsitting room. This suggests that in less urban areas at early ages the pull of family ties offsets the price effect, but at later ages the price effect becomes important.

This view is corroborated by the pattern for single females (Table 5.3), although their urban-rural differential is so marked at early ages that the decline in this differential still leaves the rural non-farm headship rate for females of 65 and over at .37 compared with .47 for large urban areas. For all age groups in large urban areas as a whole, and for most age groups in Montréal and Toronto, the headship rate for single females is markedly higher than that for single males, despite their lower incomes. Apparently, urban single women, have a much greater taste for the privacy and control yielded by a separate dwelling unit than do men. Perhaps this would be revealed to be the case also for rural women if rural men living in inherited housing or in job-linked housing could be removed from the comparison.

See footnote(s) on page 121.

TABLE 5.2. Summary Statistics for the Separate-dwelling Decision by Age of Single Males and by Area, 1971

Area	Age group							
	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
				Elasticity[1]				
Toronto CMA	1.67(.12)	.82(.04)	.49(.05)	.69(.14)	.33(.06)	.70(.12)	.81(.17)	.16(.03)
Montréal CMA	.49(.01)	.93(.05)	.28(.02)	.50(.09)	.35(.05)	.25(.03)	.16(.02)	.43(.12)
Canada								
Urban 30,000 or more	1.91(.06)	.76(.03)	.51(.04)	.49(.07)	.40(.06)	.30(.05)	.28(.06)	.18(.01)
Urban under 30,000	2.58(.08)	1.33(.06)	.66(.05)	1.33(.26)	.54(.06)	.26(.05)	.16(.01)	.42(.08)
Rural non-farm	.70(.01)[2]	.55(.01)	.46(.02)	.47(.05)	.25(.01)	.27(.04)	-.20(.01)	-.02(.00)
Rural farm	---[2]	-1.78(.02)	.07(.00)	.17(.00)	.60(.10)	-.06(.00)	.15(.01)	.13(.01)
				Coefficient (times 25) of income ($000)[3]				
Toronto CMA	6.65[4]	3.79[4]	2.62[4]	4.00[4]	1.96[5]	4.15[4]	5.66[4]	0.89
Montréal CMA	1.90	4.68[4]	1.64	3.02[4]	2.30[4]	1.76	1.29	4.30
Canada								
Urban 30,000 or more	7.88[4]	3.43[4]	2.87[4]	3.12[4]	2.49[4]	2.23[5]	2.01[4]	1.41[5]
Urban under 30,000	10.45[4]	5.86[4]	3.14[4]	6.77[5]	3.06[5]	1.80[5]	1.20	5.59[5]
Rural non-farm	2.74[2]	2.28	2.08	2.42[5]	1.42[4]	2.46[5]	-1.44	-0.18
Rural farm	---[2]	-6.85	0.31	0.86	3.96[4]	-0.45	2.40	1.22
				Income at which probability of headship is .35[6]				
Toronto CMA	16,650	13,125	9,650	6,875	5,870	6,450	4,600	11,570
Montréal CMA	57,525	9,625	7,475	5,875	3,325	-----	-----	225
Canada								
Urban 30,000 or more	12,975	14,650	7,675	4,825	4,800	425	725	-----
Urban under 30,000	12,025	12,250	13,075	8,350	7,775	1,375	-----	-----
Rural non-farm	42,525[2]	29,025[7]	19,725	10,950	8,475	-----	-----	-----
Rural farm	---[2]	--[7]	152,350	24,650	4,625	-----	-----	-----
				Proportion heads				
Toronto CMA	.01	.11	.27	.35	.38	.34	.39	.31
Montréal CMA	.01	.14	.32	.35	.39	.43	.50	.49
Canada								
Urban 30,000 or more	.01	.10	.30	.39	.38	.46	.44	.45
Urban under 30,000	.01	.07	.17	.23	.28	.41	.47	.50
Rural non-farm	.01	.05	.13	.23	.30	.51	.52	.65
Rural farm	.00	.01	.08	.21	.32	.46	.67	.56

[1]The elasticity is computed at the income $6,489. It and the income coefficient are estimates from the simple logit model with income as the only independent variable. The number in brackets is the pseudo-R^2 (defined in Table 5.1).

[2]There is only one head in the Farm 15-19 sample.

[3]This shows in percentage points the first derivative of the probability of a separate dwelling with respect to income (in thousands of dollars) at the probability level .5.

[4]Significant at the 1% level.

[5]Significant at the 5% level.

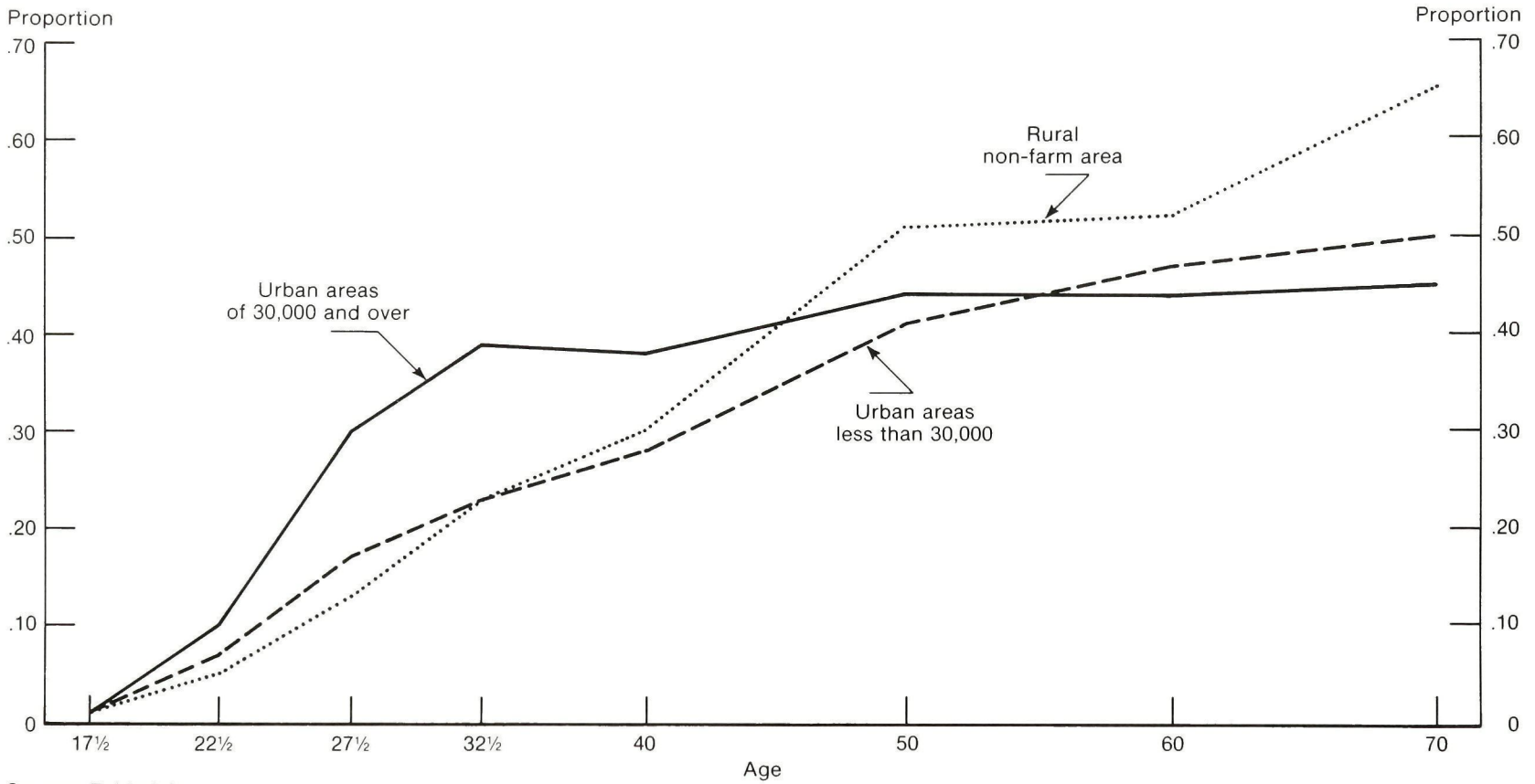
[6]Five dashes indicate probability of separate dwelling of .35 or higher at zero income.

[7]Negative income coefficient.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

Chart — 5.1

The Proportion of Single Males Controlling a Dwelling Unit by Age and Area



Source: Table 5.2.

TABLE 5.3. Summary Statistics for the Separate-dwelling Decision by Age of Single Females and by Area, 1971

Area	Age group 15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
				Elasticity[1]				
Toronto CMA	2.27(.102)	1.20(.058)	.81(.084)	.39(.063)	.51(.109)	.45(.098)	.43(.103)	.44(.121)
Montréal CMA	---[2]	.51(.015)	.64(.076)	.43(.041)	.55(.120)	.44(.098)	.61(.191)	.51(.093)
Canada								
Urban 30,000 or more	2.40(.072)	1.01(.050)	.77(.096)	.42(.044)	.46(.071)	.41(.077)	.47(.117)	.46(.086)
Urban under 30,000	2.94(.070)	1.21(.045)	1.28(.084)	.94(.111)	.58(.052)	.32(.032)	.45(.074)	.38(.054)
Rural non-farm	---[2]	1.20(.049)	.04(.0001)	.99(.103)	.13(.0016)	.78(.106)	.56(.092)	-.65(.0090)
				Coefficient (times 25) of income ($000)[3]				
Toronto CMA	9.95[4]	6.16[4]	5.16[4]	3.23	4.23[4]	4.10[5]	3.53[5]	6.71[5]
Montréal CMA	---[2]	2.40	4.69[4]	2.93	4.03	3.67	6.65	5.62
Canada								
Urban 30,000 or more	11.98[4]	5.53[4]	5.35[4]	3.04[4]	3.23[4]	3.26[4]	3.82[4]	4.93[4]
Urban under 30,000	16.02[4]	5.83[4]	6.44[4]	5.06[5]	3.13[5]	2.05	3.35[5]	4.06
Rural non-farm	---[2]	5.19[5]	.18	5.33	.62	5.76[5]	6.03[5]	-3.33
				Income at which probability of headship is .35[6]				
Toronto CMA	9,900	8,500	5,500	600	2,100	900	1,300	100
Montréal CMA	---[2]	15,700	3,700	3,500	3,400	1,200	1,900	1,000
Canada								
Urban 30,000 or more	7,700	7,600	4,600	2,600	3,300	1,400	1,900	500
Urban under 30,000	6,900	9,700	8,700	8,000	9,000	4,100	2,500	-----
Rural non-farm	---[2]	13,800	189,700	8,000	36,200	4,200	1,500	-----
				Proportion heads				
Toronto CMA	.02	.13	.32	.51	.50	.53	.50	.55
Montréal CMA	.00	.14	.39	.38	.44	.48	.46	.46
Canada								
Urban 30,000 or more	.02	.17	.35	.42	.41	.47	.47	.47
Urban under 30,000	.01	.10	.15	.21	.23	.35	.39	.49
Rural non-farm	.00	.05	.13	.17	.19	.27	.38	.37

[1] The elasticity is computed at $6,489, the Canada average income. The elasticity and the income coefficient are estimates from the simple logit model with income as the only independent variable. The number in brackets is the pseudo-R^2 (defined in Table 5.1).

[2] Fewer than 10 heads.

[3] This shows in percentage points the first derivative of the probability of a separate dwelling with respect to income (in thousands of dollars) at the probability level .5.

[4] Significant at 1% level.

[5] Significant at 5% level.

[6] Five dashes indicate probability of separate dwelling of .35 or higher at zero income.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

The strong taste of women for a separate dwelling unit is manifest also in the income elasticities. For most age groups in urban areas the elasticity is substantially higher for women than men. For both men and women elasticities decline greatly with age. In large urban areas, at an income level of $6,489, a 1% increase in income brings a .76 percentage point increase in the probability of being a head for single males 20-24, a 1.01 percentage point increase for single females of the same age, but for those aged over 65 just .18 and .46, respectively. This indicates that income-induced increases in the demand for dwelling units in the decades ahead may be quite small, even if real income increases are large, because of the decline in the proportion of the population in the sensitive age groups.

5.2. Income Components, Cultural-demographic Characteristics and the Separate Dwelling Decision

A major concern of this study is to explore the effects of various income components on housing demand. In addition there is a presumption that ethnic and immigration characteristics have a substantial effect on the separate-dwelling decision. These are strong reasons for estimating a fuller model of the separate dwelling decision. In this section we apply such a model to two different market areas, the Toronto and Montréal CMA's.

The income variables included in this richer model are unexpected transitory income, expected transitory income, permanent income and opportunity net worth (see Chapters 2 and 3 for definitions and estimation). Because the decision to occupy a separate dwelling is a consumption decision, there is an initial presumption that it should depend largely on permanent income. Net worth should not matter, except via its effect on permanent income, because rent may be paid out of current income. A more subtle look at the question suggests, however, the possibility of net worth effects because those who change their status from living with parents to heading their own household or sharing with others like themselves generally face the expense of furnishings. That is, occupying a separate dwelling unit generally requires the ownership of a stock of durable goods.

Similarly, unexpected transitory income also should have some effect because it may be saved in the form of furnishings and it also provides the cash required

TABLE 5.4. Means and Standard Deviations of Variables[1] for Individuals, Toronto and Montréal CMAs, 1971

Variables	Married males, 25 and over		Non-married individuals, 25 and over	
	Toronto CMA	Montréal CMA	Toronto CMA	Montréal CMA
Head	.96(.21)	.98(.15)	.55(.50)	.54(.50)
Female				
Single			.21(.41)	.27(.44)
Not single			.41(.49)	.35(.48)
Male				
Widowed, separated or divorced			.15(.35)	.14(.35)
Age	45.12(13.51)	44.90(13.56)	50.81(18.46)	50.83(17.23)
Period of immigration				
1961-65	.06(.23)	.03(.17)	.04(.19)	.02(.15)
1966-68	.06(.25)	.03(.17)	.04(.20)	.03(.16)
1969-71	.03(.17)	.01(.10)	.05(.22)	.02(.13)
Mother tongue				
French	.02(.13)	.64(.48)	.03(.16)	.67(.47)
Neither English nor French	.32(.47)	.16(.36)	.22(.41)	.11(.31)
Retired male[2]	.05(.23)	.06(.24)	.04(.20)	.05(.21)
Unemployed[3]	.03(.16)	.03(.18)	.03(.17)	.03(.18)
Years of education	10.51(3.96)	9.75(4.00)	10.13(3.90)	9.00(3.93)
Self-employed	.10(.29)	.10(.30)	.04(.19)	.04(.19)
Measured income ($)	9,580(7,484)	8,527(6,774)	5,041(4,688)	4,270(4,471)
Unexpected transitory income ($)	48(6,113)	38(5,508)	61(3,757)	-247(3,736)
Expected transitory income ($)	-1,961(4,121)	-1,718(3,613)	-1,735(3,643)	-800(2,658)
Permanent income ($)	11,493(6,112)	10,208(5,646)	6,837(5,231)	5,317(4,309)
Opportunity net worth ($)	15,035(11,657)	13,522(10,245)	7,676(9,292)	8,966(9,051)

[1]Where the number given is less than one it refers to the proportion having the characteristic; standard deviations are given in brackets.

[2]Male 55 or over, not in labour force and last worked before 1970.

[3]Currently unemployed but worked during 1970-71.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

for moving costs. A further reason for expecting both components of transitory income to have an effect on this decision is the possibility of a borrowing constraint. That is, if current income is below permanent income it may be difficult to borrow the funds to allow living apart from relatives, or living alone rather than sharing with a similar other person, although the level of permanent income would justify this.

The results of our estimation are displayed in Tables 5.5 and 5.6. The coefficients for married males are not easy to discuss because for this group the probability of a separate dwelling unit is so high and because the logit model implies that the effect of any independent variable becomes slight at high probability levels. For this reason we have computed probabilities for selected values of the independent variables. These are shown in Table 5.7.

The results show that permanent income is not much more important than other components of income. For married males, however, there is more evidence (Table 5.5) of the dominance of permanent income than there is for non-marrieds. The effect of a one-dollar change in permanent income is much larger than the effect of a similar change in unexpected transitory income. Probably married men have acquired possessions and habits making short-term moves associated with changes in unexpected transitory income costly moves. Perhaps also the social imperative of a separate dwelling unit is very strong for married men. In any case if their permanent income allows a separate dwelling they are apparently likely to sustain this situation by borrowing or dipping into savings if they have negative transitory income.

These comments on the results for married males cannot be pushed too far. Although the various income components are all statistically significant at the 1% level, their quantitative importance is slight. As Table 5.7 shows, for an otherwise typical[7] married male even very large changes in income change the probability of a separate dwelling unit by only three percentage points at most. Indeed, the only characteristic lowering the probability to substantially less than .99 is immigration into Canada within 10 years of the census, and even this characteristic has an effect of consequence only in Toronto.

See footnote(s) on page 121.

TABLE 5.5. Estimates of Logit Models of the Separate-dwelling Decision, for Married Males Aged 25 and Over,[1] Toronto and Montréal CMAs, 1971

Variables	Models							
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Toronto CMA				Montréal CMA			
Age								
(Age 45)	.0070[2]	.016[2]	.021[2]	.020[2]	.0035[3]	-.025[2]	-.021[2]	-.016
(Age 45) - squared	-.0012[3]	-.00099[4]	-.0011[3]	-.0012[3]	-.0015	-.00099[4]	-.00092[4]	-.0016[3]
Period of immigration								
1961-65	-.39[2]	-.43[2]		-.41[2]	-.40[2]	-.39[2]		-.37[2]
1966-68	-.78[3]	-.81[3]		-.81[3]	-.55[2]	-.56[2]		-.55[2]
1969-71	-1.50[3]	-1.57[3]		-1.57[3]	-1.49[3]	-1.49[3]		-1.50[3]
Mother tongue								
French	-.72[2]	-.73[2]		-.71[2]	.0034	.056		.044
Neither French nor English	-1.00[3]	-1.00[3]		-.99[3]	-.67[4]	-.67[4]		-.67[4]
Retired[5]	.56[2]	.70[2]	1.04[3]	.75[2]	.32	.87[4]	.83[4]	.86[4]
Unemployed[6]	-.23	-.17	-.049	-.18	.051[2]	.057	.074	.058
Years of education	.058[3]	.015	.061[3]	.017	.028[2]	-.021	-.017	-.014
Self-employed	.36[2]	.12	.27	.13	1.00[2]	.67[2]	.71[2]	.72[2]
Measured income	.18[3]				.16[3]			
Transitory income				.16[3]				.13[3]
Unexpected transitory income		.16[3]	.22[3]			.12[3]	.16[3]	
Expected transitory income		.23[3]	.24[3]			.42[3]	.45[3]	
Permanent income		.28[3]	.29[3]	.24[3]		.32[3]	.35[3]	.18[3]
Opportunity net worth		-.0058	.013	.0069		.0050	.0024	.050[4]
Constant	2.13[3]	1.68[3]	.28	1.75[3]	3.03[3]	2.26[3]	1.87[3]	2.52[3]
Pseudo[7] R^2	.206	.210	.150	.210	.140	.152	.124	.147
Usual[8] R^2	.113	.117	.068	.116	.069	.073	.043	.068
OLS[9] R^2	.074	.076	.032	.071	.038	.041	.028	.041
Number of observations	5599	5599	5599	5599	5470	5470	5470	5470

[1] Excludes those attending school full-time.

[2] $|t| \geq 1$.

[3] Significant at 1% level.

[4] Significant at 5% level.

[5] 55 or over, not in labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] Defined as $\frac{1-(\tilde{P}/ML^{1/T})^2}{1-\tilde{P}^2}$ where $\tilde{P} = \bar{P}^{\bar{P}}(1-\bar{P})^{1-\bar{P}}$, $\bar{P}$ proportion heads, ML likelihood of the sample assuming the maximum likelihood estimates of the parameters. See Uhler and Cragg (1971, p. 344).

[8] Computed as $1 \quad \Sigma(P_i-\hat{P}_i)^2/\Sigma(P_i-\bar{P})^2$.

[9] R^2 from the linear probability model estimated using OLS.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

TABLE 5.6. Estimates of Logit Models of the Separate-dwelling Decision, for Non-married Males and Females Aged 25 and Over,[1] Toronto and Montréal CMAs, 1971

Variables	Models							
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Toronto CMA				Montréal CMA			
Female								
Single	.62[2]	.68[2]	.74[2]	.68[2]	.22[3]	.23[3]	.25[3]	.24[3]
Not single	1.72[2]	1.84[2]	1.91[2]	1.83[2]	1.45[2]	1.49[2]	1.50[2]	1.52[2]
Male								
Widowed, separated or divorced	1.05[2]	1.02[2]	1.05[2]	1.02[2]	.79[2]	.76[2]	.76[2]	.74[2]
Age								
(Age 45)	.020[2]	.018[2]	.018[2]	.018[2]	.016[2]	.014[2]	.014[2]	.011[2]
(Age 45) squared	-.00071[2]	-.00059[2]	-.00058[2]	-.00061[2]	-.0012[2]	-.0013[2]	-.0013[2]	-.0012[2]
Period of immigration								
1961-65	-.23[4]	-.22[4]		-.22[4]	-.053	-.036		-.030
1966-68	-.025	-.029		-.029	-.072	-.084		-.083
1969-71	-.57[2]	-.57[2]		-.57[2]	-.50[4]	-.54[4]		-.49[4]
Mother tongue								
French	.18[2]	.19[2]		.19[2]	-.37[2]	-.36[2]		-.36[2]
Neither English nor French	-.38[2]	-.37[2]		-.37[2]	-.35[3]	-.34[2]		-.35[3]
Retired[5]	.067	.19	.24[4]	.18	.45[3]	.57[2]	.57[2]	.59[2]
Unemployed[6]	-.62[3]	-.62[3]	-.62[2]	-.62[2]	-.12	-.13[4]	-.12	-.13
Years of education	.069[2]	.052[2]	.059[2]	.052[2]	.030[2]	.017	.023[3]	.012
Self-employed	.59[2]	.46[3]	.45[3]	.46[3]	.94[2]	.87[2]	.86[2]	.86[2]
Measured income	.12[2]				.11[2]			
Transitory income				.099[2]				.094[2]
Unexpected transitory income		.099[2]	.11[2]			.095[2]	.099[2]	
Expected transitory income		.11[2]	.13[2]			.0083	.0096	
Permanent income		.13[2]	.14[2]	.13[2]		.076[2]	.075[2]	.11[2]
Opportunity net worth		.015[3]	.015[3]	.017[2]		.032[2]	.034[2]	.020[2]
Constant	-1.80[2]	-1.94[2]	-2.20[2]	-1.9[2]	-.70[2]	-.74[2]	-1.11[2]	-.75[2]
Pseudo[7] R^2	.222	.226	.216	.226	.174	.180	.174	.179
Usual[7] R^2	.169	.172	.165	.172	.133	.136	.132	.136
OLS[7] R^2	.162	.165	.156	.165	.125	.129	.125	.128
Number of observations	3304	3304	3304	3304	3849	3849	3849	3849

[1] Excludes those attending school full-time.

[2] Significant at 1% level.

[3] Significant at 5% level.

[4] $|t| \geq 1$.

[5] 55 or over, not in labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] For definitions, see Footnotes 7-9 of Table 5.5.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

TABLE 5.7. The Probability of a Separate Dwelling for Selected Values of Independent Variables,[1] Toronto and Montréal CMAs, 1971

Variables	Married males		Others	
	Toronto	Montréal	Toronto	Montréal
Foreign mother tongue				
Immigrated 1961-65	.95	.98	.62	.69
1966-68	.93	.98	.66	.68
1969-71	.87	.96	.53	.57
Native-born[2]	.97	.99	.67	.70
Native-born[2]				
Mother tongue English	.99	.99	.74	.76
Mother tongue French	.98	1.00	.78	.69
Years of education				
10 years	.99	.99	.74	.76
17 years	.99	.99	.81	.79
Unemployed	.99	.995	.61	.74
Permanent income				
$5,000	.97	.99	.66	.72
10,000	.99	1.00	.79	.79
15,000	1.00	1.00	.88	.85
Measured income[3]				
$5,000	.97	.98	.59	.68
10,000	.99	.99	.72	.79
15,000	1.00	1.00	.82	.87

[1]Characteristics other than the one "selected" are given by the following list: age 50; native-born; English mother tongue; not retired; not unemployed; not self-employed; 10 years of education; zero unexpected transitory income; $0-$1,800 expected transitory income; $8,000 permanent income; $11,000 opportunity net worth; and for non-married: .24 proportion single female, .18 proportion other female and .14 proportion widowed, separated and divorced male. Probability is computed using specification two (Tables 5.6 and 5.7) unless otherwise indicated.

[2]Also includes those who immigrated before 1961.

[3]Computed using first model, see Table 5.6.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

For non-married persons the effect of current income on the probability of a separate dwelling unit is quite insensitive to the size of various components of that income. Permanent income has little more effect than transitory income. Much more than married men, this group apparently adjust their living arrangements to fit their current circumstances. This myopic housing decision pattern also shows up in the effects of unemployment. Unemployment in Toronto for the typical non-married reduces the probability of headship to .61 from .74.[8]

Opportunity net worth has a small but noticeable effect on headship in both places. This suggests that for the non-marrieds the accumulation of durable goods associated with several years in the labour force has a positive effect on the readiness to live in a separate dwelling unit.

For non-marrieds, unlike married males, an increase in income increases the probability of headship greatly. An increase of less than one standard deviation (see Table 5.4) in permanent income to $10,000 from $5,000 increases the probability of headship of the typical non-married in Toronto to .79 from .66; in Montréal to .79 from .72. The other two major factors affecting headship of the non-married are age, and immigration combined with a foreign mother tongue. Recent immigrants (1969-71) with a foreign mother tongue in Toronto and in Montréal have a probability of headship about 20 percentage points less than long-time residents with English as their mother tongue. In this aspect of behaviour immigrants assimilate very quickly (see Table 5.7), with almost all their impact on housing demand felt within three years of their arrival. However, those long-time residents and native-born with a mother tongue either foreign or French (in Montréal) have about a seven-percentage-point lower probability of headship than those with English mother tongue, so that non-English speaking immigration apparently has a persistent influence on headship. The quantitative importance of this is indicated by the fact that 22% of Toronto non-marrieds have a foreign mother tongue (Table 5.4). Perhaps immigration *per se* is important in the short-run because it implies temporary disruption in consumption and income, while a foreign language is of long-run importance because it is an indicator of deeply ingrained differences in habit and custom.

See footnote(s) on page 121.

Because of the great importance of sex, age and marital status, the logit model is estimated (Tables 5.8 and 5.9) for groups yielded by stratifying the sample by these characteristics. Because of the relatively small size of many of the samples, few variables are generally significant even at the 5% level. A few results do stand out. First, for young (21-29) singles, the effect of a foreign mother tongue is consistently statistically significant with a very great negative quantitative effect. For Toronto single males it has the same effect as a $12,000 (1970 dollars) reduction in permanent income. Secondly, education has a substantial positive effect for young single males in both cities and young single females in Montréal. In fact, in Toronto one year of education increases the probability of headship of young single males more than does $1,000. The effect of education may arise largely because in order to get post-secondary education many in this age group have to leave their parents' home and move to another city. As can be seen the quite consistently strong positive effect of education for the young does not persist into older age groups, so that there is no support for the hypothesis that more education, by itself, leads to a greater taste for the privacy and control afforded by a separate dwelling unit.

The variables which are almost invariably statistically very significant and quantitatively important are the two income variables. Permanent income is generally more important than transitory income. For young singles transitory income is more important than it is for singles 30-64. This is as one would expect. The young would usually not have been able to accumulate savings to allow them to ride out temporary reductions in income and so would react to a negative transitory income by changing their accommodation. For the elderly (65 and over), widowed, separated and divorced $1,000 of permanent income is far more important than $1,000 of transitory income in increasing the probability of headship. This group would often be living in an owned house, acquired when they were married, and so it is not surprising they are unwilling to adapt their living accommodation to short-term income changes.

For ease in further interpretation we use the probabilities computed (Table 5.10) for benchmark members of these groups. These probabilities are based on many coefficients which are not, individually, statistically significant and so only patterns that emerge are of interest, not individual probabilities. The

TABLE 5.8. Estimates of a Logit Model of the Separate-dwelling Decision for Non-married,[1] by Age and Sex, Toronto CMA, 1971

Variables	Single			Widowed, separated or divorced		
	21-29	30-64	65+	21-29	30-64	65+
			Males			
Age						
(Age 45)	-.11	.046[2]	1.57[3]	-2.83[4]	.014	.070
(Age 45) squared	-.0067	-.0012[4]	-.023[3]	-.075[4]	-.0020[4]	-.00075
Period of immigration						
1961-65	-.43	-.67[4]	–	6.67	-.95	-6.74
1966-68	.56[4]	.55[4]	–	–	1.18[4]	-6.96
1969-71	.092	-.019	4.72	–	-1.03[4]	-.94
Mother tongue						
French	1.02[3]	.46	-6.09	-5.14	.34	-6.73
Neither English or French	-.97[2]	-.57[3]	-2.79[3]	-1.60[4]	.55[4]	.28
Retired[5]	–	.22	-.99	–	.15	-.035
Unemployed[6]	-.55[4]	-.91[4]	-6.13	-4.62	-1.47[3]	-7.81
Years of education	.11[2]	.023	-.098	.035	.024	.0063
Self-employed	.25	.25	.55	-.30	.64	-.0053
Transitory income	.078[3]	.074[3]	.043	.20[4]	.12[2]	.080
Permanent income	.080[3]	.20[1]	.32	.19[4]	.14[2]	.43[4]
Constant	-2.39	-2.07[2]	-24.77[3]	-27.81[4]	-.66[4]	-1.81
Pseudo[7] R^2	.158	.209	.478	.309	.191	.255
Usual[7] R^2	.115	.155	.402	.215	.149	.178
OLS[7] R^2	.102	.152	.348	.218	.129	.159
Number of observations	711	435	57	56	304	139
			Females			
Age						
(Age - 45)	-.038	.0079	.45[4]	-1.04	.019[4]	.11
(Age 45) - squared	-.0047	-.00077	-.0057[4]	-.032	-.0011[4]	-.0023[4]
Period of immigration						
1961-65	-1.10[4]	1.15[3]	6.01	-1.46	-.48	-1.54[3]
1966-68	-.026	-.18	-5.87	6.65	-.76[4]	-1.11[4]
1969-71	.30	-.022		-7.62	-1.55[3]	-2.00[4]
Mother tongue						
French	-.51	-.046	6.55	.035	.20	-.46
Neither English or French	-1.03[2]	-.20	-.11	.087	-.27[4]	-.55[3]
Unemployed[6]	.11	1.99[4]	-6.10	-.49	-.37	5.58
Years of education	-.0016	-.019	.10[4]	.14[4]	.076[4]	.034[4]
Self-employed	-5.09	1.03[4]	5.67	8.82	.39	6.43
Transitory income	.18[2]	.13[2]	.35[3]	.15[4]	.16[2]	.11[4]
Permanent income	.25[2]	.18[2]	.28[4]	-.049	.12[3]	.32[2]
Constant	-1.33	-.81[4]	-9.71[4]	-8.17	.085	-1.33
Pseudo[7] R^2	.171	.127	.332	.236	.132	.180
Usual[7] R^2	.109	.099	.232	.174	.091	.130
OLS[7] R^2	.114	.093	.216	.165	.086	.123
Number of observations	489	397	101	110	671	619

[1] Excludes those attending school full-time.

[2] Significant at 1% level.

[3] Significant at 5% level.

[4] $|t| \geq 1$.

[5] 55 or over, not in labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] For definitions, see Footnotes 7-9 of Table 5.5.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

TABLE 5.9. Estimates of a Logit Model of the Separate-dwelling Decision for Non-married,[1] by Age and Sex, Montréal CMA, 1971

Variables	Single			Widowed, separated or divorced		
	21-29	30-64	65+	21-29	30-64	65+
			Males			
Age						
(Age 45)	-.65	.043[2]	-.058		.066[2]	.49[3]
(Age 45) - squared	-.020[3]	-.00078	-.00076		.00064	-.0085[3]
Period of immigration						
1961-65	1.49[4]	.18	-6.47		.72	-6.78
1966-68	1.53[2]	.54	-.37		6.70	-6.18
1969-71	1.01[4]	.89[3]	-		5.88	-.70
Mother tongue						
French	-.36[3]	.021	.60		-.47[3]	-.90[3]
Neither English or French	-.99[2]	.36[3]	.079		-.73[3]	-.038
Retired[5]	-	.61[3]	.82[3]		-.81[3]	.35
Unemployed[6]	-.63[3]	.56[3]	-7.46		-.64[3]	-.84
Years of education	.048[3]	-.025	-.036		-.089[3]	.14[4]
Self-employed	1.08[4]	.29	7.01		1.38[4]	1.32[3]
Transitory income	.079[2]	.053[4]	.34[4]		.086[4]	.081[3]
Permanent income	.052[3]	.15[2]	.055		.25[2]	.22
Constant	-6.42	-1.08[2]	.79		.16	-7.92[3]
Pseudo[7] R^2	.140	.094	.323		.214	.277
Usual[7] R^2	.112	.068	.230		.163	.198
OLS[7] R^2	.101	.069	.180		.143	.190
Number of observations	750	562	67		352	157
			Females			
Age						
(Age 45)	-1.36[3]	.024[4]	.046	3.48[3]	.011	-.0053
(Age 45) squared	-.039[4]	-.00017	-.0018	.083[3]	-.0021[4]	-.00068
Period of immigration						
1961-65	.41	-.095	-6.61	6.64	-.92[3]	-1.73[4]
1966-68	.31	.518		-7.00	-.96[3]	-2.65[2]
1969-71	-.47	-1.04		8.53	-1.81[4]	-8.43
Mother tongue						
French	-.40[3]	-.43[4]	-1.03[2]	-.57	-.44[3]	-.072
Neither English or French	-.98[4]	-.42[3]	-.65	6.96	-.50[3]	-.081
Unemployed[6]	-1.07[3]	.40	7.67	-.68	-.18	-8.54
Years of education	.094[4]	-.025	.029	.012	-.021	.00030
Self-employed	-4.54	.26	5.92	-	1.04[3]	1.89[3]
Transitory income	.045[3]	.16[2]	.17[3]	.27[3]	.15[2]	.059
Permanent income	.016	.09[2]	.26[3]	.071	.18[2]	.50[2]
Constant	-12.84[3]	-.55[3]	-.26	36.62[3]	1.29[2]	.41
Pseudo[7] R^2	.160	.128	.230	.340	.109	.228
Usual[7] R^2	.115	.097	.166	.240	.079	.172
OLS[7] R^2	.110	.093	.166	.228	.063	.156
Number of observations	579	655	179	79	754	366

[1] Excludes those attending school full-time.

[2] Significant at 1% level.

[3] $|t| \geq 1$.

[4] Significant at 5% level.

[5] 55 or over, not in labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] For definitions, see Footnotes 7-9 of Table 5.5.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

results for singles here corroborate the results of the simple model shown in Tables 5.2 and 5.3. That is, after standardizing for a wide range of characteristics it is still true that young females have a higher headship rate than young males and are more affected by income. For the widowed, separated and divorced who are middle-aged - but not for those of this status who are old - females are much more likely to be heads than males. For these females, headship is also much less affected by income than that of males, perhaps because when their marriage ends in middle-age, females (more often than males) are left with assets which are not proxied by the two income variables used in the model.

TABLE 5.10. The Probability of a Separate Dwelling by Sex, Age and Marital Status for Non-married Individuals at Selected Permanent Income Levels,[1] Toronto and Montréal CMAs, 1971

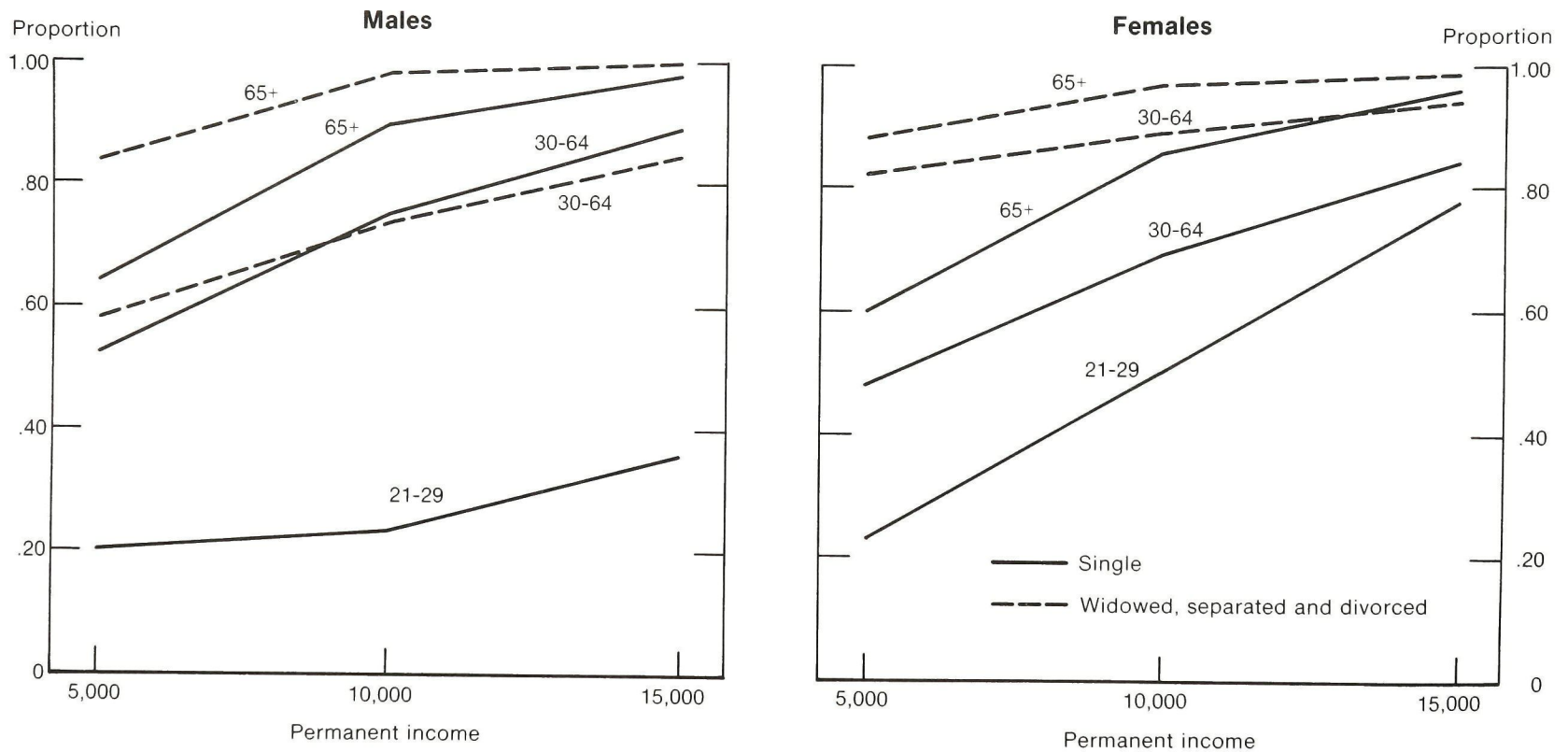
Permanent income and area	Single			Widowed, separated or divorced	
	21-29	30-64	65+	30-64	65+
			Males		
$5,000					
Toronto CMA	.20	.52	.64	.58	.84
Montréal CMA	.35	.38	.23	.65	.84
$10,000					
Toronto CMA	.27	.75	.90	.74	.98
Montréal CMA	.41	.57	.28	.86	.94
$15,000					
Toronto CMA	.36	.89	.98	.85	1.00
Montréal CMA	.48	.74	.34	.96	.98
			Females		
$5,000					
Toronto CMA	.23	.48	.60	.82	.88
Montréal CMA	.45	.54	.79	.88	.91
$10,000					
Toronto CMA	.50	.69	.86	.89	.97
Montréal CMA	.47	.75	.93	.95	.99
$15,000					
Toronto CMA	.78	.84	.96	.94	.99
Montréal CMA	.49	.88	.98	.98	1.00

[1] Characteristics other than permanent income are given by the following list: age 25 (for group 21-29), 47 (for group 30-64) and 70 (for group 65 and over); native-born; English mother tongue; not retired; not unemployed; not self-employed; 10 years of education; zero unexpected transitory income. Probabilities are calculated using coefficients in Tables 5.8 and 5.9.

Source: 1971 Census of Canada, Public Use Sample Individual Tapes.

Chart — 5.2

The Proportion of Typical[1] Non-married Individuals Controlling a Separate Dwelling by Sex and Marital Status and Permanent Income, Toronto CMA



(1) For definition see footnote 1, table 5.10.

Source: Table 5.10.

FOOTNOTES

[1]We do not, however, explicitly model the marriage decision or other marital-status decision.

[2]It has been pointed out to the author, however, that even in 1978, in Guelph, Ontario, there is sufficient social disapproval of a single woman's leaving her parents' home for an apartment in Guelph to mean that a single woman wishing a separate dwelling is likely to move to the neighbouring city of Kitchener. In this case mobility occurs <u>because</u> of a housing decision.

[3]At a probability level of .8 it would increase headship by about three to four percentage points.

[4]More precisely assuming that the true model is $\log \frac{P}{1-P} = \beta_0 + \beta_1 P_H + \beta_2 Y$ where P is the probability of headship, P_H is the price of housing and Y is income. The income at which the probability equals .81 is given by $(\log \frac{.81}{.19} - \beta_0 = \beta_1 P_H)/\beta_2$ and under the assumption that $\beta_1 < 0$ and β_0, β_1, and β_2 are constant this expression is smaller the smaller is P_H. As can be seen from Table 5.1, Column 2, the estimated β_2 is indeed roughly constant among different areas, so that if β_0 and β_1 are also roughly constant the differences in computed income depend largely on the difference in P_H. These differences will be greater the greater is β_1, i.e. the greater the partial derivative of the computed income with respect to P_H is minus β_1/β_2.

[5]Qualitatively similar results, however, to those in Table 5.1 were obtained when the sample was men 20 and over.

[6]The rural non-farm rate is based on a sample size of only 192.

[7]The "typical" or benchmark individual is precisely specified in Footnote 1 to Table 5.7. Notice that probabilities are computed for an individual with these characteristics except for replacement by a different value in the case of the variable of interest.

[8]In Table 5.7 the benchmark probability .74 is that for native-born persons with English mother tongue.

CHAPTER 6

THE HOME-OWNERSHIP DECISION

To a neoclassical economist, a discussion of the home-ownership decision has no place in a study of housing consumption. Whether a household chooses to own a house and sell itself housing services or chooses to purchase housing services from others is irrelevant to the consumption decision. Home ownership is purely a portfolio-allocation decision.

As we have seen in Chapter 2, there are a number of reasons to dispute this view. In the first place, it is cheaper for an owner-occupant to supply certain kinds of housing services than for a landlord to do so. This is strikingly clear in the case of high-quality, single-detached houses. The management costs for an owner who is not an occupant are high because of the absence of the kind of economies of scale obtainable in large multi-family buildings. This phenomenon in turn suggests another reason why the home ownership decision is in part a consumption decision. A household may find that desirable housing is unavailable except by owner-occupancy. If the rental market in high-quality, single-detached houses is very thin, for instance, landlords may abandon this market completely, so that the few households who would find it advantageous to rent such accommodation are forced to buy.

Home ownership also is not just a portfolio-allocation decision because of the way credit markets operate. For the majority of households, home ownership is a necessary condition for generating a very large part of the portfolio to be allocated. Lending institutions do not commonly lend large sums to households except on the security of residential property. Furthermore, when they do lend on residential property, they require regular amortization payments over the life of the loan. In sum, home ownership is the only way most households may acquire large debts and at the same time it forces them to save.

Home ownership protects the household from the most important component of rising rents, rising capital costs. On these grounds we would usually expect those who have been homeowners for at least two or three years to be better off than renters of the same measured income.[1] At the same time, because of the very

See footnote(s) on page 166.

substantial transaction costs of changing housing, it is very likely that many young households who own are worse off both in terms of current consumption and net worth than renting households of the same age. It is young households who are most likely to change jobs and migrate, thus incurring the brokerage charges, legal fees and other costs of buying and selling housing. Only when house prices are rising at an historically atypical rate will gross capital gains offset the transaction costs of frequent moves.[2]

It is clear that the home-ownership decision of households has a major affect on their welfare. In this chapter we examine the factors influencing that decision. First, we focus our attention on only two fundamental variables, household income and age of the household head, and compare their relation to home ownership in different provinces and in areas of different levels of urbanization. Next, we turn our attention to two CMAs, Toronto and Montréal, and, using much richer models, discuss the tenure decision in greater depth. We concentrate much of our attention on the issue of the relative importance of transitory income, permanent income and opportunity net worth. In order to discuss this and other issues we apply our models to various subsamples of all households: purchasers, sellers, households in four age groups, French-Canadians and immigrants. Technically, the use of subsamples enables us to allow for interactions in a quite comprehensive fashion.

Throughout this chapter we use the logit model of binary choice. Among other things, this model assumes that the change in probability arising from a change in the value of an independent variable is very low both at very low-probability levels and at very high-probability levels. This assumption arises quite naturally out of the fact that the minimum and maximum probabilities must be zero and one. Thus, where income is an important determinant of ownership probability, this model assumes that at very high incomes an increase in income will have much less effect on probability than a similar increase at a middle-income level.[3]

See footnote(s) on page 166.

6.1. Urbanization and Home Ownership

Most studies of home ownership focus their attention on metropolitan areas. Just how misleading this practice may be is shown in this section. Indeed, it is fair to say that home ownership is the housing characteristic most obviously setting apart rural from urban areas. The incidence of home ownership increases very markedly as the degree of urbanization declines.

Much more dramatic than this are the contrasts in the responsiveness of home ownership to income. As Table 6.1 shows, it can be said that in rural non-farm areas income does not affect home ownership at all; the highest elasticity of the probability of ownership is .11 (in British Columbia) and only in British Columbia and Ontario are income coefficients significant even at the 5% level.[4] In small urban areas, on the other hand, ownership is quite responsive to income and in large urban areas it is more responsive still. This is in large part the outcome of two related phenomenon. In less urbanized areas the price of a given quality of housing is lower because of the lower price of land. It is also true that low-quality housing is available because of less stringent building by-laws. As a result, at any given income the probability of ownership is higher in these areas than elsewhere; this necessarily implies that for a given income coefficient the percentage increase in probability resulting from a given percentage increase in income is lower for these areas.[5] As the second column of Table 6.1 shows, however, the greater responsiveness of more urbanized areas is not just an artifact of the definition of elasticity. In New Brunswick, for instance, a $1,000 increase in household income increases the incidence of home ownership imperceptibly in rural non-farm areas, but by about 2.3 percentage points in small urban areas and three percentage points in large urban areas. The effect of increasing urbanization is much more dramatic than this in the Prairie Provinces. The message here is that in rural non-farm areas income is no barrier to home ownership and so an increase in income increases home ownership very little. To a lesser extent the same is true in small urban areas.

This point is brought out strongly by the computation of the income at which the probability of ownership is .61 (the ownership proportion for all Canada). In rural non-farm areas this income level is zero, and in small urban areas it is well below the poverty line as given in 1971 Census of Canada, Bul. SF-3 (p. 14), except

See footnote(s) on page 166.

TABLE 6.1. Income Elasticity of Probability of Ownership: Logit Specification by Area, 1971

Area	Elasticity[1]		Coefficient (times 25) of income ($'000)[2]	Income at which probability of ownership is .61[3]	Proportion owners
				$	
Toronto CMA	.40	(.10)	2.16	14,000	.55
Montréal CMA	.56	(.11)	2.26	21,600	.35
Urban 30,000 or more					
Newfoundland	.27	(.06)	1.84	9,700	.61
Nova Scotia	.45	(.11)	2.39	14,100	.51
New Brunswick	.51	(.11)	2.98	11,700	.52
Quebec	.56	(.11)	2.31	20,900	.36
Ontario	.38	(.10)	2.20	12,400	.57
Manitoba	.43	(.12)	2.92	9,500	.59
Saskatchewan	.47	(.14)	3.64	8,100	.60
Alberta	.49	(.14)	2.93	11,400	.56
British Columbia	.42	(.12)	2.67	10,700	.57
Canada	.45	(.11)	2.39	14,300	.51
Urban under 30,000					
Newfoundland	-.09	(.01)	-1.02	-	.77
Nova Scotia	.18	(.04)	2.01	900	.72
New Brunswick	.23	(.05)	2.30	3,500	.69
Quebec	.30	(.06)	2.12	8,700	.60
Ontario	.19	(.05)	1.77	3,100	.70
Manitoba	.13	(.02)	1.00	5,800	.64
Saskatchewan	.17	(.03)	1.59	2,400	.68
Alberta	.17	(.03)	1.42	3,200	.68
British Columbia	.23	(.06)	1.97	4,600	.68
Canada	.20	(.04)	1.73	4,500	.67
Rural non-farm					
Newfoundland	-.01	(.00)	-.03	-	.93
Nova Scotia	.04	(.01)	0.92	-	.87
New Brunswick	.00	(.00)	0.07	-	.87
Quebec	.04	(.00)	0.44	-	.76
Ontario	.09	(.02)	1.21	-	.79
Manitoba	-.11	(.02)	-1.15	-	.77
Saskatchewan	-.04	(.00)	-0.48	-	.77
Alberta	-.01	(.00)	-0.09	-	.71
British Columbia	.11	(.07)	1.20	-	.75
Canada	.04	(.00)	.46	-	.79

[1]The elasticity for each area is calculated at the Canada average household income $9,391. The number in brackets following the elasticity is the pseudo R^2 defined in Table 5.1.

[2]All income coefficients for the CMA's and urban areas are significant at the 1% level except for Newfoundland and Manitoba small urban areas, where they are significant at the 5% level. For rural areas, only Ontario, Manitoba, British Columbia and Canada have income coefficients significant at the 5% level.
This income coefficient times 25 shows, in terms of percentage points, the first derivative of the probability of ownership with respect to income (in thousands of dollars) at the probability level of .5.

[3].61 is the proportion owners for all Canada. Dashes in this column indicate a probability of ownership of .61 or higher at zero income.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

in Quebec, while in large urban areas it is well above the mean income level. We can see that if there are substantial economic advantages to home ownership, these benefits are enjoyed at low-income levels only in less urbanized areas.

6.2. Ownership in Quebec

A striking feature of our findings which deserves comment is the very low proportion of owners in Quebec combined with a rather high responsiveness there of ownership to income. We have suggested that the general explanation for the lower proportion of owners in more urbanized places lies in the higher pure price of housing and the lesser availability of low-quality owner housing in those places. However, this clearly does not explain the Quebec phenomenon since Quebec prices are lower than those in any other province (Table 4.2). The most plausible explanation is simply that the largely francophone population of Quebec has a lower preference for ownership. There is some difficulty, however, in determining how much Quebec's current low ownership rate is merely the result of the preferences of the past as these are now ossified in the existing housing stock. In particular, low home ownership in Quebec has been closely associated for many decades with the characteristic type of housing there, the duplex or triplex. Once a very large proportion of the stock consists of this type, there are institutional obstacles to any great change in ownership proportion. Consider for instance a stock consisting only of duplexes and triplexes. If each such structure could be occupied by only one owning household, the maximum ownership rate would be pushed below 50%. The institutional obstacle to high ownership rates is the expense of converting a two or three-unit building to condominium tenure.

The rather high responsiveness of ownership to income in Quebec is the opposite to what one would expect if one took the pattern of Black housing ownership in the United States as a model (Struyk, 1976) for the Quebec case. For United States Blacks who, like Quebecers, have a low incidence of home ownership, the unavailability of good-quality ownership housing probably explains the low response of ownership to income. Some fragmentary evidence in Chapter 4 suggests that in Quebec the situation is close to the reverse; there is plentiful family housing of an adequate quality available for rent so that at low and middle-incomes there is not a strong incentive for families to own; at the same time, high-quality housing is not readily available <u>except</u> by owner-occupancy. Probably as a result ownership is highly responsive to changes in income.

6.3. Age and Ownership

In this section the focus is on age, the second crucial variable affecting home ownership. As we see in Table 6.2, the incidence of ownership increases very markedly with the age of the household head. In rural areas this persists to the very oldest age groups while in more urban areas ownership reaches a peak in the peak-earnings age group and then declines. The percentage point increase in ownership induced by a given increase in income follows roughly the same age pattern (Table 6.2 and Chart 6.1). In large urban areas, although a $1,000 increase in income increases the probability of ownership of a household by just about 2.1% when the head is 25-29, the increase is about 3.3% for a head 35-44 and then just about 1.3% for a head 65 or over. This is partly explicable in terms of the facts of mobility and the lifetime income pattern. Young households are likely to move. Under these circumstances it is frequently not advantageous to own because of the heavy transaction cost of ownership and, as a result, households may not respond to an income increase by purchasing.

It is interesting to note that, in small urban areas and in rural non-farm areas, the response to a $1,000 increase in income is greater for one of the two youngest age groups than it is for <u>any</u> other age group. This is in marked contrast to the situation for large urban areas. This may arise because rural households do not believe that they are likely to move. Economic reasons are more plausible. In rural areas prices are so much lower that any given increase in income is much more likely to bring a young household to the threshold level where ownership is affordable. That is, in rural areas as elsewhere young households are poorer than older households, but because of lower prices their income is high enough to bring many to the threshold of ownership. The push towards ownership will be reinforced if rental accommodation is not freely available. It is also possible that, in rural areas, young households are more ready to devote a substantial portion of their income to the forced saving involved in house purchase because of the limited opportunity for many of the consumption activities found in the city. Expensive restaurants and opera performances are not found down on the farm.

This suggests that in large urban areas the substantial income responsiveness of ownership in the case of the middle-aged is to a large extent a reflection of the delay resulting from the higher prices. In cities, many households must wait

TABLE 6.2. Income Elasticity of Probability of Ownership by Age of Head: Logit Specification by Area, 1971

Area	Age of Head						
	15-24	25-29	30-34	35-44	45-54	55-64	65+
				Elasticity[1]			
Toronto CMA	1.15 (.08)	.65 (.06)	.51 (.11)	.40 (.11)	.24 (.07)	.24 (.08)	.25 (.07)
Montréal CMA	.59 (.01)	.58 (.03)	.70 (.09)	.59 (.12)	.59 (.15)	.33 (.07)	.25 (.04)
Canada							
Urban 30,000 or more	.81 (.04)	.62 (.05)	.56 (.09)	.52 (.14)	.41 (.13)	.26 (.07)	.20 (.04)
Urban under 30,000	.38 (.01)	.50 (.05)	.34 (.05)	.22 (.06)	.18 (.06)	.13 (.04)	.13 (.03)
Rural non-farm	.10 (.00)	.18 (.01)	.06 (.00)	.06 (.01)	.04 (.01)	.01 (.00)	.06 (.01)
Rural farm	.02 (.00)	-.00 (.00)	-.02 (.01)	-.01 (.00)	-.01 (.00)	.00 (.00)	-.01 (.01)
				Coefficient (times 25) of income ($000)[2]			
Toronto CMA	3.25	2.23	2.43	2.75	1.88	1.65	1.78
Montréal CMA	1.63	1.83	2.75	2.75	2.75	1.53	1.10
Canada							
Urban 30,000 or more	2.35	2.13	2.75	3.25	2.75	1.68	1.30
Urban under 30,000	1.25	2.30	2.15	2.20	2.25	1.80	1.90
Rural non-farm	4.50	1.25	0.55	0.85	0.68	0.15	1.73
Rural farm	0.19	-0.01	-0.48	-0.17	-0.28	0.13	-0.65
				Income at which probability of ownership is .61[3]			
Toronto CMA	32,400	28,600	16,500	9,800	7,100	9,400	8,800
Montréal CMA	63,900	39,600	22,100	16,900	16,900	22,400	30,500
Canada							
Urban 30,000 or more	39,200	28,800	16,000	10,400	10,100	10,800	11,600
Urban under 30,000	45,900	18,000	10,600	3,100	100	–	–
Rural non-farm	46,600	–	–	–	–	–	–
Rural farm	–	–	–	–	–	–	–
				Proportion owners			
Toronto CMA	.07	.25	.49	.66	.71	.65	.59
Montréal CMA	.04	.15	.30	.44	.46	.43	.37
Canada							
Urban 30,000 or more	.08	.24	.46	.61	.64	.61	.55
Urban under 30,000	.18	.40	.58	.74	.79	.79	.76
Rural non-farm	.43	.59	.70	.81	.85	.87	.87
Rural farm	.66	.81	.89	.93	.95	.96	.96

[1] The elasticity for each area and age is calculated at the Canada average household income, $9,391. The number in brackets following the elasticity is the pseudo R^2 given in Table 5.1.

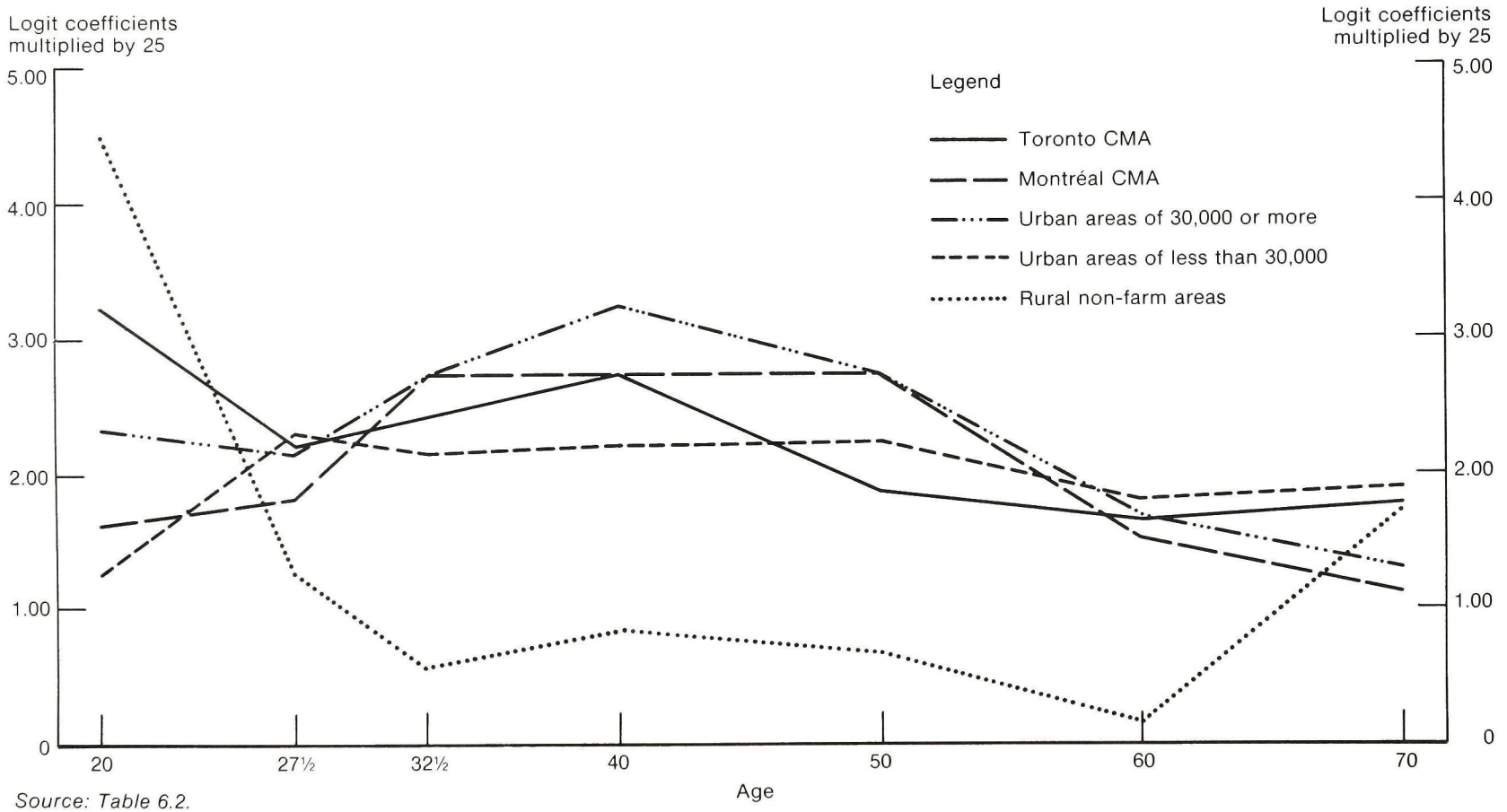
[2] The income coefficient times 25 shows, in terms of percentage points, the first derivative of the probability of ownership with respect to income at the probability level .5. Income coefficients are significant at the 1% level with the following exceptions: those for the 15-24 age group, except Toronto and Canada 30,000 or more; those for farm areas; those for rural non-farm areas except for 25-29, 35-44 and 65 and over.

[3] .61 is the proportion owners for all Canada. Dashes instead of a value for income indicate that the probability of ownership is .61 or higher at zero income.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

Chart — 6.1

The Effect of Income on the Probability of Ownership by Age of Household Head and Area



Source: Table 6.2.

until they are high up on their lifetime-income curve to reach the point where an extra $1,000 of income pushes them over the threshold into ownership. An additional factor encouraging the middle-aged is perhaps increased awareness of the desirability of the forced saving involved in ownership as the retirement age gets closer.

It is of some interest to notice that, in all areas, this simple income model is much more successful in predicting variations from the mean probabilities in the case of peak-age households than in the case of other households. This is shown by the values of the "pseudo R^2" which roughly tells how well the model does in predicting whether or not households own, compared with a prediction assuming that all households have the same probability of owning.[6] It seems probable that income is a relatively "successful" variable for middle-aged households because their income is relatively secure and is regarded as appropriate as a basis for the long-term commitment of home purchase. We note that the income used in this simple model is actual 1970 household income, rather than any measure of permament income. However, even a permanent income measure such as that used by Carliner (1974) - a weighted average of the last four years' income - would not adequately capture the effect on young households of concern about fluctuations in their income. A high probability of unemployment or departure from the labour force to return to school would make home ownership unappealing for even a high-income household if it did not have enough accumulated net worth to allow it to ride out such a period. Young households are likely to have both a high probability of unemployment and a low net worth: so risk-averting young households, even with a high income, are apt to avoid ownership. If they do not themselves avoid ownership they are likely to find that lenders are reluctant to lend to them.

A difficulty with this explanation of our results is the finding that extremely yound households - those with heads aged 24 or less - in Toronto and large urban areas exhibit a greater responsiveness of ownership to income than does the next older age group. This curiosity does not appear just to be the result of some anomalies in the samples. Li's results using the logit model on 1970 Census data for Boston and Baltimore (1977, Table IV.C) show a very similar pattern for these age groups. Because this very young age group includes a few heads with some or complete university education, it may be inferred that a relatively high proportion

See footnote(s) on page 166.

have been working for some years. We speculate that these heads might regard their current income as more secure than slightly older heads with fewer years in a job.[7]

We have just referred to findings for some U.S. cities. It is of interest that though the general pattern of our findings is similar to that found in U.S. studies (Carliner, 1974; Struyk, 1976) there are some interesting differences. In Canada, there is a substantially lower level of home ownership in comparable-sized cities than in the U.S. Also, in Canada the rural-urban differential is greater. One may speculate that these differences are connected with different price patterns in the two countries.

The pattern of responsiveness of ownership to income with age for Canada is however rather similar to the pattern found by Struyk, in his study of St. Louis (1976). At an income level of $8,000 (in 1969), he found the elasticity of the probability of ownership falling from 1.19 for husband-wife families under 30 to .141 for such families with heads over 65. These results were obtained using OLS estimation of the linear probability model and are very similar to our results (not shown in Table 6.2) using the same procedures. As Table 6.2 shows, however, the logit model yields a substantially less steep decline in income elasticity with increasing age.

6.4. Income and Wealth Components, Household Composition and Ownership

The application of the very simple model of the ownership decision has allowed some useful broad-brush comparisons. The discussion of other issues requires a richer model. In this section, we apply such a model to two different market areas, the Toronto and Montréal CMAs. These two areas are marked by very different ownership proportions, as Table 6.1 shows. Thus, where findings are similar for the two cities we can have confidence that they are not peculiar to these two cities.

The variables in the richer model fall under roughly three heads: income components and characteristics of the household head closely associated with the lifetime-income pattern; household composition variables; and education. Household composition variables are important because of the presumption that preferences for owner-occupancy vary over the life cycle. Education, we presume, affects preferences

See footnote(s) on page 166.

at all stages of the life cycle. Of course, it can be argued that these "taste" variables are perhaps also budget constraint variables. Education, for instance, affects labour force behaviour. The results of our estimation will not allow resolution of the issue of the role that education plays in the ownership decision but it will provide some important evidence.

6.4.1. Household Composition and Home Ownership

In the previous chapter we did not distinguish stages of the life cycle except in a very rudimentary fashion. Now that we are dealing with households rather than individuals it is worthwhile extending the treatment. We do this by capturing the main strands of the life cycle model while treating age as a continuous variable. That is, we separate married and non-married households assuming the effect of age is different for each type of household.

The results show that young married households are much more likely to own than young unmarried households. It is also true that an increase in age has much more effect for young married households: as a Toronto head goes from 25 to 26 his probability of owning increases by 2.2 percentage points if he is married, but .8 percentage points if he is unmarried.[8] A somewhat more subtle point is the very different shapes of the age-ownership patterns at later ages. The ownership probability for married households declines after 62 in Toronto and 64 in Montréal.[9] This suggests that most of the reduction in unadjusted ownership probabilities after the peak reached in the 45-54 age class (Table 6.2) comes about as an adjustment to the departure of children from the family home. The age parameter estimates for not-married households imply a downturn only after 78 (Toronto) and 88 (Montréal) reinforcing the view that the early downturn for marrieds is not a pure age effect.[10] This downturn does not generally show up in U.S. studies (Carliner, 1974; Kain and Quigley, 1975; Morgan, 1965) although Li does find a downturn for high-income families (1977). In the U.S., powerful reasons for not adjusting by selling exist because of the deductability of municipal property taxes and because of the capital gains tax on residences, where the seller does not buy another owner-occupied dwelling within a short period. The very high t-statistics for the quadratic term in age and the similarity of the results for the two cities provide powerful support for this view of the effects of the capital gains tax in the United States.

See footnote(s) on page 166.

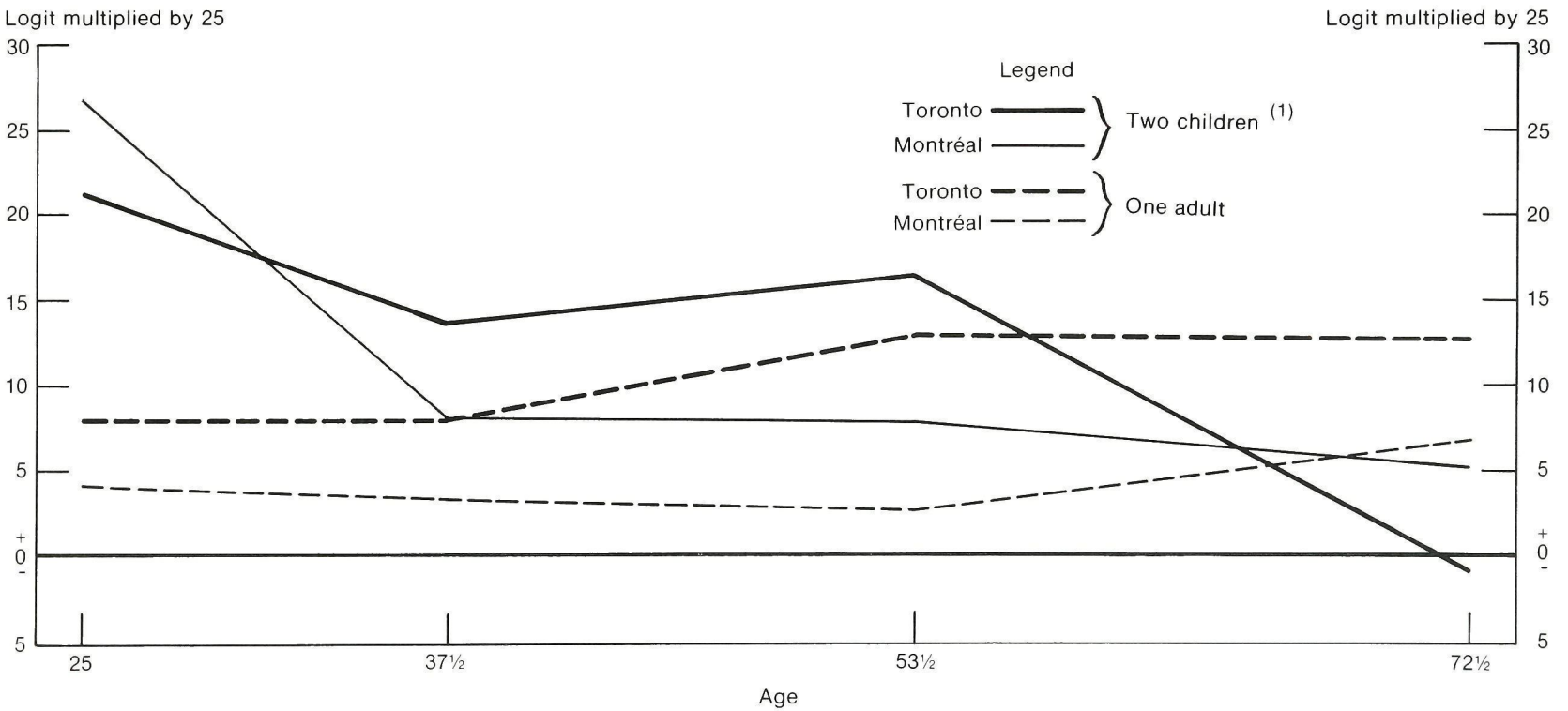
As part of the modelling of the life cycle, we also distinguish married households with young children from other married households. For both Montréal and Toronto we find that the presence of children under six adds very little to the probability of ownership. This is not surprising. It would be odd for a household to own just on the basis of this fact since children do not remain of preschool age long enough to justify such a long-term commitment as ownership. The longer-term variable — number of children (less than 18 years of age) in the household — has, in contrast, a very great effect on the probability of ownership. In Toronto, the addition of one child adds about 7.6 percentage points to the probability of ownership. In Montréal it adds about 4.7 percentage points.[11] In each case the t-statistic is very high (11.0 in Toronto). The more children in a family the more the need for the kind of spacious accommodation not readily available except with owner-occupancy. Rental family housing is in fact much more readily available in Montréal than in Toronto and so it is not surprising that the number of children has less effect there.

The number of adults in the household also has a great effect on ownership. Indeed, together the two size variables are, with age and income, the dominant variables explaining ownership both in terms of their quantitative importance (as measured by, say, the beta coefficient) and the size of their t-statistics. The number of adults, however, is substantially less crucial than the number of children. Its t-statistic is much lower and its quantitative importance as measured by the approximate effect of a one standard deviation (Table 6.3) change in this variable is also less, especially in Toronto. Certainly the need for larger adult households to live in single-detached or other close-to-the-ground housing is not obvious, the way it is for larger households with children. Having more adults does, however, increase the need for more space. Furthermore, an increase in the number of adults brings economies of scale in the management and maintenance chores required by owner occupancy. Mowing the lawn and organizing the work of painters and repairmen may be shared. In Montréal a very substantial portion of owner-occupied dwellings are duplexes or triplexes and we notice that the effect in Montréal of an additional adult is only about a 3.3 percentage point increase in probability as compared with about 10.1 percentage points in Toronto. This points to the likelihood that at present in Toronto, with the large increase in condominium ownership since 1971, the number of adults has much less effect on ownership than is shown here.

See footnote(s) on page 166.

Chart — 6.2

The Effect of Two Children and One Adult on Ownership, Montréal and Toronto CMAs



(1) Logit multiplied by 25 for two children, at least one child under six years if head in two youngest age groups and no children under six years for older heads.

Source: Table 6.8.

TABLE 6.3. Means and Standard Deviations for Household Variables, Toronto and Montréal CMAs, 1971

Variables	Toronto CMA		Montréal CMA	
	Mean or proportion[1]	Standard deviation	Mean or proportion[1]	Standard deviation
Owner	.550	.497	.353	.478
Female head				
Single	.053	.225	.069	.253
Not single	.125	.330	.119	.323
Male head				
Non-married	.087	.282	.108	.310
Age, non-married head	50.079	19.070	47.642	17.903
Age, married head	43.705	13.931	43.546	13.961
Married head, children under 6 years present	.224	.417	.219	.414
Number of children	1.073	1.363	1.106	1.427
Number of adults	2.240	.969	2.196	.924
Retired male head[2]	.045	.207	.049	.215
Unemployed head[3]	.028	.165	.037	.189
Years of education, head	10.629	3.683	9.702	3.834
More than one earner	.547	.498	.428	.495
Self-employed head	.079	.269	.076	.265
Measured income ($)	11,789	8,799	9,788	7,547
Unexpected transitory income ($)	- 365	7,545	315	6,479
Expected transitory income ($)	-2,322	6,678	-2,893	5,729
Permanent income ($)	14,111	9,187	12,680	7,943
Opportunity net worth ($)	19,286	17,977	14,916	14,285

[1]Where the number given is less than one it refers to the proportion of households having the characteristic.

[2]Male 55 or over, not in labour force and last worked before 1970.

[3]Currently unemployed but worked during 1970-71.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

6.4.2. Income, Wealth and Home Ownership

Almost all the remaining variables in our model are associated with the income and wealth of the household. In the first specification is measured income. In the next are permanent income, estimated as 5% of the discounted expected stream of future income; expected transitory income, estimated as the expected 1970 income minus permanent income; and unexpected transitory income, estimated as measured 1970 income minus expected 1970 income. Also included in the next specification is the opportunity net worth, the backward-looking analogue to permanent income. Details of the definition and estimation of these variables are given in Chapters 2 and 3. In Table 6.3 it can be seen that the mean permanent income for Toronto is $14,111, as against mean measured income of $11,789, with Montréal values somewhat lower. Mean opportunity net worth is $19,286 for Toronto and $14,916 for Montréal. This is put in context by noting that the average age of married household heads is 44 in both places.

It is important to note that permanent income here is based on characteristics of the household head. The household head's estimated permanent income is scaled so that the ratio of mean household to head income is the same for permanent income as for measured income. This means that variation in the size of the income of second earners is reflected in variation in the size of unexpected transitory income.

In Table 6.4 are the results. The estimated effect of measured income (specification one) is remarkably similar in Toronto and Montréal: a $5,000 increase in 1970 income adds well under seven and eight percentage points to the probability of owning in Toronto and Montréal, respectively. This is a much lower responsiveness than found in U.S. studies (Li, 1977, Table I). Also, comparing these results with Table 6.1, we can see that allowing for the influence of other variables reduces the estimated effect of income very substantially.

The results of the second specification are quite remarkable. Opportunity net worth is not statistically significant in either CMA. The low t-statistics are perhaps not very surprising in view of the collinearity among these variables.[12] At the same time, on the criterion of the size of its effect, net worth is also of little importance: a one-standard deviation change in opportunity net worth

See footnote(s) on page 166.

increases the probability of ownership by only about .3 percentage points in Toronto and reduces it by about 2.5 percentage points in Montréal. This compares with 13.1 and 11.8 percentages points respectively as the effect of a one-standard deviation change in actual household income.

A priori net worth is usually regarded as being of great importance in the decision to own. Indeed, in the extreme neoclassical view, the decision to own is merely a decision about the allocation of net worth. Even those who acknowledge the importance of owner-occupancy in determining the nature of housing services consumed - because, for instance, high-quality, single-detached housing for rent is virtually unavailable - still stress the importance of net worth. Thus Bossons, in a sophisticated paper (1973) in this area, says:

> "That is, the probability of owning a house should be strongly increased by an increase in assets or wealth (i.e. net worth) within a given range... The effect of income other than from controlled assets (e.g. employment earnings) should be positive, but because of the transitory variability in such income should be less significant than that of controlled assets or wealth." (pp. 17-18) (words in brackets ours).

(Controlled assets here include the value of owner-occupied housing and exclude assets such as pension-plan savings.) Contrary to this hypothesis of Bossons, our finding is that employment earnings and other income represented by household income are far more important than opportunity net worth.

Bossons presents findings apparently supporting his hypothesis and strongly contradicting ours: he finds assets much more statistically significant than income for the ownership decision. In an alternative model, however, wealth (assets minus debts) is not much more significant than other income. Furthermore, Bossons does not give information to allow us to assess the quantitative importance of the effect of net worth compared with income. Such information is given in a study by Birnbaum and Weston (1974). Consider the increase in average net worth moving from the $5,000-$7,500 income class to the $10,000-$15,000 class and then consider the increase in average income between the same two classes. According to the coefficients of their ownership model this increase in net worth ($24,180) yields an increase of 3.9% in the probability of ownership while this increase in income ($5,983)

yields an increase of 6.0%.[13] Clearly Birnbaum and Weston's findings provide support for our finding that income is quantitatively more important than net worth. Furthermore, there is very good reason to believe that the huge difference we find in favour of income is more supportable than the small difference they find. The reason for this is endogeneity in their equation. Home equity is a very large fraction of net worth and yet home equity exists precisely because of the ownership decision. Only if mortgage lenders did not require down payments and amortization payments and did freely allow refinancing to 100% of value when house prices rose would this not be true.[14] A fortiori institutional facts of life explain Bossons' great success in the model with assets, for his assets include gross house value without netting out mortgage debt. Although lenders do not lend 100% of the value of the house and do require amortization payments it is still true that a house is probably the most leveraged asset in any household's portfolio. Thus home value will be an even greater portion of assets than home equity is of net worth, and "assets" comes close to just proxying home ownership.

In view of the manifestly negligible importance of net worth in the ownership decision, it is of great interest that permanent income, which depends largely on human wealth, is both statistically significant and quantitatively important. In Toronto, a one-standard deviation increase in permanent income increases the ownership probability by about 17 percentage points; in Montréal, by about 21 percentage points. This finding - that it is future prospects that matter, not accumulated net worth - is perhaps not surprising. Houses are available now, and were available in the 1960s, on a very highly leveraged basis. Down payments of 5% were sufficient for NHA first mortgages, and bank loans and credit-union loans, as well as second mortgages from fuel companies and builders, were sometimes used to create a virtually no-downpayment situation. To get the first mortgage on which all other financing hinged, however, it was necessary to convince the mortgage lender of one's current and future prospects (see references in Chapter 2).[15] Even without the strictures of the mortgage lender one would expect future prospects to play a large part in the ownership decision. If income is not expected to rise there is a danger that the mortgage payments may be onerous and yet high transaction costs make release from the mortgage commitment via resale an unattractive alternative.

See footnote(s) on page 166.

It is of some interest to notice that the effect of a dollar change in permanent income in Montréal is somewhat greater than it is for Toronto. One may speculate that this reflects the effects on Montréal households of the decline in house prices in Montréal in the three years prior to 1971. In Toronto, where prices had risen, a household - and mortgage lender - would not have expected much, if any, loss in the event that the household wished to release itself from the commitment of ownership. In Montréal, recent falling prices suggested that it was unlikely that inflation in house prices would rescue householders from their mistakes and so lenders would regard the future prospects of the household as especially important.

These findings for the effects of net worth and permanent income encourage further comment on the effect of age on ownership. It is sometimes contended that a major reason for the powerful effect of age on ownership is simply the correlation of age with net worth (Morgan, 1965, p. 293). Emphatically our results do not support such an hypothesis. Indeed, the effect of age for both married and unmarried and for Toronto and Montréal is quantitatively much greater - especially at young ages - when permanent income and opportunity net worth are included than when they are not. It is necessary to look elsewhere for an explanation of the powerful influence of age. There are two plausible, related explanations. One is that for any given opportunity net worth position, the older the household the more concerned it is to have home ownership to protect itself against rising housing costs after retirement. Generally, pension income is fixed in money terms and so this protection is much more important after retirement than before. An alternative explanation is that age, to a large extent, just represents the number of chances a household has had to purchase, and that once a household has purchased it is very unlikely to return to renting. A household has a "chance" to purchase, under this view, when credit conditions are especially slack so that little or no downpayment is required. It also has a "chance" when its own income rises unexpectedly, so that it has substantial transitory income. Following Friedman (1957) transitory income is saved, and saving includes the purchase of durable goods like housing.

We now consider the effect together of our two transitory income variables. Expected transitory income is statistically significant in both Toronto and Montréal. Unexpected transitory income is statistically very significant in both places and its quantitative importance is substantial although less than that of permanent income. Indeed, the importance of unexpected transitory income is rather

surprising in view of the long-term nature of the commitment to ownership. One reason for its importance (and the importance of the expected transitory income) is the fact that lenders' credit qualification rules use a debt-service-to-income ratio based on current income, not permanent income. Another reason is the existence, especially in Toronto, of unrealized capital gain. The greater the transitory income the less the incentive to realize this capital gain by selling. Finally, unexpected transitory income is important because of the funds it provides for a downpayment. This reason applies only to the subset of owners who are recent purchasers but about 19% of all owners in these CMAs had occupied their dwellings for under two years (1971 Census, Vol. II-4, Table 32).

An alternative interpretation of the effect of transitory income requires some further consideration of what our "transitory" income represents. Partly, it represents true transitory income. It also, however, reflects the extent to which an individual head is not like others of his same sex, age, occupation and education class. Ceteris paribus, those with high "transitory" income are the high achievers within their socio-economic class. On this interpretation, the coefficient simply says that high achievers are relatively likely to be homeowners.

The third specification facilitates comparison of results here with those of other studies. When permanent income is entered as the sole income variable it is seen that the coefficient of permanent income is somewhat lower than that of measured income. Kain and Quigley, using a very crude specification for permanent income, found a much larger drop in coefficient and a much more dramatic fall in goodness of fit (1975, p. 124, 141). More interesting are the results of Carliner (1974). His measured income coefficient, like those shown here, was rather close to his permanent income coefficient, although smaller (1.18 as compared with 1.37, in a linear probability model). Yet his permanent income variable is very different from that used here: he specified permanent income as a weighted average of the current and three preceding years' incomes.

6.4.3. The Effect of Household Characteristics Associated with Income Variability

In our model are four characteristics which indicate the extent of endemic income variability for the household. The first of these is "unemployed head". This refers only to the unemployment status of the household head in the week prior to the census and so it can have no direct influence on either the income of the

head - since income is 1970 income - nor on ownership, except for the very tiny proportion of the samples who might have sold or purchased in that week. Nonetheless this variable is significant at the 1% level and has a huge quantitative effect, indicating a reduction of something like 17 percentage points in the probability of owning in Toronto and 15 percentage points in Montréal. This strongly implies that current unemployment is highly correlated with endemic unemployment. Certainly we know that there are occupations such as those in the construction trades where the unemployment rate is very high. This source of income variability is certainly acknowledged in lenders' "qualification" requirements (see Chapter 2) where occupations with high income variability are counted as negative factors.

Another variable indicating substantial income variability is "more than one earner". Household income whose source is partly the income of someone other than the head is intrinsically less stable. In Toronto and Montréal this characteristic reduces the probability of ownership by about five percentage points. The third variable indicating income variability is "self-employed" but in this case the impact is positive and very strong, especially in Montréal. Presumably the income variability effect here is offset by the high-achievers effect. It is also possible that the self-employed wish to allocate assets to home ownership for protection in the event of bankruptcy or that income variability has a positive effect when it is associated with a high level of income.

Finally, households with retired heads typically have a very stable money income and these households are relatively likely to own.

6.4.4. Education and the Home-ownership Decision

Formal education is the one taste variable in the model which is not closely connected with the household life cycle. In view of comments earlier about the unavailability of certain types of desirable housing in the rental market there is some reason to expect education to have a positive effect on home ownership. In fact, in Toronto, its effect is distinctly negative: a four-year increase in years of education reduces the ownership probability by about six percentage points. Furthermore, the addition of permanent income to the model increases the negative effect (compare specifications one and two in Table 6.4).

TABLE 6.4. Estimates of Logit Models of the Ownership Decision, All Households, Toronto and Montréal CMAs, 1971

Variables	Models							
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Toronto CMA				Montréal CMA			
	(Logit coefficients multiplied by 25)[1]							
Female head								
Single	-46.43[2]	-44.40[2]	-44.51[2]	-43.83[2]	-44.99[2]	-40.85[2]	-41.14[2]	-42.35[2]
Not single	-26.03	-24.21	-25.04	-23.63	-26.81	-22.77	-24.43	-24.17[2]
Male head								
Non-married	-30.30[2]	-28.74[2]	-27.20[2]	-28.38[2]	-38.23[2]	-35.08[2]	-33.25[2]	-35.85[2]
Non-married head								
(Age - 45)	1.78[2]	1.99[2]	2.13[2]	1.97[2]	1.42[2]	1.62[2]	1.85[2]	1.67[2]
(Age - 45) squared	.029[2]	.030[2]	.031[2]	.030[2]	.020[2]	.019[2]	.020[2]	.020[2]
Married head								
(Age - 45)	1.33[2]	1.63[2]	1.81[2]	1.61[2]	1.05[2]	1.36[2]	1.62[2]	1.41[2]
(Age - 45) squared	.049[2]	.049[2]	.051[2]	.048[2]	.040[2]	.035[2]	.038[2]	.038[2]
Children under 6 years present	1.57	1.40	.55	1.42	2.28[3]	2.08[3]	1.54	2.03
Number of children	7.62[2]	7.60[2]	7.54[2]	7.55[2]	4.82[2]	4.65[2]	5.07[2]	4.79[2]
Number of adults (-2)	9.79[2]	10.12[2]	13.16[2]	10.16[2]	2.89[2]	3.32[2]	6.05[2]	3.24[2]
Retired male head[5]	10.80[2]	10.31[4]	7.92[4]	10.39[4]	8.74[4]	8.24[4]	5.75[3]	8.37[4]
Unemployed head[6]	-17.40[2]	-16.97[2]	-19.48[2]	-16.86[2]	-16.01[2]	-14.67[2]	-16.46[2]	-14.88[2]
Years of education, head	1.04[2]	1.59[2]	1.44[2]	1.63[2]	.75[2]	.19[2]	.18[3]	.068
More than one earner	5.51[2]	5.14[2]	1.74[3]	5.11[2]	5.95[2]	5.50[2]	1.99[3]	5.66[2]
Self-employed	11.82	10.01[2]	9.17[2]	9.87[2]	20.21[2]	17.53[2]	17.15[2]	17.76[2]
Measured income	1.49[2]				1.56[2]			
Unexpected transitory income		1.32[2]				1.37[2]		
Expected transitory income		1.06[4]				2.08[2]		
Transitory income				1.32[2]				1.38[2]
Permanent income		1.87[2]	1.17[2]	1.99[2]		2.69[2]	1.52[2]	2.35[2]
Opportunity net worth		.016		.028		.18[3]		.056
Constant	7.35[4]	6.20[4]	9.96[2]	5.95[4]	-30.49[2]	-33.09[2]	-32.42[2]	-33.15[2]
Pseudo[7] R^2	.376	.378	.365	.378	.279	.279	.266	.283
Usual[7] R^2	.298	.300	.287	.300	.206	.206	.193	.209
OLS[7] R^2	.281	.283	.277	.283	.198	.198	.188	.200
Number of observations	7723	7723	7723	7723	8044	8044	8044	8044

[1] The transformed coefficient shows in terms of percentage points the first derivative of the probability of ownership with respect to the variable, at the probability level of .5.

[2] Significant at the 1% level.

[3] $|t| \geq 1$.

[4] Significant at the 5% level.

[5] Male head 55 or over, not in the labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] For definitions, see Footnotes 7-9 of Table 5.5.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

These results are only somewhat different from those found in U.S. studies. Generally education is found to have a positive effect (Kain and Quigley, 1975; Morgan, 1965; Birnbaum and Weston, 1974) but just as generally the effect is found to be quantitatively and statistically insignificant. Birnbaum and Weston, in fact, find a negative effect in their Black sample. Yet there is much greater income stability among those with a higher education than among the less well-educated. Morgan (1965) presents detailed evidence on this point. He also gives us other reasons[16] for expecting higher education to be associated with ownership:

> "There may also be a tendency for education to foster more concern with the family, an emphasis on housing rather than other forms of consumption, and more long-range planning. And although people expect to be mobile, and there is no need for them to make long-range commitments to a level of living when they buy a house, there is good evidence for a longer time horizon among those with more formal education" (1965, p. 295).

It is hard to agree with Morgan's point about mobility here because the transactions costs of ownership make ownership uneconomic if the household intends to move within about three years, under conditions of no more than moderately rising house prices. Turning Morgan around on this point indeed suggests a reason for our finding of a negative effect of education. It may simply reflect the reluctance of a relatively mobile group to make the commitment of ownership.

This still leaves the Montréal-Toronto contrast to be explained. The negative effect in Montréal is much less than in Toronto. It seems plausible that this reflects an interaction effect of house prices. In 1971 house prices in Toronto were very high, compared to both Montréal prices and United States prices, although Toronto rents were not relatively so very high (see Chapter 4). Under these circumstances, householders with a high demand for housing but willing to devote to it only a limited amount of their cash flow would be pushed into renting rather than owning. Thus a university-educated person, not willing to settle for a "starter home", might rent a luxury townhouse at the same time that a tradesman of the same income might buy.

See footnote(s) on page 166.

6.5. The Purchase and Sell Decisions

It has been argued by some authors (Kain and Quigley, 1975; King, 1972) that the purchase decision, not the own decision, should be the focus of analysis. That is, we should examine the flow decision, not the stock decision. The argument for focusing on the purchase decision is the supposition that owners are typically not in equilibrium. For instance, an owning older couple might not actively choose to own, but might not sell because of transaction costs and inertia. In this case the equilibrium tenure decision, "not own", is not the decision actually observed.

Because of this problem it has become the vogue to confine the analysis to movers, on the grounds that movers include only those who have made a recent active decision. Unfortunately, this is based on the implausible assumption that households move only for reasons unconnected with the decision to own.[17] Now it is certainly true that many do move for job reasons, or because their current housing accommodation is unsatisfactory for reasons unconnected with the fact that the accommodation is rented rather than owned. Some mover, however, move merely in order to own simply because changing tenure usually requires a move to another dwelling. Most renters do not have the option to buy the apartment they are living in - especially before 1971 when condominium conversions were rather rare. The possible absurdity of looking only at movers is seen when it is noted that it is conceivable for a sample of movers to be made up solely of those who move only in order to purchase.

As Struyk (1976) and Straszheim (1975) have argued, another reason for not looking only at movers is the possibility that movers who move for job reasons are an unrepresentative sample of the population. Certain occupations such as construction trades and banking are associated with more mobility than others. In any case, the presumption that a mover's housing decision is an equilibrium decision (see Chapter 2) is not very much more supportable than the presumption that the owner's decision is an equilibrium one. The size of transactions costs will tend to lead to disequilibrium in the case of movers just as it does for non-movers. Thus a young couple, forced to move for job reasons, might buy a year earlier than it intended in order not to have to move twice within a year.

See footnote(s) on page 166.

In our view it is inappropriate to use a sample of only movers. It does, however, enrich understanding of the ownership decision to examine recent purchasers separately. But the appropriate model to apply is a stock-adjustment model in which the dependent variable is not purchase but first time purchase. We now sketch out such a model. Consider the whole group of households who, before June 1970, were renters. Let

$$DO(t) = f(X1(t), X2(2) \ldots Xk(t)) \qquad (6.1)$$

where DO(t) is an index of the demand at the end of t where t is the year starting June, 1970 for ownership and X1(t) ... Xk(t) is the vector of characteristics listed in Table 6.4. Assume that the demand for purchase depends partly on the change in DO during t. Assume that the demand for purchase also depends partly on the level of the ownership index, because it appears plausible that those in the sample with a high value for the ownership index include many who were on the verge of buying during (t-1). Whether a high-income household buys a house in 1970, 1971 or 1972 may be largely a matter of chance, just as whether a household buys a bottle of brandy in week 1, week 2, week 3 or week 4 is largely a matter of chance. Thus the expression for the index of the demand for purchase during t, DP(t) is as follows:

$$DP(t) = a(DO(t) \quad DO(t-1)) + b\ DO(t) \qquad (6.2)$$

where a and b are unknown parameters. Using the logit model,

$$\ln\frac{(P(t))}{(1-P(t))} \quad = \quad DP(t)$$

where P(t) is the probability of purchasing during t.

It is useful to note some implications of (6.2). This is most easily done by substituting in it a truncated form of (6.1). Write this truncated form as:

$$DO(t) = \beta_0 + \beta_1 M(A-45) + \beta_2 M(A-45)^2 + \beta_4 NM*MALE + \beta_5 NM*(A-45)$$

$$+ \beta_6 NM*(A-45)^2 + \beta_7 CN$$

where A is age, M is one if married, NM is one if not married, MALE is one if male (all variables refer to the head of the household), CN is number of children. Then, where a household has a married head and had one in the previous year, (6.2) is

$$DP(t) = a(\beta_1 - 91\beta_2 + 2\beta_2 A + \beta_7 \Delta CN + \Delta NM*MALE) + b(\beta_0 + \beta_1 (A-45)$$

$$+ \beta_2 (A-45)^2 + \beta_7 CN)$$

From these expressions it is seen that if the change in the ownership index has the dominant effect, then DP(t) will be negatively affected by age because β_2 (Table 6.4) is negative. It is also to be noted that there is no way of including variables like ΔCN, the change in the number of children between June, 1970 and May, 1971. This analysis of the purchase decision, in other words, reveals that that data resources are deficient because there are not data on many of the changes in status - like change in the number of children - which would induce households to purchase. Often, however, some inference about the probability of a change in status during the previous year is possible from the level of a variable. For instance, the larger the number of children the more likely the number increased during the previous year.

So far we have discussed the decision to change tenure from renter to owner, i.e. the decision to become a first-time purchaser. An analogous model may be used for the decision to change tenure from owner to renter. Assume that the index of demand for selling, DS(t), is analogous to (6.2) except that the effect of independent variables is opposite in size and not of the same absolute size. There are two major reasons for the assumption of asymmetry. First, most of the transactions cost of home ownership is incurred at sale when the brokerage fee is paid. The size of this transactions cost is apt to make the adjustment coefficient, a,

rather low in the sell equation. Another source of possible asymmetry lies in the nature of effect of the income and wealth variables in the context of institutional mortgage lending practices. Because of lenders' requirements, a household buying for the first time needs a downpayment, so the size of transitory income is apt to be an important factor encouraging purchase. On the other hand, an owner with negative transitory income would generally be able to borrow against the equity in his house so negative transitory income is unlikely to lead to the sale of the house.

6.5.1. Characteristics of Purchasers and Sellers

Before discussing the results of the purchase and sell models it is illuminating to examine the mean characteristics of households in the four stages of what might be called the tenure life cycle: persisting renters, recent purchasers, persisting owners, recent sellers. These categories are defined in terms of comparisons of current (census date) status and status one year prior to the census. In particular, purchasers are owning households who moved within a year of the census and whose previous tenure is rental. Presumably in most cases these households made a first-time purchase within a year of the census. Analogously, sellers are renting households who moved within a year of the census and whose previous tenure is owner.[18] The rarity of purchase and sale is shown by the fact that the Public Use Sample includes only 165 purchasers and 90 sellers for Toronto; for Montréal, only 142 and 62, respectively.

One striking aspect of the tenure pattern shown in Table 6.5 is the greater difference between purchasers and persistent renters than between persisting owners and sellers, perhaps because when circumstances change, owners tend not to sell. This contrast is especially marked for Toronto. Thus, in Toronto, 27% of persisting renters are female headed, but only 4% of purchasers, as compared with 11% of persisting owners and 25% of sellers. Most of the female persisting owners are widows, apparently retaining family homes after the death of their husbands. Much more symmetric adjustment is indicated in the case of children: in Toronto, persisting renters average .8 children, purchasers 1.2, persisting owners 1.3 and sellers 1.0. In Montréal the contrast in numbers of children is more dramatic: persisting renters have .9 children but purchasers have 1.5. In both places purchasers are much likelier to have preschool children than persisting renters;

See footnote(s) on page 166.

TABLE 6.5. Means[1] for Household Variables Purchasers, Sellers and Others, Toronto and Montréal CMAs, 1971

Variables	Persisting renters[2]		Purchasers[3]		Persisting owners[2]		Sellers[3]	
	Toronto	Montréal	Toronto	Montréal	Toronto	Montréal	Toronto	Montréal
Female head								
Single	.10	.09	.02	.01	.01	.02	.03	.02
Not single	.17	.14	.02	.04	.10	.08	.22	.23
Male head								
Non-married	.14	.14	.06	.04	.04	.04	.07	.15
Age, non-married head	46.59	46.44	39.00	41.00	60.85	58.99	44.21	48.65
Age, married head	39.19	41.60	35.97	35.49	47.18	47.39	46.49	46.54
Married head, children under 6 years present	.21	.21	.45	.52	.23	.22	.22	.19
Number of children	.78	.94	1.24	1.54	1.33	1.45	.99	1.21
Number of adults	1.91	2.04	2.44	2.22	2.51	2.52	2.00	1.94
Retired male head[4]	.03	.05	.01	.00	.06	.06	.06	.07
Unemployed head[5]	.04	.05	.01	.04	.02	.02	.07	.03
Years of education, head	10.99	9.49	11.56	10.93	10.21	9.83	11.05	10.87
More than one earner	.49	.40	.71	.46	.59	.48	.43	.27
Self-employed head	.05	.05	.05	.06	.11	.14	.04	.07
Measured income ($000)	9.46	8.32	14.78	10.65	13.76	12.64	11.23	10.48
Unexpected transitory income ($000)	-.15	.01	2.94	-.35	.03	.04	-1.31	-1.59
Expected transitory income ($000)	-3.57	-3.21	-6.47	-6.22	-.56	-1.38	-2.05	-2.24
Permanent income ($000)	13.19	11.52	18.31	17.22	14.30	13.98	14.59	14.31
Opportunity net worth ($000)	13.52	11.91	10.70	10.14	25.44	21.91	20.01	18.30

[1]Where the number given is less than one it refers to the proportion of households having the characteristic.

[2]"Persisting renters" are current (1971) renters who did not move within a year of the census or who did move but whose previous tenure is renter. "Persisting owners" are defined analogously.

[3]"Purchasers" are current (1971) owners who moved within a year of the census and whose previous tenure is renter. "Sellers" are defined analogously.

[4]Male 55 or over, not in the labour force and last worked before 1970.

[5]Currently unemployed but worked during 1970-71.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

45% of purchasers in Toronto (52% in Montréal) as compared with only 21% of persisting renters. The fact that 22% of sellers (Toronto) also have very young children suggests that a substantial proportion of sellers are only renters temporarily, perhaps because many of them have recently moved from another city and are renting while shopping for a house to buy. This is substantiated by the fact that the age of married seller heads is slightly less than that of married persisting owner heads.

In Toronto the household income of purchasers is sharply higher than that of persisting renters. In Montréal this difference is not nearly so marked, reflecting the much less onerous burden of purchase in that city. In fact, in Montréal purchasers have a household income just 84% that of persisting owners, while in Toronto purchasers have larger incomes than persisting owners. Probably in Toronto among the persisting owners are many who could not have afforded ownership if they had waited until 1970-71 because of the very substantial rise in house prices in the 1960s. Prices in Montréal, in contrast, rose very little. The very high household income which allowed Toronto purchasers to leap the price barrier was apparently largely transitory income. The remarkable fact is that 71% of Toronto purchasing households include two or more employment income earners compared with only 59% for persisting owners. In Montréal there is no such contrast, the ratios being just 46% and 48% respectively. It is striking that the only very great difference between Toronto and Montréal in the pattern of household characteristics by tenure stages is in these two relatively temporary economic characteristics: measured household income and number of employment income earners. In both cities, the expected current income of the heads of purchasing households is almost precisely the same as that for persisting owner heads.

It is illuminating to examine the characteristics of purchasers and sellers in other areas (Table 6.6). Some characteristics are relatively invariant among Toronto, Montréal, large urban areas, small urban areas and rural non-farm areas. In particular in all these places married sellers are considerably older - 10 1/2 years older in the case of large urban areas (Table 6.6) - than purchasers. Married purchasers average between 34 and 36. This is about two years older than the average NHA borrower in 1971 (CHS, 1972, Table 93) despite the fact about one-quarter of NHA borrowers, unlike the purchasers included here, were previously

TABLE 6.6. Means[1] for Household Variables Purchasers and Sellers by Age, Canada by Area, 1971

Variables	Purchasers[2]			Sellers[2]		
	Urban areas		Rural non-farm areas	Urban areas		Rural non-farm areas
	30,000 or more	Under 30,000		30,000 or more	Under 30,000	
Female head						
Single	.01	.0	.02	.02	.0	.0
Not single	.03	.01	.03	.25	.19	.15
Male head						
Non-married	.05	.05	.05	.14	.07	.09
Age, non-married head	43.00	46.65	39.96	51.11	57.30	48.18
Age, married head	34.34	35.06	35.51	44.97	43.66	43.75
Married head, children under 6 years present	.46	.49	.52	.18	.28	.30
Number of children	1.42	1.55	1.69	1.04	1.54	1.66
Number of adults	2.21	2.18	2.12	1.89	2.08	1.98
Retired male head[3]	.01	.01	.02	.05	.08	.05
Unemployed head[4]	.02	.04	.03	.05	.03	.03
Years of education, head	11.77	10.89	9.77	10.79	10.65	9.19
More than one earner	.61	.54	.45	.35	.48	.33
Self-employed head	.07	.07	.12	.07	.13	.08
Household income ($000)	12.24	10.16	8.50	9.24	9.30	7.71

[1] Where the number is less than one it refers to the proportion of households having the characteristic.

[2] Purchasers are current (1971) owners who moved within a year of the census and whose previous tenure is renter. Sellers are defined analogously.

[3] Male head 55 or over, not in labour force and last worked before 1970.

[4] Currently unemployed but worked during 1970-71.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

owners. In all areas also, the proportion of purchasers with preschool children hovers around one-half.

In a number of other respects purchasers, especially relative to sellers, differ greatly from area to area. In Toronto and large urban areas purchasers average many more children than do sellers, but in Montréal, small urban areas and rural non-farm areas they do not. The same phenomenon shows up in the case of adult numbers. It is tempting to conclude that this indicates that, where house prices are high relative to rents, and apartments are freely available, households are apt to adjust their tenure in response to changes in household size. This is corroborated by the much lower proportion of sellers who are widowed, separated or divorced women in less urbanized areas where apartments are less readily available.

The two earnings characteristics shown here also reveal the effects of the greater affordability of owner housing in Montréal, small urban areas and rural non-farm areas. In these areas the average income of purchasers is very little more than the average income of sellers, while in Toronto and in large urban areas the differential is 24 percentage points and 26 percentage points respectively. The same pattern is true for the number of earners, with 61% of purchasers but only 35% of sellers in large urban areas having more than one earner.

6.5.2. Result of the Logit Model of the Purchase and Sell Decisions

We have just discussed household means conditional on tenure or tenure change. We now reverse the direction of analysis and discuss tenure change conditional on housing characteristics as revealed by the multi-variate analysis of the logit model. Because of the rarity of the purchase and sale events it is not surprising that the model has only limited success in predicting purchase and sale. To put the results in context note that the proportion of the "purchase" sample who actually purchase is 5.0% for Toronto and 2.8% for Montréal. The proportion of the "sell" sample selling is 2.2% for Toronto and 2.3% for Montréal. The pseudo R^2 is just .159 for purchase for Toronto (Table 6.2) compared with a pseudo R^2 of .378 for the ownership decision. The R^2 for Toronto for OLS estimation of the linear probability model is just .05, and this compares very favourably with the R^2 of .02 obtained by Lee (1963) in his purchase regression using a sample with 5.2 percent purchasers. Lee's sample includes all households, previously owners as well as

previously renters, and so purchases represent housing adjustment for owners as well as tenure change for renters. Our higher R^2 suggests that there is merit in distinguishing between these two kinds of purchase.

In general, the magnitude of the logit coefficients is not very different for the (tenure-change) purchase decision than it is for the ownership decision. Thus, for instance, the logit coefficient for widowed, separated and divorced female heads for Toronto is -1.54 in the purchase regression compared with -.95 in the corresponding ownership regression (Tables 6.4, 6.7).[19] This suggests that the dominant effect in the purchase demand index is level of ownership demand index rather than the change in that index brought about by changes in status (i.e. in equation (6.2), the coefficient b is greater than a). The age coefficients, however, do show quite clearly that the change-of-status effect is of some importance. From the ownership regressions the probability of ownership increases less with a one-year increase in age the older the head, i.e. the coefficient of A-45 is positive and the coefficient of $(A-45)^2$ is negative. Thus if the change in the ownership index has the dominant effect on DP(t), and the level of the ownership index is unimportant, the coefficient of age will be negative. In fact we find for Toronto that the first derivative of probability with respect to age, at age 30, is .122P(1-P) for ownership in contrast to -.071P(1-P) for purchase; for Montréal, .102P(1-P) against only .012P(1-P).[20] Indeed, by age 50, the effect of age on the probability of purchase is negative in both places although its effect on ownership is positive.

The other variable most closely associated with a recent change in status is the presence of children under six. A substantial proportion of households with very young children obviously must have been childless in the recent past. It is not surprising then, that in both Toronto and Montréal, households with young children are substantially more likely to purchase than households without. This effect is one of the very few here statistically significant at the 5% level or better. In the ownership regression, in contrast, the presence of children less than six has a statistically indiscernible and quantitatively insignificant effect.

See footnote(s) on page 166.

TABLE 6.7. Estimates of Logit Models of the Purchase and Sell Decision, Toronto and Montréal CMAs, 1971

Variables	Purchase[1]				Sell[2]			
	Models				Models			
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Toronto CMA		Montréal CMA		Toronto CMA		Montréal CMA	
Female head								
Single	-1.07[3]	-1.24[3]	-3.36[4]	-3.21[4]	1.58[5]	1.54[5]	.48	.56
Not single	-1.28[5]	-1.54[5]	-1.29[5]	-1.11[5]	1.39[4]	1.33[4]	1.90[4]	1.96[4]
Male head								
Non-married	- .45	.54[3]	-2.10[4]	-2.03[4]	.19	.22	1.74[4]	1.77[4]
Non-married head								
(Age - 45)	.020	.0016	.032[3]	.032[3]	.10[4]	.11[4]	.032[3]	.039[3]
(Age - 45) squared	- .0031[3]	.0038[5]	.0012[3]	.00084	.00053	.00061	.0014[3]	.0014
Married head								
(Age 45)	.045[4]	.019	.030[5]	.038[3]	.016[3]	.024[3]	.0085	.020
(Age 45) squared	.0025[4]	.0030[4]	.0014[3]	.0020[5]	.00093[3]	.0013[5]	.00085[3]	.0010
Children under 6 years present	.47[5]	.49[5]	.61[4]	.63[4]	.50[3]	.53[3]	.050	.090
Number of children	.020	.014	.021	.021	- .34[4]	- .35[4]	.10	.11
Number of adults (-2)	.27[4]	.23[5]	.044	.089	.55[4]	- .55[4]	.56[5]	.53[5]
Retired male head[6]	- .062	.22	-4.70	-4.23	.18	- .39	.049	.060
Unemployed head[7]	-1.85[3]	-1.92[3]	.075[4]	.045	1.25[4]	1.29[4]	.83[3]	.82[3]
Years of education, head	.0035	.017	.075[4]	.051[3]	.045[3]	.069[3]	.084[5]	.091[5]
More than one earner	.083	.058	.13	.099	.071	.084	.23	.20
Self-employed	.29	.17	- .016	.12	.78[3]	.67[3]	- .63[3]	.59[3]
Measured income[8]	.044[4]		.031[5]		.0056		.0021	
Transitory income		- .073[5]		.064[3]		.064[3]		.036
Permanent income		2.43[4]		1.52[5]		-1.45[3]		.91
Opportunity net worth		.0099		.036[5]		.019[3]		.0060
Constant	-3.29[4]	-2.73[4]	-4.42[4]	-4.57[4]	-4.00[4]	-3.84[4]	-4.63[4]	-4.57[4]
Pseudo[9] R^2	.156	.159	.117	.118	.127	.131	.118	.119
Usual[9] R^2	.061	.063	.028	.030	.061	.065	.040	.042
OLS[9] R^2	.050	.050	.025	.026	.039	.039	.032	.032
Number of observations	3329	3329	5072	5072	4156	4156	2748	2748

[1] Purchasers are owners at the Census date with length of occupancy less than one year and previous tenure renter. Non-purchasers are: renters with length of occupancy less than one year and previous tenure renter; renters with length of occupancy one year or more.

[2] Sellers are renters at Census date with length of occupancy less than one year and previous tenure owner. Non-Sellers are defined analogously to non-purchasers.

[3] $|t| \geq 1$.

[4] Significant at the 1% level.

[5] Significant at the 5% level.

[6] Male head 55 or more, not in the labour force and last worked before 1970.

[7] Currently unemployed head who worked during 1970-71.

[8] Actual household income.

[9] For definitions, see Footnotes 7-9 of Table 5.5.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

6.5.3. Income and the Purchase Decision

Earlier, in the discussion of the ownership decision, we suggested that an explanation for the substantial effect of transitory income lay in the fact that a substantial proportion of owners are recent purchasers. This explanation depends on the assumption that transitory income is indeed an important variable affecting purchase. We test this assumption here in the purchase model. The result? Transitory income has a perverse effect, although the coefficient is neither large nor statistically very significant for either CMA. Renters in 1970 were not more likely to buy during the period June 1970 to June 1971 if their transitory income for 1970 was relatively high. This result cannot be taken as strong evidence that out transitory income variable is defective in view of Lee's finding (1963) that reported income change from the previous year did not have an effect on purchase significant at the 5% level. Furthermore, Kain and Quigley found measured household income to be highly statistically significant in the purchase decision but to have only half the effect it had on the purchase decision that it had on the own decision (1975, Tables 5.1 and 5.3). These are like the results here (see Tables 6.4 and 6.7). Also here, permanent income has a quite large and statistically significant effect. This supports the view that the purchase decision arises not so much because of a change in the immediate circumstances of the household but rather because the household's demand for ownership has risen to a high level.

6.5.4. The Sell Decision

We have argued earlier that the sell decision should be analysed separately from the purchase decision, because the decision to change tenure from own to rent is not symmetric with the decision to change tenure from rent to own. Some of the regression estimates in the sell regressions do not strongly corroborate this point. In particular, the effects of marital status variables for the sell decision are roughly symmetric with the purchase decision. The effects of the two household-size variables do show strong asymmetry, however. While family size matters little for the purchase decision it rather strongly affects the sell decision. At a probability level of 5% a one-adult decrease in household size increases the probability of selling in both Toronto and Montréal by more than 2.5 percentage points. There is also some asymmetry in the effect of unemployment. For the sell decision, unlike the purchase decision, the size of the unemployment effect is immense in both CMAs and is statistically very significant in Toronto.

The income variables are of less importance for the sell decision than for the purchase decision. Indeed, permanent income's effect is greater than its standard error only in the Toronto CMA, and measured household income does not have an influence even as slight as this. This suggests that ordinarily after a household has owned for some time it has accumulated sufficient home equity and other assets so that income variations have little effect in encouraging sale unless those variations are the unexpected and huge ones associated with reverses such as unemployment and widowhood.

6.6. Age Interactions and the Ownership Decision

Earlier we saw that when the elementary model of the ownership decision is applied separately to various age groups, the coefficient of income shows a substantial rise and then, after 45-54, a sharp decline with age. Furthermore, we established later that age is a very distinctly crucial variable in its own right. In particular, the introduction of permanent income variables into the model estimated for all ages (Table 6.4) actually increases the quantitative effect of age on ownership.[21] In this section we explore the interaction of age and income further, and the interaction of age with other variables.

We first notice (Table 6.8) that the ownership probability of households without married heads is much less affected by this characteristic the older the head. Single people under 30 in Toronto and Montréal are shown to have a probability of owning of virtually zero.[22] In both cities non-married heads become increasingly like married heads in their ownership behaviour as they become older.[23]

The most interesting demographic variables, in their interaction with age, are those for household size and composition. Contrary to the aggregate model, the presence of preschool children has a very sizeable positive impact here on the probability of ownership - but only for very young households, with the effect of preschool children (grandchildren?) being actually negative for the middle-aged and older. Charting the effect of two children (assuming at least one preschool for the two younger households and neither preschool for the two older households) in Chart 6.2 we see again the very substantial effect of family composition. There is an interesting contrast here between Montréal and Toronto. In both cities the effect is greatest for the youngest heads. However, the effect in Montréal then drops off very sharply while in Toronto it falls more slowly and

See footnote(s) on page 166.

TABLE 6.8. Estimates of the Income and Wealth Components Model of the Ownership Decision, by Age Group, Toronto and Montréal CMAs, 1971

Variables	Age group							
	Less than 30	30-44	45-64	65+	Less than 30	30-44	45-64	65+
	Toronto CMA				Montréal CMA			
	(Logit coefficients multiplied by 25)[1]							
Female head								
Single	-659.98[2]	-80.03[3]	-40.04[3]	-23.85	-59.57	-49.41[3]	-34.23[3]	-134.77[4]
Not single	-624.27[2]	-27.07[4]	-25.11[3]	8.53	-31.11	-25.04[4]	-16.28[4]	-119.15[2]
Male head								
Non-married	-628.53[2]	-44.20[3]	-29.50[3]	-10.59	-52.97	-40.87[3]	-26.09[3]	-136.05[4]
Non-married head								
(Age 45)	-50.56	2.71	2.26[2]	1.76	7.16	2.38	.46	4.09[2]
(Age 45) squared	1.49	.079	.076[2]	.017	.23	.15	.030	.063[2]
Married head								
(Age - 45)	14.47[2]	3.65[4]	.94	2.54	4.07	3.32[3]	1.50[2]	4.25[2]
(Age - 45) squared	.23	.081[2]	.067[2]	.050[2]	.000081	.20[3]	.045[2]	.076[2]
Children under 6 years present	14.65[4]	2.71	15.20[3]	1.81	4.60	1.48	9.39[2]	31.23[2]
Number of children	3.22[2]	5.58[3]	8.33[3]	.48	11.19[3]	3.30[3]	3.94[3]	2.56
Number of adults	7.92[3]	7.92[3]	12.99[3]	12.68[3]	4.11	3.43[2]	2.64[4]	6.80[3]
Retired male head[5]	–	–	.41	10.36[2]	–	–	12.92[2]	8.14[2]
Unemployed head[6]	16.24	-30.31[3]	14.31[4]	6.76	-49.77[4]	-13.16[4]	6.04	27.54[2]
Years of education, head	1.60[2]	2.08[3]	.98[4]	.70[2]	1.29[4]	1.76[3]	.11	.34
More than one earner	6.03[2]	-7.01[4]	4.80[2]	.80	-14.22[4]	7.97[3]	.20	1.16
Self-employed	31.63[3]	11.52[4]	3.11	6.44	12.83[2]	12.71[3]	25.56[3]	7.66
Transitory income	2.65[3]	2.02[3]	.59[3]	1.09[3]	2.09[3]	2.04[3]	1.22[3]	.49[2]
Permanent income	2.70[3]	2.70[3]	.61[2]	2.20[2]	3.50[3]	1.48[3]	2.18[3]	-.074
Opportunity net worth	.85	.43	.21[2]	-.046	-.87	1.76[3]	-.024	.17[2]
Constant	136.85	11.05	12.55[4]	-22.99	6.30	-68.57[3]	-35.71[3]	32.49
Pseudo[7] R^2	.314	.346	.229	.166	.244	.276	.212	.103
Usual[7] R^2	.216	.271	.185	.123	.160	.211	.164	.076
OLS[7] R^2	.200	.251	.168	.117	.133	.191	.156	.074
Number of observations	1430	2584	2684	1025	1556	2765	2733	990

[1] The transformed coefficient shows in terms of percentage points the first derivative of the probability of ownership with respect to the variable, at the probability level of .5.

[2] $|t| \geq 1$.

[3] Significant at the 1% level.

[4] Significant at the 5% level.

[5] Male head 55 or over, not in the labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] For definitions, see Footnotes 7-9 of Table 5.5

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

steadily with age. We suspect this partly reflects the effect of easier availability of rental family housing in Montréal which means there is less incentive for households with children to buy, especially since much of the ownership housing is duplex or triplex and so not much different from rental housing.

The effect of additional adults is quite different from the effect of additional children. In both Toronto and Montréal, an additional adult has much less effect than the presence of children for very young families, but the effect of an additional adult rises with age of the head, especially in Toronto. Presumably, the extra adult, where the head is young, is often a mother-in-law and the household would not own just to provide extra space for her. A grown-up child living in the house of an older head may, however, keep older heads from selling (see Table 6.7). At all points of the life-cycle the existence or not of a third adult in the household is much closer to being a matter of active choice for the household than the presence of children. Once a child is born, there is little room for choice about its inclusion in the household until it reaches 16. Because of this different degree of choice, it is not surprising that the effect of an additional adult, although greater for older heads, does not vary nearly as much over different ages as the effect of an additional child. An extra adult, at all ages, will tend to live with the household only if there is enough space - which in Toronto usually requires an owned dwelling.

In view of this very different pattern for children and adults it is clearly important to make the distinction we have made between children and adults as elements of the size of the household. This distinction is not made by either Struyk (1976) or Li (1977).[24] An apparently odd result of Li's is in fact explicable in terms of this distinction. He found that for the elderly, while households of three or four persons are more likely to own than households of two, households of five or more are less likely to own than households of three or four. Our results for Toronto show that this would be true for Toronto if the three- or four person households were all-adult and the five-and-over households included children.

Transitory income in this disaggregated model shows an even stronger interaction with age than does measured income in the disaggregated elementary model

See footnote(s) on page 166.

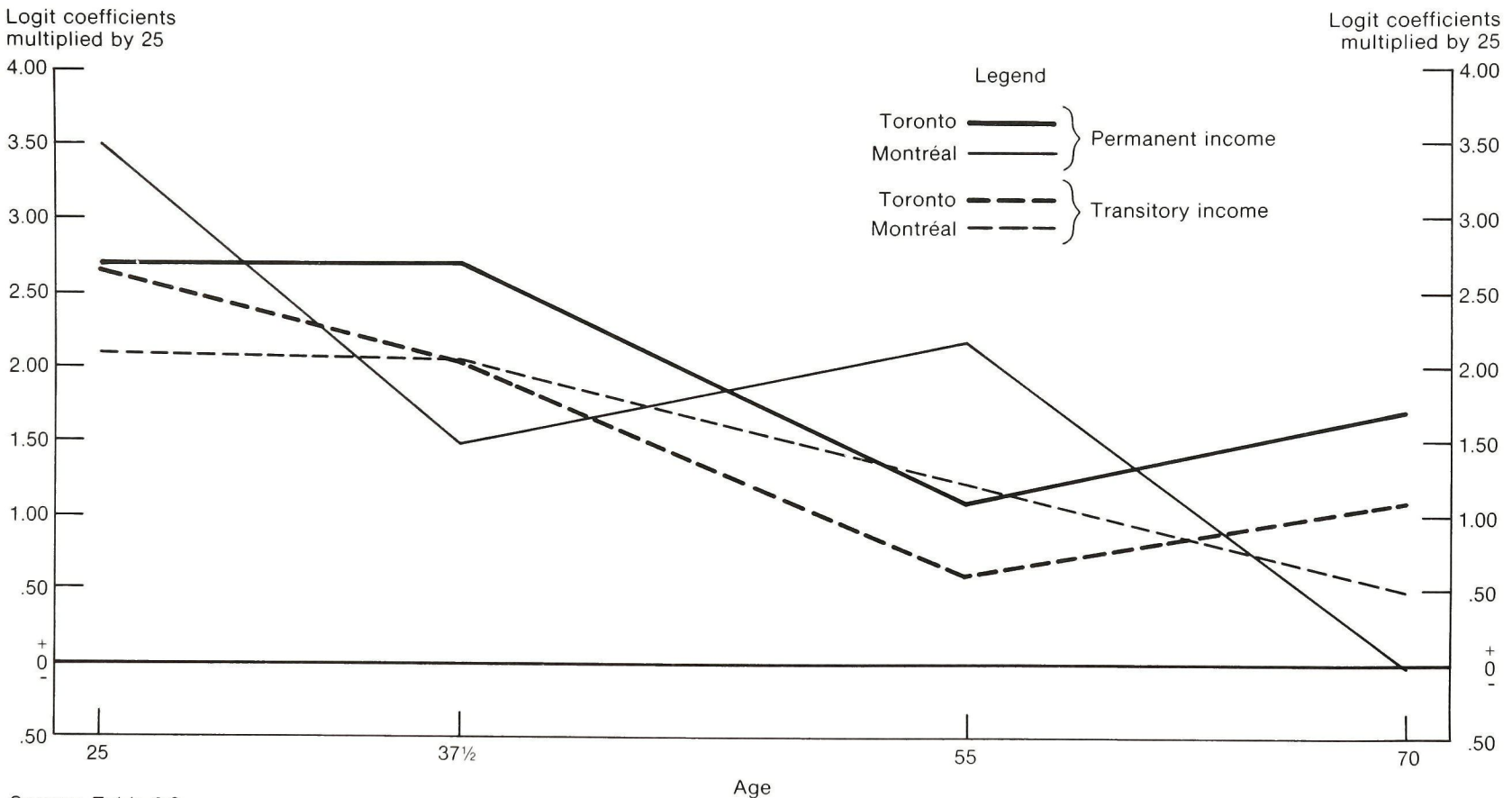
(Table 6.2 and Chart 6.3). A $1,000 increase in transitory income increases the probability of owning in Toronto at a 50% probability level by about 2.6 percentage points for very young households, 2.0 percentage points for households 30-44, but just .6 percentage points for households 45-64 and 1.1 percentage points for households 65 and over. In Montréal, the decline in the effect of transitory income is monotonic with age. In neither city do we see the inverted-U shape that shows up in the elementary model for measured income. These results here are entirely plausible in terms of our earlier discussion of the effects of transitory income. Young households are unlikely to have assets sufficient for a downpayment accumulated from other years and so they need transitory income to buy. Older households are much likelier to have purchased several years earlier and so transitory income is for most of them less relevant.

Opportunity net worth also has an effect varying greatly by age. Its greatest impact occurs in the 30-44 age group. For that group it has a substantial positive effect in both cities, significant at the 1% level in Montréal, while in aggregate model it is not significant at this level in either city and the size of the effect is much less, or negative.

To show the quantitative importance of the income variables in distinguishing between owners and non-owners in Table 6.9, we show the estimated coefficient of each income variable times one standard deviation of that variable. This table immediately makes it clear that opportunity net worth is not a variable of consequence. It also indicates that income is much less important in explaining the variation of ownership for the late middle-aged and old than it is for younger heads. Both transitory and permanent income have very sizeable effects for younger heads. Whether or not the source of the transitory income is an earner other than the head is also very important for these groups, but not for older people. In Montréal for those under 30 the existence of more than one earner in the household has such a dampening effect on the probability of ownership that the second earner would have to increase household income by more than $6,800 in order to have a net positive effect (see Table 6.9). For the two older age groups on the other hand, the second earner as a source of income has no such dampening effect. In Toronto the dampening effect persists through all age groups, although it is very small for the old. At the same time, in Toronto, transitory income is important in determining who among the oldest group are owners. This is perhaps the outcome of

Chart — 6.3

The Effect of Transitory Income and Permanent Income on the Probability of Ownership, by Age, Toronto and Montréal CMAs



Source: Table 6.8.

the fact that in Toronto, unlike Montréal, the typical elderly homeowner in 1971 would be the beneficiary of substantial capital gain. Those with positive transitory income would be less tempted to realize this gain by selling.

TABLE 6.9. The Quantitative Importance[1] of the Income and Wealth Variables, by Age Group, Toronto and Montréal CMAs, 1971

	Transitory income		Permanent income		Opportunity net worth	
Age group	Toronto	Montréal	Toronto	Montréal	Toronto	Montréal
Less than 30	19.72	13.49	19.62	22.90	1.76[2]	-1.57[2]
30-44	17.21	14.38	22.58	10.73	2.61[2]	9.40
45-64	5.19	9.14	3.98[2]	11.96	3.01[2]	- .29[2]
65 or over	8.02	3.67[2]	4.62[2]	.16[2]	-1.34[2]	4.29[2]

[1]As measured by the estimated coefficient (times 25) times one standard deviation of the variable. The estimated coefficients are given in Table 6.8.

[2]Coefficient not significant at the 5% level.

Source: 1971 Census of Canada, Public Use Sample Tapes.

6.7. Francophones, Immigrants and the Home-ownership Decision

In Chapter 5 it was established that not-married francophones and recent immigrants are both substantially less likely to control a separate dwelling unit than other individuals. Furthermore, abundant evidence has been presented in this and earlier chapters to support the hypothesis that Quebecers, including Montréalers, have a weaker preference for housing than other Canadians. In this section we use the logit model to determine whether recent immigrants and francophone families, when other variables are controlled for, are less likely to own. The results for francophone households will cast light on the issue of how strongly the great ownership difference between Quebec and the rest of Canada is associated with the francophone nature of that province.

The data used in this section are for families, not households, because the household Public Use Sample Tapes do not include information on immigration status or mother tongue. A census family exists if a husband and wife live together or if a parent lives with a never-married child. Family members include never-married

children of the family head. Excluded, however, are ever-married children and other relatives of the head such as a widowed mother or a brother or sister.

To provide evidence on the tastes of francophones the logit model is estimated separately for Montréal families with a francophone head, and for other Montréal families (Table 6.10). Most of the resulting coefficient estimates are not strikingly different for the two groups. Francophone families, however, are substantially less affected by the presence of several children - especially when these children are six years of age or over - than other families. An additional child adds over five percentage points to the probability of owning in the case of non-francophones but only about three and one-half percentage points for francophones. This suggests that the duplexes and triplexes so typical of Montréal rental housing are regarded as more appropriate for children by the francophones than by others.

An indication that francophone-anglophone differences are likely to become less important in the future is the strong evidence that the richer, more educated the francophone, the less different his probability of owning is from an anglophone of the same status. In particular, although four additional years of education adds not much less than eight percentage points to the probability that a francophone will own it adds less than three percentage points for others. For $10,000 additional income the effect is about 16 percentage points for francophones as compared with 14 percentage points.[25] This is put in context by noting that for a quite typical family[26] the probability of owning for a francophone-headed family is 51% compared with the probability 59% for other families.

It is illuminating to compare this difference with the difference between the crude ownership probability for Toronto households and Montréal households. That difference is 20 percentage points (Table 4.1). This much greater difference supports the view put forward in Section 6.2 that much of the current contrast in ownership between Quebecers and other Canadians stems from past preferences as these are ossified in existing housing. In particular the large numbers of duplexes and triplexes built in Quebec years ago foreclose the possibility of a high owner-occupancy proportion because of the difficulty of arranging separate ownership of each dwelling unit in a duplex building.

See footnote(s) on page 166.

TABLE 6.10. Estimates of the Ownership Model for Francophones and Recent Immigrant Families, Montréal and Toronto CMAs, 1971

Variables	Montréal CMA		Toronto CMA	
	Families with francophone head	Other families	Families with 1961-71 immigrant head	Other families
	(Logit coefficient multiplied by 25)[1]			
Female head				
Single	-183.37	-41.29[2]	-154.44	-27.79[2]
Not single	-19.20[3]	-28.50[3]	-43.44[2]	-32.24[3]
Male head, non-married	-21.11[3]	-61.85[3]	-167.37	-35.21[3]
Non-married head				
(Age 45)	2.04[3]	1.43[4]	2.27[2]	1.78[3]
(Age - 45) - squared	-.054[3]	.0058	.045	-.021[2]
Married head				
(Age - 45)	.85[3]	.95[3]	-.31	1.13[3]
(Age - 45) squared	-.036[3]	-.048[3]	-.099[3]	-.046[3]
Children under 6 present	3.36[2]	1.58	2.55	3.88[2]
Number of children	3.51[3]	5.34[3]	7.08[3]	6.40[3]
Number of adults (-2)	3.56[4]	2.97[2]	2.30	6.85[3]
Retired male head[5]	15.44[3]	7.21[2]	8.29	3.18
Unemployed head[6]	-8.91[2]	.31	-3.98[2]	-11.49[4]
Years of education, head	1.95[3]	.70[4]	-.66[2]	.42[4]
More than one earner	-10.12[3]	-8.94[3]	-5.56[2]	-4.30[2]
Self-employed head	19.36[3]	4.07[2]	.31	3.13
Period of immigration, head				
1961-65	-42.41[3]	-24.17[3]		
1966-68	-34.80[4]	-38.47[3]	-14.38[3]	
1969-71	-33.85[2]	-68.39[3]	-38.97[3]	
Francophone head[7]			-13.67	-23.10[3]
Measured income	1.59[3]	1.40[3]	2.01[3]	.84[3]
Constant	-48.26[3]	-26.68[3]	-24.59[3]	-9.46[3]
Pseudo[8] R^2	.196	.240	.276	.214
OLS[8] R^2	.137	.167	.173	.159
Number of observations	4141	2291	922	5549

[1] The transformed coefficient shows in terms of percentage points the first derivative of the probability of ownership with respect to the variable, at the probability level of .5.

[2] $|t| \geq 1$.

[3] Significant at the 1% level.

[4] Significant at the 5% level.

[5] Male head 55 or over, not in the labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] Mother tongue French.

[8] For definitions, see Footnotes 7 and 9 of Table 5.5.

Source: 1971 Census of Canada, Public Use Sample Family Tapes.

While Montréal the major cultural dichotomy of interest is the francophone anglophone one; in Toronto it is the recent-immigrant/native-born one. The coefficients shown in Table 6.10 imply that recent immigrants in Toronto like francophones in Montréal have a substantially lower probability of owning their own home than other families. For an otherwise typical family[27] the probability is just 60% as compared with 70%. An examination of the individual coefficients reveals that in many respects immigrant families behave like other families. One very substantial difference, however, is that for widowed, separated and divorced family heads. These are much less likely to own when they are immigrants than when they are not. This is consistent with the findings in Chapter 5, where it is seen that immigrant status makes very little difference to the decision to control a separate dwelling unit in the case of married males but a great deal of difference for other adults. Because the sample in Table 6.10 is families, not households, many of the widowed, divorced and separated heads are probably not even household heads.

The age-ownership pattern of recent immigrants is also markedly different from that of other families. Other things equal, the peak-ownership probability for non-immigrant families with a married head is reached when the head is 57, but for recent immigrant families it is reached when the head is only 43. Indeed, the early and quite sharp peaking of the married immigrant ownership curve implies that married young recent immigrants - those under 35 - are very much like the native-born in their tenure choice. Older married immigrants are much less assimilated.

The most noteworthy of all differences between immigrants and others is the effect of income. An increase in income of $1,000 has the effect of increasing the immigrant ownership probability by about two percentage points but the non-immigrant probability by less than one percentage point. This is consistent with the view put earlier (Chapter 5) that immigrants are different not so much because of intrinsically different housing tastes but because of the economic disruption they have experienced. An immigrant of a given measured income level would not have the accumulated assets that a native-born person would have because of the difference in their earnings history. For this reason current income would bear much more of the burden of ownership. It is instructive to link this with the difference in the age-pattern. The older the immigrant when he arrives the more disruptive is immigration

See footnote(s) on page 166.

apt to be with respect to asset accumulation. So the explanation advanced here for the large-income effect for immigrants vis-a-vis the native-born is consistent with the great difference in their age-ownership pattern.

FOOTNOTES

[1]For an extended discussion of this point see Shelton's analysis (1968) based on U.S. data.

[2]See our discussion in Chapter 2. A direct comparison of U.S. and Canadian circumstances is that of Ricketts (1977).

[3]See Chapter 3 for a more complete discussion of the logit model.

[4]Manitoba's income coefficient is significant at the 5% level on a two-tailed test, but it is negative. There is some evidence that British Columbia rural non-farm areas are in fact rather urbanized.

[5]Assuming the logit model, the first derivative of probability, P, with respect to income, YH, is $P(1-P)\beta$ and the elasticity is $(1-P)\beta YH$ where β is the coefficient of YH. If P is a function of price and minimum unit value, as well as of YH, lower price and unit value will increase P and so lower the elasticity.

[6]The R^2 from estimation of the linear probability model shows a very similar pattern.

[7]Kain and Quigley's finding that five years on current job increases the probability of ownership by 4.5 percentage points (1975, OLS estimates of ownership) provides some support for this supposition.

[8]These numbers are computed using specification two and assuming $14,000 permanent income, -$2,500 expected transitory income, $17,000 opportunity net worth, 10 years of education and other variables equal to zero.

[9]Specification two is used for this and other computations unless indicated otherwise.

[10]It might be contended that the ownership probability for not-married heads is kept up by the fact that the older the not-married person, the more likely he or she is to be "ever-married". On this argument, the continued rise of ownership with age for the not-married is just a statistical artifact of the transfer of homeowners who are married into the not-married class on the death of a spouse. Our model, however, includes a separate dummy for female ever-married heads and this will capture the effects of this transfer in the case of widows. There is the additional point that one would expect married homeowners who are transferred into the not-married class to make some housing adjustment to their new situation. A new widower without children, for instance, might sell his house.

[11]We use "about" here and later because the transformed coefficient referred to - here 7.6 - refers to the first derivative of probability with respect to the variable, at the probability level .5. Thus 7.6 is an upper bound.

[12]See the correlations given in Chapter 3.

[13]Computed from the data for Whites in their Table 2 and the equation for St. Louis Whites, their Table 8. The data are for 1967. Using their equation for all the U.S. with Whites and Blacks combined, but with a race dummy variable, the effect of income relative to wealth is much greater than this.

[14]This point is argued strongly by Kain and Quigley (1975). Birnbaum and Weston acknowledge the problem and re-estimate their equations using a net-worth concept net of home equity. Unfortunately, they do not report the coefficients or t-statistics of the reformulated wealth variable.

[15]It is of interest that while we support Bossons' basic tack (1973) that credit rationing is very important in any explanation of home ownership it turns out that it is income, especially permanent income, that apparently matters to lenders, not net worth.

[16]He gives these as reasons for expecting a higher house value, not a higher probability of ownership. They seem to apply with as much force to the latter as to the former.

[17]Kain and Quigley present the argument for this position (1975, p. 122-23).

[18]The sum of persisting renters, purchasers, persisting owners and sellers is less than the number of households given in Table 6.4, because we omit households who reported that they did not previously live in another dwelling in Canada or reported that they were not head of household in their previous dwelling. For Toronto the number in these classes is 238; for Montréal, 224.

[19]Results are discussed in terms of logit coefficients, not these coefficients times 25. The logit coefficients in Table 6.7 are not multiplied by 25 because this would yield the first derivative of probability with respect to the variable at a probability level of .5 and the mean probability is just .05 for Toronto purchasers, and less for the other decisions in Table 6.7. At the mean probability level of .05, the first derivative of probability with respect to a variable in percentage points would be ((.05 X .95 X 100) =) 4.75 times the logit coefficient.

[20]Here, as elsewhere in the text, we use the results from the second specification in Table 6.7 and the fourth in Table 6.4 unless noted otherwise. In these expressions P refers to probability.

[21]The t-statistics before the introduction of the permanent income variables are, for married heads for Toronto (Montréal in brackets), 17.65 (13.68) for (age - 45) and -12.12 (-9.44) for $(age-45)^2$. After the introduction of these variables they are respectively 13.42 (10.39) and -10.64 (-7.72).

[22]We note that we have retained in our specification the age variable to capture the effect of the change in age <u>within</u> rather broad age groups. For uniformity we have left the transformed age variable, i.e. (age-45), as before. This means that for <u>all age groups</u> the reference category to which the constant term refers is households with two adults, zero income and head aged 45.

[23]To compute the effect on the logit of a male head's not being married, for a 65-year-old, sum the "male, not married" effect, 20 times the coefficient of (age-45) for not married and 400 times the coefficient of $(age-45)^2$ for not married and subtract from this 20 times the coefficient of (age-45) for married and 400 times the coefficient of $(age-45)^2$ for married.

[24]Struyk reports specific regression results only for the effect of "number of persons" and reports that "Whether these people were children, boarders, non-relatives, etc., had no discernible effect on tenure choice. The exception is that the presence of an aged family member in a family with a non-aged head increased the probability of home ownership for husband-wife families aged 45-65 by 5%." (1976, p. 68). It is possible that Struyk's non-correction for age differences within his age groups led to his no-difference result since the split between children and adults is correlated with the age of the head.

[25]In this respect our results for francophones in Montréal are qualitatively similar to Struyk's results for Blacks in St. Louis, U.S.A. (cf his Tables 4-6 and 4-8B). Generally, our findings show francophones and others in Montréal are much more similar in their behaviour than Blacks and Whites in St. Louis.

[26]One with a male head aged 45, having 10 years of education, married, not retired, not unemployed, not immigrated 1961-71, not self-employed, and with two children, at least one under six, two adults, only one earner, $12,000 measured family income.

[27]Defined as in the previous footnote, except not-francophone head and not immigrated 1966-71.

CHAPTER 7

THE HOUSING EXPENDITURE DECISION

The previous two chapters examine the decision to occupy a separate dwelling unit and the decision to own. This chapter examines the next decision in the hierarchy, the gross housing expenditure decision, where gross housing expenditure is indicated by house value in the case of owners and gross rent in the case of renters. Two basic models are used.

The first model specifies that housing expenditure depends on income. This is the model generally used in time-series analysis and so the income elasticities derived from this model are the most appropriate cross-section elasticities for comparisons with time-series elasticities. This model is used in section 7.1 to discuss rural-urban and interprovincial differences in housing expenditure and in section 7.2 to discuss age differences.

The second model adds variables suggested by the analysis in Chapter 2. The most important of these are transitory income, permanent income and opportunity net worth. Also included are variables associated with the variability of income, such as unemployment, and variables associated with variations in taste. This model is estimated for the Toronto and Montréal CMAs.

7.1. Location and Income Elasticities of Housing

Cross-section estimates of the income elasticity of housing expenditure are generally based on sample data confined to large urban areas (Muth, 1960; Reid, 1962; de Leeuw, 1971; Kain and Quigley, 1975) or on national data, with no distinction made between areas of different population density (Winger, 1963; Carliner, 1973). Where distinctions have been made between areas the estimation has allowed the level of expenditure, but not the response of expenditure to a change in income, to vary be area (e.g. Lee, 1963). This practice is unexceptionable so long as elasticities do not differ substantially by area. The results presented in this section show, however, that elasticities do differ substantially by area. Much of this section is devoted to explanation of the pattern of these differences. It is argued that this pattern is connected with another result, the much lower estimated elasticities for micro data from a single market area than elasticities estimated using city means.

It will be noted that the specifications do not include a term for the pure price of housing. In fact it seems a reasonable assumption that within each of the provincial urbanization groups the pure price of housing faced by households is roughly constant.[1] In particular, Table 4.2 shows that the price of new housing varies substantially from one province to another largely because of variations in the price of land, but intraprovincial variation among large urban areas is slight (with the notable exception of Ontario where the difference is quite substantial between Toronto, plus areas in the Toronto shadow, and the rest of the province's large urban areas). Thus, for instance, though the Alberta large urban areas group includes two distinct market areas, Calgary and Edmonton, the pure price of housing apparently differs by only a few percentage points so that the departure from the ideal of including only one market in a single sample is not an important problem.

The income elasticities in Table 7.1 are estimated assuming two alternative functional forms, the linear and the double logarithm. The linear form assumes that a dollar increase in income will increase housing expenditure by a constant amount, no matter what the level of income, and assumes that the percentage increase in expenditure resulting from a 1% increase in income, the income elasticity, approaches one as income gets very large.[2] In Table 7.1, the elasticities shown for this specification all assume the same level of income, the Canada mean income for homeowners. The double log form assumes that elasticity is constant. Elasticity is given by the coefficient of the log of income.[3] It can be seen that while the linear form has the disadvantage of assuming that the elasticity approaches one as income gets very large, the double log form, which puts no constraints on the size of the elasticity, on the other hand assumes that the elasticity is the same at all levels of income. There is no theoretical reason to prefer one form over the other and so both are estimated here.

The most striking aspect of the results is the low value of the elasticities. They indicate that the proportion of income spent on housing declines very sharply as income rises. They are much lower than most previous studies would indicate (see especially Muth, 1960, 1969; and Reid, 1962). None of them is as high as .5 although de Leeuw in his well-known review article of U.S. elasticity

See footnote(s) on page 199.

TABLE 7.1. Income Elasticities of Housing Expenditure for Homeowners, by Area, 1971

Area	Elasticities[1]		Mean house value household income ratio	Mean household income $
	Linear form[2]	Double log form		
Toronto CMA	.18 (.23)	.17 (.13)	2.40	14,555
Montréal CMA	.40 (.34)	.27 (.18)	1.56	13,219
Urban of 30,000 or more				
Newfoundland	.25 (.18)	.16 (.09)	2.01	12,296
Nova Scotia	.24 (.28)	.35 (.23)	1.79	13,190
New Brunswick	.38 (.23)	.30 (.13)	1.72	10,816
Quebec	.31 (.25)	.25 (.14)	1.56	13,464
Ontario	.25 (.23)	.22 (.14)	2.15	13,186
Manitoba	.31 (.19)	.23 (.14)	1.69	11,212
Saskatchewan	.37 (.24)	.26 (.16)	1.74	10,059
Alberta	.26 (.24)	.22 (.18)	1.92	12,640
British Columbia	.26 (.26)	.18 (.14)	2.37	11,742
Canada	.27 (.22)	.23 (.14)	2.01	12,697
Urban under 30,000				
Newfoundland	.56 (.22)	.41 (.21)	1.44	7,487
Nova Scotia	.50 (.20)	.40 (.18)	1.52	8,556
New Brunswick	.35 (.08)	.35 (.15)	1.39	8,072
Quebec	.39 (.22)	.29 (.16)	1.48	9,919
Ontario	.33 (.16)	.26 (.14)	2.02	10,321
Manitoba	.37 (.27)	.25 (.16)	1.36	9,858
Saskatchewan	.48 (.23)	.32 (.19)	1.57	7,993
Alberta	.34 (.22)	.26 (.15)	1.72	9,484
British Columbia	.26 (.11)	.19 (.09)	2.03	10,220
Canada	.38 (.18)	.30 (.15)	1.78	9,707
Rural non-farm				
Newfoundland	.47 (.14)	.42 (.18)	1.28	5,801
Nova Scotia	.61 (.19)	.45 (.19)	1.57	6,487
New Brunswick	.51 (.09)	.21 (.06)	1.22	5,999
Quebec	.47 (.19)	.27 (.27)	1.36	7,052
Ontario	.45 (.20)	.32 (.15)	2.19	8,511
Manitoba	.55 (.15)	.30 (.12)	1.53	5,655
Saskatchewan	.55 (.20)	.18 (.06)	1.49	4,964
Alberta	.39 (.10)	.33 (.15)	1.69	6,335
British Columbia	.36 (.15)	.25 (.11)	2.33	9,205
Canada	.54 (.20)	.38 (.16)	1.83	7,313
Canada total	.40 (.26)	.40 (.22)	1.93	10,693

[1] The $\bar{R}^2$ is shown in brackets.

[2] Linear form elasticities are computed assuming income is $10,693, the Canada mean household income for homeowners.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

estimates concludes, "Thus, the preponderance of cross-section evidence supports an income elasticity for homeowners moderately above 1.0, or slightly higher than the elasticity for renters" (1971, p. 10). Earlier he comments about the elasticity estimates of T. H. Lee that "... they are very low. For renter households the estimated elasticities tend to be about .65; for owners they tend to be about .8" (1971, p. 5). Yet our estimates for Canada are all much less than even Lee's estimates.

As indicated in Chapter 3, bias in the measurement of selling value accounts for a small part of the difference between these elasticities and elasticities estimated using aggregate data. On these grounds adjustment of homeowner elasticities upwards by about 15% is warranted. In addition, adjustment is required because imputed rent is not included in the income of owners. This is partly offset by the downward adjustment required because house value is used rather than the more appropriate variable, housing expenditure, which includes items such as heating cost. The net adjustment to the homeowner elasticities arising from these two factors is no more than 15% (see de Leeuw, 1971). Finally, measured income is used rather than permanent income. This biasses the elasticity downwards but recent studies show this bias to be slight: Carliner's results suggest an upper bound on adjustment of homeowner elasticities of 26% with 18% for renter elasticities (1973, p. 530). Applying all these adjustments, not <u>one</u> of the homeowner elasticities is as high as .8 and not one of the renter elasticities (for which only the last adjustment is required) comes even close to .6. Yet, we repeat, de Leeuw has labelled these elasticities "very low".

To consider this question further we examine the elasticities in some detail. First, we notice that the elasticities estimated using the double log form are consistently lower than elasticities estimated from the linear form. The proportion of variation in housing expenditure explained by variation in income (as indicated by the R^2) is also generally much less for the double log form. This suggests that the linear specification is preferable to the double-log.[4]

These results reveal a clear pattern for homeowner elasticities to increase, the lower the level of urbanization.[5] In other words, the results imply that the

See footnote(s) on page 199.

proportion of income homeowners spend on housing declines with income everywhere but declines less with income in rural areas. This reflects the fact that in less urbanized areas the mean housing sales-value-to-income ratio for the poor is relatively low, not that the ratio for the rich is relatively high. An exception to this pattern is Quebec where the elasticities vary little between large urban areas, small urban areas and rural areas. There is also a great difference between Montréal and Toronto. The homeowner elasticity for Montréal is .40, well above the highest elasticity for any single province's large urban area group and almost double the Toronto elasticity of .18.

In the case of income elasticities for renters there is no systematic connection between level of urbanization and size of income elasticity. In general, the elasticities are lower than the range for homeowners (.16 to .34 for large urban areas compared with .24 to .38) corroborating the usual finding that renter elasticities are lower than homeowner elasticities (de Leeuw, 1971). The differential is much greater for rural areas than for large urban areas.

There is reason to believe that the low values for these elasticities and the pattern of elasticities among urbanization size groups are connected. It may be hypothesized that they are both the outcome of phenomena which broadly speaking are manifestations of the existence of community norms. These norms we would expect to be function of community income. Where income elasticities are estimated using aggregate data the elasticity estimated is essentially the elasticity of the community norm for housing with respect to the average community income. One would expect this elasticity to be substantially higher than the elasticity estimated for individuals within a community because the community housing norm constrains the choice of individuals within a community. Recent U.S. results corroborate this. The income elasticity of demand for housing computed using micro data in St. Louis is estimated at only .32 for renters and .40 for owners (Kain and Quigley, 1975, p. 333). The elasticity computed by Carliner, again using micro data but for all the U.S. (so that the community norm elasticity and the within-community elasticity each have a weight) is .48 for renters and .58 for owners (1973, p. 530). These compare with de Leeuw's results using metropolitan area medians of .81 for renters and 1.34 for owners (1971, pp. 8, 9).[6,7]

See footnote(s) on page 199.

TABLE 7.2. Income Elasticities of Housing Expenditure for Renters, by Area, 1971

Area	Elasticities[1]		Mean annual gross rent-household income ratio	Mean household income $
	Linear form[2]	Double log form		
Toronto CMA	.21 (.22)	.18 (.17)	.20	9,379
Montréal CMA	.24 (.17)	.14 (.12)	.17	8,295
Urban of 30,000 or more				
Newfoundland	.21 (.14)	.12 (.07)	.18	7,911
Nova Scotia	.21 (.14)	.15 (.11)	.21	8,171
New Brunswick	.16 (.04)	.05 (.02)	.17	7,264
Quebec	.25 (.22)	.13 (.11)	.17	8,133
Ontario	.25 (.23)	.19 (.18)	.20	8,865
Manitoba	.32 (.23)	.19 (.15)	.19	7,249
Saskatchewan	.34 (.21)	.23 (.21)	.21	6,438
Alberta	.22 (.18)	.16 (.12)	.20	7,902
British Columbia	.22 (.17)	.17 (.14)	.22	7,407
Canada	.26 (.21)	.16 (.14)	.19	8,232
Urban under 30,000				
Newfoundland	.24 (.15)	.25 (.21)	.14	8,889
Nova Scotia	.21 (.05)	.05(-.00)	.18	6,308
New Brunswick	.33 (.23)	.27 (.27)	.18	6,349
Quebec	.19 (.09)	.13 (.09)	.16	7,116
Ontario	.18 (.09)	.18 (.14)	.18	7,836
Manitoba	.39 (.37)	.33 (.33)	.18	7,960
Saskatchewan	.24 (.15)	.19 (.15)	.19	6,406
Alberta	.29 (.24)	.18 (.14)	.18	7,373
British Columbia	.25 (.15)	.17 (.13)	.20	7,557
Canada	.23 (.12)	.17 (.12)	.18	7,382
Rural non-farm				
Newfoundland	.15 (.04)	-.00(-.00)	.14	6,817
Nova Scotia	.39 (.14)	.27 (.15)	.15	5,957
New Brunswick	.03(-.02)	-.01(-.18)	.16	5,937
Quebec	.18 (.07)	.16 (.09)	.14	6,804
Ontario	.31 (.14)	.22 (.12)	.16	7,314
Manitoba	.18 (.04)	.06(-.00)	.13	7,513
Saskatchewan	.33 (.21)	.15 (.10)	.15	6,053
Alberta	.11 (.01)	.09 (.02)	.14	7,036
British Columbia	.28 (.13)	.21 (.12)	.15	7,848
Canada	.25 (.10)	.18 (.09)	.15	7,057
Canada total	.26 (.19)	.17 (.13)	.18	8,009

[1] The $\bar{R}^2$ is shown in brackets.

[2] Linear form elasticities are computed assuming income is $8,009, the Canada mean household income for renters.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

Let us now examine evidence of the constraint on individual choice arising from the existence of the community norm. In the case of single-detached homes, the potential purchaser is substantially constrained in his choice by the unavailability of a "quantity" of housing below some minimum level. If a purchaser wishes to purchase a single-detached house in the Toronto CMA, it will be difficult for him to find a house with a 20-foot frontage lot, with 700 square feet of living space and with only an outside toilet. Building and zoning bylaws do not generally permit the construction of such a house (Report of the Task Force on Housing and Urban Development, 1969, pp. 41). If the purchaser lives in a rural non-farm area, however, he may very well find that this bundle of housing characteristics is available. The minimum standard enshrined in bylaws is a standard very substantially affected by the typical community income and this is much lower in rural areas than in large urban areas.

Even if building codes did not exist there still would be little availability of low-quantity housing bundles in large urban areas because of high land prices. Average land prices will be higher the more densely settled the area and the higher the average income in the area. In high-price areas a purchaser in principle could choose a single-detached house with very little land but such a house would be so undesirable compared with accommodation in a multifamily building that it would be unlikely to exist. Thus in areas of either high land prices or demanding building bylaws ownership of single-detached houses is likely to be relatively low and the quantity of housing chosen by those in fact purchasing is likely to be relatively constant until an income is reached at which the minimum-bundle constraint is no longer operative. This implies a relatively low income elasticity in such areas.

It is of some interest at this point to recall Duesenberry's "relative-income" hypothesis of consumer behaviour (1962). This says that a household's consumption will depend on its own income but also on the consumption of others, and in particular on the consumption of households at the community's median income level. This hypothesis explains why the income elasticity within areas is less than the income elasticity between areas. It does not explain, however, why the elasticity in rural areas is greater than in urban areas. The minimum-bundle

hypothesis does explain this pattern.[8] An implication of this hypothesis is that the urban poor bear a substantial burden as a result of zoning and building bylaws.

As noted earlier, in the case of renters there is no clear tendency for elasticities to increase as levels of urbanization decline. There are a number of related explanations of this consistent with community-norm hypothesis. First, the minimum-bundle constraint will not be nearly as severe for rented dwellings as for owned single-detached because rented dwellings are typically not single-detached (in 1971, for Canada 80% were not single-detached, for the Toronto CMA, 90%, and for the Montréal CMA, 96%) (1971 Census of Canada, Vol. II.3, Tables 1, 2) and building codes thus constrain very little the floor area and land area per dwelling unit. Very small rental dwellings are available. Building codes do require a minimum quality of construction, however.

Renter elasticities, in addition, are directly affected by the possibilities for owners. In particular, in large urban areas where the minimum single-detached owner bundle is large, many low-income households rent who in a rural area would own. Assuming that ownership is associated with a strong taste for housing, then the group forced into renting will consume a lot of housing, i.e. pay a high rent - thus increasing the average rent paid by all low income renters. If at higher incomes there is no such effect the result will be a lower estimated elasticity of housing for renters than in the absence of the minimum bundles. This effect would tend to lower the elasticity in large urban areas relative to less urbanized areas.

In addition, for renters there is an effect on availability which directly relates to the immoveability of housing structures. In less densely settled areas there is by definition a relatively thin market. This will induce risk-averting landlords to offer only a narrow range of accommodation. The reason for this can be seen as follows. Suppose that 5% of all potential renting households demand very high-quality accommodation and suppose that this 5% is randomly scattered over all areas of Canada. Suppose in one market - a large city - the potential renting households number 90,000, while in another market they amount to 2,500.

See footnote(s) on page 199.

In both cases the expected vacancy rate is zero for landlords offering high-quality accommodation equal to 5% of the stock. The standard deviation of the vacancy rate, however, is much higher for the second market than for the first. While for the first market the probability of a vacancy rate greater than 10% is virtually zero in the second case it is 12.5%.[9] Note that, to some extent, the same risk which keeps a landlord from building accommodation outside some narrow range will operate to keep a risk-averting household from ordering a custom-built house outside a narrow range. There is the possibility that the owning household may at some point need to sell and in a thin market the probability of finding a purchaser who is a demander of high-quality accommodation will be low. The thin-market or liquidity risk, however, will clearly be less important to the owner-occupier than the landlord because the owner-occupier has greater control over the date he vacates than the landlord has over the date a tenant vacates. For this reason, there should be a tendency for observed renter elasticities to be substantially less than owner elasticities in thinly settled areas because high-income renters who desire high-quality accommodation will not find it readily available. In sum, while in highly urban areas there is an important minimum-bundle constraint for owners, in less urbanized areas there is a maximum-bundle constraint on renters.

7.2. Age and Income Elasticities of Housing

In Chapter 4, we saw that mean expenditure on housing varies according to the age of the household head. We now ask whether the response of housing expenditure to changes in income varies with age. In other words, suppose there is an increase in average income per Canadian household. Will the resultant increase in housing expenditure vary according to whether household heads are older or younger, on average? Evidence on this question is displayed in Tables 7.3 and 7.4 and Chart 7.1.

In the case of owners there is not a pervasive strong pattern of variation of elasticity with age. In Toronto for heads 30-64 there is very little variation of income elasticity with age.[10] In Toronto and Montréal the elasticity of those over 65 is relatively high, perhaps because in these large markets there is such a variety of housing that when people retire they quite readily adjust their housing to their new level of income. Elderly owners in rural non-farm areas,

See footnote(s) on page 199.

TABLE 7.3. Income Elasticity of Housing Expenditure for Homeowners by Age of Household Head and by Area, 1971

Area	Age of head: Under 25	25-29	30-34	35-44	45-54	55-64	65+
			Elasticity linear form[1]				
Toronto CMA	.34 (.37)	.08 (.01)	.17 (.23)	.18 (.22)	.17 (.18)	.18 (.27)	.23 (.24)
Montréal CMA	.00 (-.09)	.37 (.41)	.40 (.22)	.34 (.30)	.45 (.34)	.39 (.37)	.45 (.40)
Canada							
Urban 30,000 or more	.12 (.01)	.29 (.14)	.26 (.16)	.29 (.23)	.28 (.24)	.24 (.21)	.27 (.18)
Urban under 30,000	.64 (.29)	.36 (.13)	.29 (.09)	.37 (.20)	.40 (.18)	.33 (.11)	.38 (.12)
Rural non-farm	.72 (.20)	.69 (.28)	.57 (.19)	.62 (.24)	.48 (.19)	.48 (.15)	.50 (.11)
Total	.52 (.17)	.48 (.23)	.39 (.20)	.40 (.26)	.39 (.26)	.36 (.24)	.42 (.20)
			Elasticity double-log form				
Toronto CMA	.21 (.10)	-.03 (-.00)	.26 (.17)	.16 (.11)	.17 (.12)	.17 (.14)	.17 (.13)
Montréal CMA	-.06 (-.08)	.21 (.08)	.36 (.22)	.28 (.16)	.38 (.23)	.17 (.12)	.26 (.17)
Canada							
Urban 30,000 or more	.03 (-.00)	.17 (.05)	.20 (.10)	.29 (.14)	.25 (.12)	.20 (.12)	.20 (.10)
Urban under 30,000	.18 (.07)	.25 (.09)	.48 (.18)	.40 (.17)	.32 (.13)	.25 (.13)	.25 (.10)
Rural non-farm	.29 (.09)	.46 (.20)	.49 (.18)	.46 (.18)	.41 (.17)	.27 (.11)	.32 (.09)
Total	.24 (.08)	.43 (.20)	.41 (.18)	.48 (.22)	.41 (.20)	.34 (.20)	.34 (.15)
			Value-income ratio ($\overline{SV}/\overline{Y}$)[2]				
Toronto CMA	2.58	2.58	2.37	2.43	2.24	2.21	3.16
Montréal CMA	1.74	1.72	1.62	1.58	1.45	1.52	1.88
Canada							
Urban 30,000 or more	2.35	2.06	2.09	2.01	1.81	1.90	2.67
Urban under 30,000	1.67	1.86	1.85	1.71	1.55	1.68	2.51
Rural non-farm	1.85	1.67	1.82	1.69	1.64	1.87	2.38
Total	2.02	1.93	1.99	1.90	1.73	1.85	2.57
			Income at which SV/Y is 2.25[3]				
Toronto CMA	15,790	15,300	16,100	16,497	15,745	15,312	15,682
Montréal CMA	6,340	7,098	7,098	7,990	7,047	7,154	7,012
Canada							
Urban 30,000 or more	9,437	10,090	11,029	11,420	10,734	10,445	10,377
Urban under 30,000	4,384	7,392	8,044	7,643	6,583	6,272	6,576
Rural non-farm	3,936	4,130	5,517	4,989	5,541	5,242	4,856
Total	6,336	7,690	8,990	9,205	8,392	7,995	7,717
			Mean value ($)				
Toronto CMA	32,250	33,839	35,683	36,259	35,403	34,664	31,462
Montréal CMA	14,269	18,156	19,307	21,468	22,343	20,428	17,565
Canada							
Urban 30,000 or more	21,164	23,544	25,524	27,128	26,682	24,930	22,107
Urban under 30,000	13,272	18,106	19,442	19,733	18,107	15,665	14,227
Rural non-farm	11,076	13,179	14,824	14,925	15,202	12,982	10,644
Total	15,390	19,414	21,636	23,150	22,309	19,791	16,364
			Coefficient of variation of value				
Toronto CMA	.36	.28	.31	.41	.33	.37	.42
Montréal CMA	.37	.36	.46	.50	.56	.62	.68
Canada							
Urban 30,000 or more	.41	.40	.40	.44	.47	.49	.53
Urban under 30,000	.63	.48	.48	.55	.59	.63	.68
Rural non-farm	.79	.71	.76	.82	.83	.88	.92
Total	.63	.53	.52	.53	.59	.64	.72

[1]The $\bar{R}^2$ is shown in brackets. The linear elasticities are computed assuming income is $10,693, the Canada mean household income for owners.

[2]SV is sales values; Y is household income; a bar over a symbol indicates a mean.

[3]The income at which the value-income ratio is 2.25 is computed using OLS estimates of the linear form.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

TABLE 7.4. Income Elasticity of Housing Expenditure for Renters by Age of Household Head and by Area, 1971

Area	Age of head													
	Under 25		25-29		30-34		35-44		45-54		55-64		65+	
Elasticity linear form[1]														
Toronto CMA	.14	(.06)	.16	(.11)	.18	(.15)	.21	(.17)	.19	(.23)	.23	(.34)	.32	(.32)
Montréal CMA	.17	(.07)	.23	(.12)	.23	(.15)	.18	(.09)	.19	(.13)	.34	(.36)	.26	(.18)
Canada														
Urban 30,000 or more	.21	(.10)	.18	(.11)	.23	(.17)	.25	(.17)	.24	(.18)	.29	(.34)	.30	(.27)
Urban under 30,000	.16	(.04)	.24	(.12)	.20	(.07)	.23	(.14)	.17	(.07)	.11	(.04)	.37	(.23)
Rural non-farm	.28	(.10)	.26	(.07)	.18	(.04)	.20	(.07)	.24	(.13)	.24	(.13)	.24	(.07)
Total	.21	(.09)	.21	(.12)	.24	(.14)	.25	(.15)	.24	(.16)	.29	(.30)	.32	(.27)
Elasticity double-log form														
Toronto CMA	.08	(.05)	.10	(.09)	.14	(.11)	.15	(.11)	.16	(.14)	.19	(.19)	.33	(.28)
Montréal CMA	.06	(.07)	.10	(.07)	.11	(.07)	.10	(.06)	.13	(.09)	.12	(.12)	.17	(.18)
Canada														
Urban 30,000 or more	.10	(.08)	.11	(.07)	.12	(.08)	.15	(.09)	.16	(.12)	.17	(.18)	.28	(.23)
Urban under 30,000	.08	(.05)	.15	(.08)	.14	(.07)	.13	(.06)	.15	(.09)	.13	(.08)	.25	(.17)
Rural non-farm	.13	(.07)	.14	(.04)	.14	(.03)	.14	(.05)	.15	(.07)	.14	(.08)	.24	(.11)
Total	.10	(.07)	.12	(.07)	.13	(.07)	.15	(.08)	.16	(.11)	.18	(.16)	.29	(.23)
Rent-income ratio $(12 \times \overline{GR}/\overline{Y})$[2]														
Toronto CMA	.22		.19		.19		.20		.18		.19		.27	
Montréal CMA	.19		.17		.17		.17		.15		.16		.19	
Canada														
Urban 30,000 or more	.22		.18		.18		.18		.17		.17		.23	
Urban under 30,000	.19		.17		.17		.16		.16		.16		.25	
Rural non-farm	.18		.16		.15		.13		.12		.14		.19	
Total	.21		.18		.18		.18		.16		.17		.23	
Estimated income at which rent-income ratio is .27[3]														
Toronto CMA	6,346		6,742		6,581		6,666		6,542		6,220		5,914	
Montréal CMA	4,555		4,793		4,816		4,921		4,701		4,298		4,530	
Canada														
Urban 30,000 or more	5,372		5,489		5,474		5,392		5,156		4,767		4,794	
Urban under 30,000	4,508		4,558		4,813		4,549		4,469		4,045		3,584	
Rural non-farm	3,646		3,815		4,039		3,629		3,215		3,091		2,639	
Total	5,073		5,153		5,172		5,110		4,861		4,517		4,443	
Gross rent: mean ($)														
Toronto CMA	147		162		160		163		164		156		133	
Montréal CMA	107		121		120		120		118		118		110	
Canada														
Urban 30,000 or more	125		134		136		135		132		125		112	
Urban under 30,000	106		114		119		116		110		95		83	
Rural non-farm	91		97		100		90		86		78		62	
Total	120		128		130		129		125		118		104	
Coefficient of variation of gross rent														
Toronto CMA	.33		.30		.37		.34		.37		.44		.48	
Montréal CMA	.33		.37		.35		.42		.44		.52		.54	
Canada														
Urban 30,000 or more	.38		.34		.36		.42		.46		.49		.57	
Urban under 30,000	.39		.36		.45		.39		.44		.46		.55	
Rural non-farm	.43		.46		.52		.49		.51		.49		.50	
Total	.39		.36		.40		.44		.48		.51		.59	

[1] The $\bar{R}^2$ is shown in brackets. The linear elasticities are computed assuming income is $8,009, the Canada mean household income for renters.

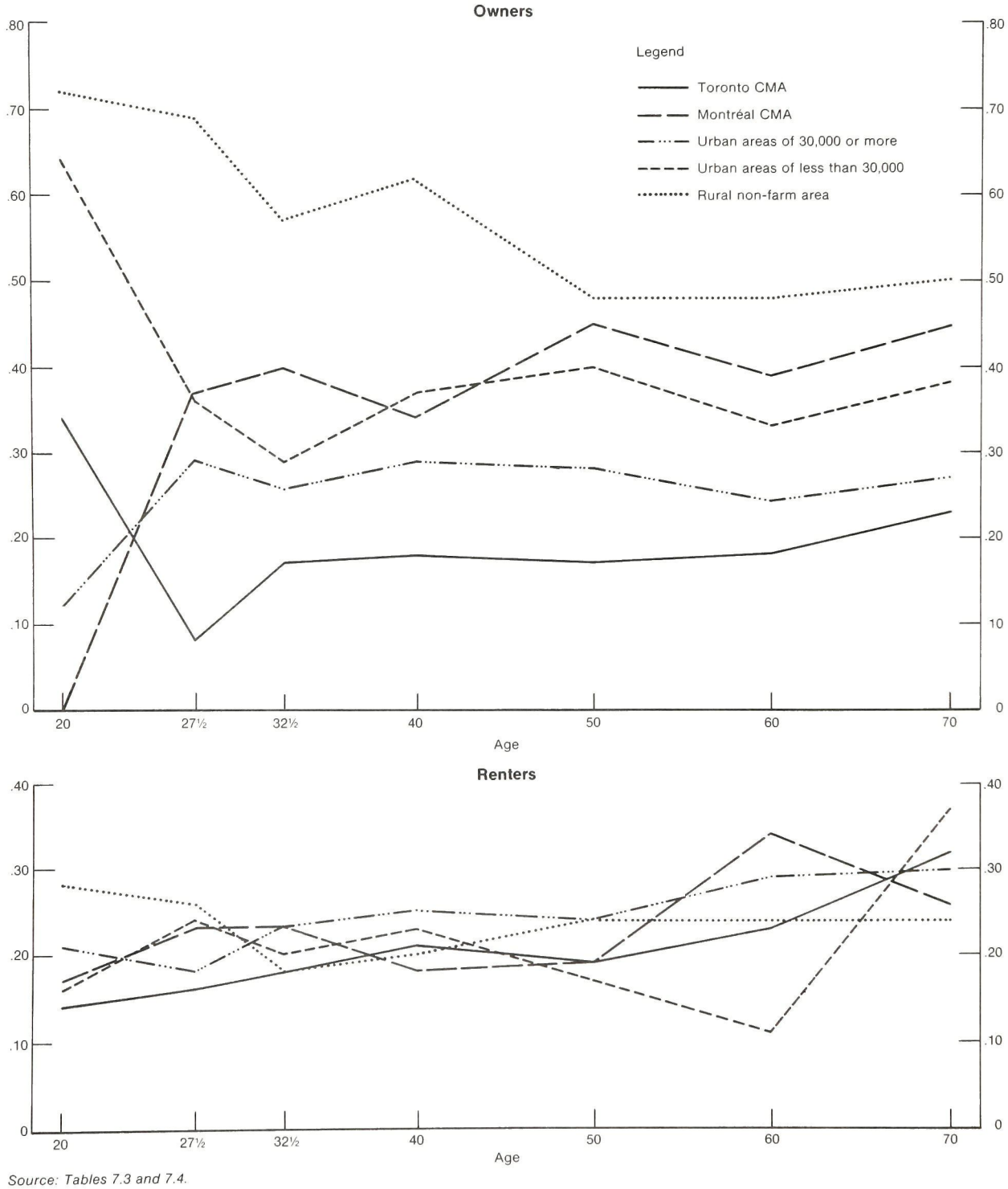
[2] GR is gross rent; Y is household income; a bar over a symbol indicates a mean.

[3] The income at which the rent-income ratio is .27 is estimated using OLS estimates of the linear form.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

Chart — 7.1

Income Elasticities by Age of Household Head and Area and Tenure



Source: Tables 7.3 and 7.4.

with less choice, would be less inclined to buy another house. In Toronto and in all the multi-market areas (large urban areas, small urban areas and rural non-farm areas) the elasticity for one of the two youngest age groups is the peak elasticity. This is probably associated with the fact that the income-qualification rules of lenders (see Chapter 2) tend to bias the elasticity towards one. The very young would be most affected by these rules because they would have accumulated the net worth to allow them to make a large downpayment.

While for virtually all age groups the elasticity is much higher in small urban areas and in rural non-farm areas than elsewhere, the differential is especially marked for those under 30. This is consistent with the fact that in these areas young households with little savings face a much less severe minimum-bundle constraint than in more urbanized areas. This results in an average housing expenditure for the young homeowner which is much less in rural than in more urbanized areas. The average sales-value-to-average-income ratio for households headed by 25-29 year-olds is 2.58 in the Toronto CMA, 2.06 for all large urban areas, 1.86 for small urban areas and just 1.67 for rural non-farm areas. For prime-age (45-54) headed households the differentials associated with levels of urbanization is substantially less; the ratios are respectively 2.24, 1.81, 1.55, 1.64.

Evidence of the importance of permanent income relative to current income in housing expenditure is the generally higher explanation, as indicated by the R^2, for those 35-54 than for other age groups. In these age groups, current income is at its peak for most occupations and education groups and current income is a better proxy for average lifetime income than current income at other ages. This is an especially important point for the highly educated because their income climbs very steeply with age.

The results here are somewhat like those of King (1972). In his analysis of house purchases during the years 1967-69 in the New Haven SMSA he finds an R^2 of .63 for households with heads aged 40-50 compared with R^2 of .34 for heads under 30 and R^2 of .17 for heads over 60.[11] He also finds, contrary to our findings, an elasticity much lower for elderly households than for heads 30-60.

See footnote(s) on page 199.

This is perhaps associated with the existence of the capital gains tax in the U.S. Such a tax would discourage trading down.

The pattern of variation of elasticity with age for renters is quite distinctly different from that for owners. In most areas elasticity increases with age so that, though for all ages, taken together, renter elasticities are less than owner elasticities, for elderly households the reverse is usually true. This is consistent with the hypothesis that permanent income is an important determinant of housing expenditure. For elderly renters, unlike owners, there is not the problem of omission from current income of imputed rental income so that measured income is a quite good proxy for permanent income. These results perhaps also reflect the greater transactions costs for owners than for renters. High transaction costs may make elderly owners relatively reluctant to adjust their housing expenditure to reduced income by moving.

In rural areas, very young households, unlike the case elsewhere, have a higher elasticity than households with heads 30-44. For all age groups, renter elasticities in rural and small urban areas are lower than owner elasticities. Indeed, in rural areas renter elasticities are usually well under half owner elasticities. In these areas, also, the housing expenditure of renter households accounts for a very low proportion of income. Thus while in Toronto annual gross rent as a percentage of current income for elderly households is 27%, in large urban areas it is 23%, in small urban areas, 25% and in rural non-farm areas only 19%. This is especially noteworthy in view of the fact that households in rural areas are much poorer than those in more urban areas, with an average income of just $3,800 as compared with $6,000 in the Toronto CMA.

7.3. Income and Wealth Components, Household Composition and Housing Expenditure

The parsimonious model of housing just presented has allowed important conclusions about some major issues. A richer model is now called for, for a variety of reasons. At a purely statistical level, the parameter estimates of the parsimonious model are in general affected by specification error bias. At a substantive level it is of interest to specify a model which can capture effects suggested by the discussion in Chapter 2. We estimate such a model for the Toronto and Montréal CMA's. Among the variables in this model are transitory income, permanent income, opportunity net worth (for definition and estimation see Chapters 2 and 3), and variables describing household types and household size.[12]

7.3.1 Household Composition and Housing Expenditure

To capture the effects of household size we use two variables: number of children under 18 and number of adults. This is done because of possible endogeneity with respect to adults but not children. In the case of children under 18 there is a strong presumption that household composition is decided exogenously to the housing decision. In other words, parents presumably do not choose their housing and then choose which, if any, of their children they will allow to share that housing with them. On the other hand, an adult owning or renting a dwelling may - on the basis of spare rooms in that dwelling - decide to invite another adult to join his household. Or, alternatively for adults, especially in the case of rented dwellings, the choice of housing and choice of size of household may be joint. In fact the results (Tables 7.5 and 7.6) show children add more to expenditure than do adults and children have a much greater effect for renters than for owners. A renting household with two children, at least one under six, spends $9.30 more in Toronto and $10.29 more in Montréal than a household without children. For owners the amounts are $11.03 and $1.03, respectively[13,14] (but none of the owner coefficients are statistically significant). These results are unlike those of David (1962) who, however, does not distinguish between adults and children. He finds a substantial reduction in housing expenditure with increases in family size. Results more like ours are those of Goldstein, who in another U.S. study

See footnote(s) on page 199.

TABLE 7.5. Estimates of Models of Housing Expenditure for Owners, Toronto and Montréal CMAs, 1971

(Dependent variable: Sales value in hundreds of dollars)

Variables	Models							
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Toronto CMA				Montréal CMA			
Female head								
Single	15.32	43.15[1]	19.19[2]	38.41[1]	42.19[1]	64.14[3]	57.81[3]	51.63[3]
Not single	.073	25.68[3]	6.35	20.73[1]	2.98	20.45[2]	9.09	9.12
Male head, non-married	-16.55[2]	9.09	3.35	-12.39[2]	-42.08[3]	-38.02[3]	-34.65[1]	-46.14[3]
Non-married head[4]								
(Age 45)	- 1.81[3]	2.07[3]	.20	- 1.85[3]	.32	1.19[2]	.73[2]	.87[2]
(Age 45) squared	.049[3]	.053[3]	.031[2]	.048[3]	.024[2]	.036[2]	.041[2]	.039[2]
Married heads[4]								
(Age 45)	.44[2]	- .043	2.57[3]	.21	1.17[3]	- .27	3.23[3]	.18
(Age 45) squared	.025[1]	.012	.025[2]	.027[1]	.036[1]	.013	- .033[1]	.038[3]
Children under 6 present	6.45[2]	7.89[2]	5.45	6.75[2]	3.40	6.11	1.74	3.33
Number of children	2.45[2]	1.58[2]	.53	1.90[2]	1.55	- 2.54[2]	.15	1.45
Number of adults (-2)	1.54	3.36[2]	14.19[3]	3.48[2]	7.96[3]	6.78[1]	5.37[2]	7.10[1]
Retired male head[5]	7.31	25.32[1]	2.95	25.83[1]	9.23	32.59[1]	-24.32[3]	37.92[1]
Unemployed head[6]	-15.31	- 9.72	-27.83[1]	-11.30	5.54	.60	9.27	1.33
Years of education, head	7.44[3]	4.26[3]	5.33[1]	4.87[3]	6.59[3]	4.57[3]	6.01[3]	5.95[3]
More than one earner	-20.71[3]	-17.47[3]	9.91[1]	-17.54[3]	-17.42[3]	-16.74[3]	.36	-17.86[3]
Self-employed head	52.20[3]	38.79[3]	48.04[3]	39.49[3]	37.68[3]	30.85[3]	46.40[3]	31.56[3]
Measured income[7]	4. 59[3]				6.31[3]			
Transitory income				3.75[3]				5.85[3]
Unexpected transitory		3.76[3]				5.90[3]		
Expected transitory income		6.11[3]				11.07[3]		
Permanent income		6.68[3]	4.72[3]	5.68[3]		8.61[3]	4.22[3]	6.15[3]
Opportunity net worth		.41[3]		.82[3]		.038		1.02[3]
Constant	207.06[3]	194.70[3]	207.59[3]	192.63	67.63[3]	59.58[3]	72.06[3]	53.89[3]
R^2	.307	.324	.240	.323	.418	.428	.250	.424
Number of observations	3154	3154	3154	3154	1666	1666	1666	1666
Income elasticity[8]	.192	.280	.206	.240	.404	.522	.321	.398

[1] Significant at 5% level.

[2] $|t| \geq 1$.

[3] Significant at 1% level.

[4] The F-statistic for the group of four age variables in Rows 4-7 for the Toronto CMA is 2.58 for the second specification; for Montréal CMA it is 1.14 for the second specification.

[5] Male head 55 or over, not in the labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] Actual household income.

[8] Income elasticity computed at variables means. The income elasticity for models two and four is computed as the sum of the elasticities of the income components.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

TABLE 7.6. Estimates of Models of Housing Expenditure for Renters, Toronto and Montréal CMAs, 1971

(Dependent variable: Monthly gross rent)

Variables	Models							
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Toronto CMA				Montréal CMA			
Female head								
Single	-16.71[1]	- 8.60[2]	-11.82[1]	8.50[2]	-11.25[1]	3.28[3]	6.18[2]	6.58[2]
Not single	- 8.95[2]	1.43	- 6.45[3]	1.54	4.78[2]	14.85[1]	6.95[1]	11.06[1]
Male head, non-married	-18.25[1]	-15.34[1]	-14.04[1]	-15.25[1]	-11.80[1]	7.70[1]	6.13[2]	9.70[1]
Non-married head[4]								
(Age 45)	.27[1]	.32[1]	.30[1]	.32[1]	.094[3]	.066	.56[1]	.060
(Age 45) - squared	.0076[3]	.011[2]	.0025	.011[1]	- .0014	.0041[3]	.0035[3]	.0013
Married head[4]								
(Age 45)	.37[1]	.27[3]	1.27[1]	.27[3]	.28[1]	.094	.90[1]	.21[2]
(Age 45) squared	.017[1]	.019[1]	.022[1]	.019[1]	.0089[2]	.00057	.0054[3]	.0071[3]
Children under 6 present	1.33	.60	.63	.58	7.21[1]	6.44[1]	6.21[1]	6.81[1]
Number of children	4.26[1]	4.35[1]	4.31[1]	4.35[1]	2.12[1]	1.92[1]	2.54[1]	2.21[1]
Number of adults (-2)	6.55[1]	7.87[1]	12.77[1]	7.89[1]	.71	1.95[2]	6.83[1]	1.52[3]
Retired male head[5]	4.95[2]	4.71[3]	8.09[3]	4.75[3]	3.23	10.20[1]	1.84[3]	10.16[1]
Unemployed head[6]	8.77[2]	6.24[3]	-10.75[2]	6.22[3]	2.23[1]	.34[1]	4.88[3]	1.04[1]
Years of education, head	3.43[1]	2.04[1]	2.51[1]	2.04[1]	3.11[1]	2.27[1]	2.85[1]	2.43[1]
More than one earner	4.03[3]	3.51[3]	5.14[2]	3.50[3]	3.08[3]	2.59[3]	4.40[1]	3.08[3]
Self-employed head	23.94[1]	15.90[1]	19.02[1]	15.84[1]	12.71[1]	7.07[2]	9.53[1]	8.48[1]
No stove or refrigerator	-10.28[1]	9.77[1]	-11.09[1]	9.76[1]	-18.90[1]	-18.27[1]	-19.34[1]	-18.45[1]
Measured income[7]	3.11[1]				2.92[1]			
Transitory income				2.56[1]				2.64[1]
Unexpected transitory income		2.57[1]				2.57[1]		
Expected transitory income		2.51[1]				4.66[1]		
Permanent income		3.91[1]	2.35[1]	3.94[1]		4.45[1]	1.81[1]	3.39[1]
Opportunity net worth		.56[1]		.55[1]		.034		.34[1]
Constant	97.76[1]	89.76[1]	106.51[1]	89.63[1]	76.73[1]	67.58[1]	79.25[1]	69.95[1]
R^2	.285	.302	.228	.302	.264	.272	.201	.269
Number of observations	3416	3416	3416	3416	5117	5117	5117	5117
Income elasticity[8]	.187	.269	.199	.270	.207	.309	.181	.262

[1] Significant at 1% level.

[2] Significant at 5% level.

[3] $|t| \geq 1$.

[4] The F-statistics for the group of four age variables in Rows 4-7 for the Toronto CMA is 8.87 for the second specification; for Montréal CMA it is .86 for the second specification.

[5] Male head 55 or over, not in the labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] Household income.

[8] Income elasticity computed at variable means. The income elasticity for model two and four is computed as the sum of the elasticities of the income components.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

finds the effect of children to be quite strongly positive for renters (except for those with heads under 30) but negative for owners.[15] In general, however, U.S. studies do not find the highly signficiant and quantitatively quite substantial effect for children that we find for renters in both cities. One possible reason for differences might lie in a variant of the minimum bundle hypothesis. In the U.S., urban area households with children may find it relatively easy to rent large low-quality dwellings - David in his U.S. study finds that the number of rooms rises with household size although rent falls - which, because of stricter building bylaws, are not readily available in Toronto or Montréal. In Toronto it is also true that it is very common for landlords to refuse to rent to households which include children so these households are perhaps forced into relatively scarce, relatively costly accommodation.[16]

Each adult added to a renter household in Toronto adds, according to Table 7.6, about $8 to rent in Toronto and under $2 in Montréal. This suggests that, in Toronto, households already formed do not find that their larger size and consequent larger expenditure on food and clothing (and other items which tend to have a relatively constant expenditure on a per-head basis) induces them to cut back on housing expenditure. Alternatively, the quite large positive effect for adults perhaps mostly reflects the fact that when two people decide to share, their total expenditure is larger than one person of the same total income. One person at $10,000 per year is perhaps less likely to live in a two-bedroom apartment than two people each earning $5,000. The proportion of not-married heads is 41% in Toronto and 38% in Montréal[17] and it is this not-married group for which the likelihood is greatest that the household formation decision either is a result of the housing decision or is joint with it. For owners the effect of an additional adult is slight in Toronto and significantly negative in Montréal (a result relatively like U.S. results). In sum, the number of adults, like the number of children, has a much less positive impact on the expenditure of owners than on the expenditure of renters.

Almost all the remaining variables in the regressions are associated with the income and wealth of the household. Measured income is the only explicit income variable included in the first specification. For this specification, the

See footnote(s) on page 199.

income coefficients are very much like those shown in Tables 7.1 and 7.2. That is, the income elasticity in all cases is low for both Toronto and Montréal, very much lower for owners in Toronto than in Montréal and lower for renters than for owners. As in Kain and Quigley's results (1975), these elasticities estimated in the context of a fully specified model are somewhat lower than elasticities estimated on the same basis - i.e. using sample mean income - for the one-independent-variable model.[18] This indicates that measured income is positively correlated with other variables included in the model such as education.

In the second specification measured income is replaced by its components, permanent income, expected transitory income and unexpected transitory income. The sum of all these equals measured income while the sum of the first two components is current (1970) income expected on the basis of characteristics such as education of the household head (see Chapter 2 for details). Unsurprisingly, in view of the correlations referred to above, the income elasticity estimated from this model is substantially greater than that estimated from the first model. For Toronto owners it is .28 compared with .19; for Montréal owners it is .52 compared with .40.

The effect of expected current income (permanent income plus expected transitory income) is much greater than the effect of unexpected transitory income. The differential is about as large for the expenditure of renters as it is for the expenditure of owners, implying that neither group adjusts its housing as much to windfall income as to other income. This is consistent with the existence of costs of moving in both cases and with the view that permanent consumption should depend more on permanent income than on windfall income. It is somewhat surprising that the effect is not stronger for owners than for renters in view of the large transaction costs for owners. On the other hand, the decision to own which precedes the decision on expenditure for owners itself depends strongly on permanent income (see Chapter 6).

An unemployed head is one unemployed during the census week. To the extent that it is correlated with past unemployment experience current unemployment indicates the variance of income. The results (Tables 7.5, 7.6) show

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See footnote(s) on page 199.

that its effect on expenditure is rather slight. Even for Toronto owners it has no more effect than a decrease by about $1,500 in permanent income. This is in great constrast to its role in the ownership model where it is very statistically significant and has an effect equal to a decline of $5,500 in permanent income (Table 6.4).

The source of household income has a very large and statistically very significant effect on housing expenditure for owners; much less so for renters. The presence of "more than one employment income earner" reduces house value remarkably uniformly in the two cities. According to specification two, house value declines by between $1,670 and $1,750. Put another way, if a man has a working wife earning $4,650, house value in Toronto is predicted to be no greater than if the wife were at home earning nothing.[19] In the case of renters, gross rent is reduced only by $2.30 to $3.50 per month by the presence of two or more employment income earners. This is as one would expect. Owners - much more than renters - are likely to purchase a house on the basis of the income of the head of the household rather than on the basis of household income because of the fixed commitment involved in mortgage payments and the attitude of mortgage lenders.

The expenditure of widowed, separated and divorced women is explicable in terms of their special economic circumstances. Owners among them have houses worth more than $2,000 above the amount predicted on the basis of their income and other characteristics (see specification two). Those who are renters also spend more than predicted on the basis of their other characteristics but not as much more as do owners. This is probably the outcome of the fact that these women frequently have assets whose size depends not on their own past and current earnings but rather on the income of the husband who was once part of their household. The most important of these assets is, apparently, a house, in view of the rather small effect on this marital status on rent paid.

It is of interest that single women, ceteris paribus pay substantially less rent than do married men but substantially more than single men. As we have seen (Chapter 5) single women (especially young single women) at a given income level are also more likely to head a household than are single men. These

See footnote(s) on page 199.

two results together apparently imply a very markedly greater taste for housing by women than by men. It is possible, however, that this extra housing consumption is not so much the consequence of greater taste as it is of consequence of different economic circumstances. Single women typically expect to be married at some future date and so to be part of a household with more than twice their current income. For this reason the value for their permanent income as estimated here on the basis of their own characteristics is probably a substantial underestimate of their actual permanent income. If so, the large positive effect for single females (compared with single males) is merely a correction for this error. The future economic prospects of a single woman are much better than her own income would indicate and so her consumption - including her consumption of housing - may be expected to be higher than warranted by her own income.

In Chapters 5 and 6 we saw that age has a very great effect on the separate-dwelling decision and on the ownership decision. Earlier in this chapter the results of the model using income as the only independent variable showed that this strong influence of age does not carry over to the housing expenditure decision. This is corroborated here. For married owners there is a decline in expenditure after middle age (the peak age for expenditure is 43 in Toronto and 52 in Montréal) but this decline is slight. For not-married heads, both renters and owners, expenditure declines more with age than it does for married heads. The decline is so marked for owners that in this case age can be said to have an important effect. It seems plausible that this is related to the especially large relative reduction in space needs of a single parent whose children leave home and to the maintenance burden of a large house when there is no spouse to share the chores.

Finally, we comment on the remarkably powerful effect of education. The effect is a powerful one even when permanent income - which depends very substantially on education - is included in the model.[20] Furthermore, its coefficient is remarkably robust. Four additional years of education in Toronto adds $1,704 to house value in Toronto and $1,828 in Montréal. It adds $8.16 per month to rent in Toronto and $9.08 in Montréal. For renters and owners in both places a year of additional education adds more to expenditure than $500 extra permanent income. U.S. studies show quantitatively very similar results (Morgan, 1965; Kain and Quigley, 1975). It is illuminating to quote the author of the first study:

See footnote(s) on page 199.

> "While formal education is clearly important in explaining not only income, but consumption of housing relative to income, the explanation of the effect is probably not because of differential long-run or lifetime incomes, past or expected, but because of more immediate direct effects of education, such as short-term income security and stability, the capacity to plan ahead, and the resulting willingness to make major contractual commitments." (Morgan, 1965, p. 306)

Our results show that, contrary to Morgan, part of education's effect does arise because of the association of education and permanent income (cf. specifications one and two). Whether Morgan's emphasis on the association of education and short-term income security and stability as the source of its effect of housing is well-founded is an open question. Prima facie this seems plausible and the substantial positive (but not, in Toronto, statistically significant) effect of retirement - another income stability indicator - provides empirical support. At the same time, if education were largely important because of its association with income stability one would expect to find its effect vis-a-vis permanent income much greater for house value than for rent because of the lesser transaction costs in changing rent expenditure. But it is not much greater. Furthermore, "self-employment", a characteristic indicating income instability, is associated with greater expenditure for owners and renters, not less.

7.4. Income Interactions and Housing Expenditure

Public policy often focusses on poor households or on middle-income households. In this section we see how the behaviour of these households differs from that of higher-income households. For this purpose the last logit model in Tables 7.5 and 7.6 is estimated for each of three groups, households with household income reported to the census of less than $7,500, those with income of $7,500 to $14,999 and those with income of more than $15,000. As can be seen from the observations numbers in Tables 7.7 and 7.8, the proportion of the Toronto sample in these three groups is respectively 30%, 45% and 25%; for Montréal, 43%, 43% and 14%.

It is unsurprising that income and opportunity net worth do not have a statistically significant effect on house value for the lowest income groups in both cities. Most households with an income as low as this could not afford to own on the basis of that income so financial circumstances other than those indicated by our income variables both allow them to own and determine the value of the house.

TABLE 7.7. Estimates of a Model of Housing Expenditure for Owners, by Income Group, Toronto and Montréal CMA's, 1971

(Dependent variable: Sales value in hundreds of dollars)

Variables	Toronto			Montréal		
	Less than $7,500	$7,500 to 14,999	$15,000 and over	Less than $7,500	$7,500 to 14,999	$15,000 and over
Female head						
Single	58.41[1]	-25.45	36.66	18.73	125.90[2]	42.26[3]
Not single	- 2.19	29.27[1]	52.17[1]	4.08	8.11	-31.40
Male head, non-married	-19.97	- 8.15	4.97	-37.28[1]	-52.64[2]	-38.21
Non-married head[4]						
(Age - 45)	- 1.16	- 1.60[3]	- 4.16[1]	- 1.18[3]	.27	- 3.88[3]
(Age - 45) squared	.037[3]	.0072	.13	.049[3]	.0051	.16[3]
Married head[4]						
(Age - 45)	.23	- .021	- .30	.42	.26	- .24
(Age - 45) - squared	- .025	- .028[3]	- .015	- .00028	- .038[1]	- .12[2]
Children under 6 present	3.63	4.37	9.81[3]	- 2.72	- 1.08	15.27
Number of children	- 2.94	1.30	2.70[3]	- .77	.34	- 4.46[3]
Number of adults (-2)	12.62[3]	4.47[3]	1.07	3.51	- 6.95[1]	- 8.08[3]
Retired male head[5]	27.05[3]	13.33	33.04[3]	10.89	9.54	108.15[3]
Unemployed head[6]	-27.32[2]	-19.85[2]	22.53[2]	.98[2]	- 2.89[2]	-53.02[2]
Years of education, head	4.35[2]	3.72[2]	6.51[2]	4.83[2]	3.38[2]	11.14[2]
More than one earner	6.58	-20.38[2]	-31.19[2]	-10.55	-17.24[2]	-12.47
Self-employed head	3.86	50.38[2]	46.30[2]	6.35	27.02[2]	52.45[2]
Transitory income	- 3.76[3]	3.61[2]	3.06[2]	- 2.19	3.86[2]	6.19[2]
Permanent income	.33	4.40[2]	4.56[2]	.85	5.08[2]	4.59[2]
Opportunity net worth	.50[3]	.73[2]	1.03[2]	.059	.88[1]	1.52[2]
Constant	230.12[2]	223.38[2]	205.36[2]	109.64[2]	85.75[2]	12.61
R^2	.090	.088	.345	.042	.175	.399
Number of observations	567	1441	1146	370	788	508
Income elasticity[7]	.047	.161	.250	.018	.334	.398

[1] Significant at 5% level.

[2] Significant at 1% level.

[3] $|t| \geq 1$.

[4] The F-statistics for the group of four age variables in Rows 4-7 are .64, 1.78 and 2.21 for Toronto; .90, 1.29 and 2.31 for Montréal.

[5] Male head 55 or over, not in the labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] Household income.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

TABLE 7.8. Estimates of a Model of Housing Expenditure for Renters, by Income Group, Toronto and Montréal CMAs, 1971

(Dependent variable: Monthly gross rent)

Variables	Toronto			Montréal		
	Less than $7,500	$7,500 to 14,999	$15,000 and over	Less than $7,500	$7,500 to 14,999	$15,000 and over
Female head						
Single	- 6.54[1]	- 6.45[1]	- 9.00[1]	- 3.80[2]	- 1.57[2]	-25.88[1]
Not single	3.93	4.93	25.12[1]	9.67[2]	17.11[2]	7.08
Male head, non-married	-12.94[3]	-12.34[3]	-24.18[3]	- 6.26[1]	- 8.93[3]	-23.92[1]
Non-married head[4]						
(Age - 45)	- .37[2]	- .27[1]	.18	.056	.077	.39
(Age 45) - squared	.011[3]	.021[3]	.0036	.0014	.0043	.0027
Married head[4]						
(Age - 45)	.18	.39[1]	.50	.31[3]	.055	.68[1]
(Age 45) - squared	- .011[1]	- .0064	- .049[2]	- .0075[1]	- .011[1]	- .013
Children under 6 present	- 2.40	1.39	- 2.56	6.80[3]	7.95[2]	- 2.76
Number of children	2.59[1]	5.51[2]	7.73[3]	2.17[2]	2.31[2]	- .51
Number of adults (-2)	11.29[2]	7.28[2]	6.44[3]	6.38[2]	1.51[1]	.64
Retired male head[5]	- 6.93	19.97[1]	105.24[3]	2.47	23.48[2]	9.13
Unemployed head[6]	- 3.34[2]	- 8.86[2]	- 5.79[1]	2.01[2]	- .31[2]	- 6.77[2]
Years of education, head	1.54[2]	2.12[2]	2.41[1]	2.12[2]	1.88[2]	4.58[3]
More than one earner	- 2.99[2]	8.13[2]	-12.15[1]	1.24[2]	- 1.27[2]	-22.66[1]
Self-employed head	18.54[2]	11.42[1]	25.65[3]	11.30[2]	13.26[2]	-14.32[1]
No stove or refrigerator	.67	-15.94[2]	-20.30[3]	-11.29[2]	-21.99[2]	-36.68[2]
Transitory income	2.65[2]	2.46[2]	1.26[2]	1.24[2]	3.07[2]	2.37[2]
Permanent income	3.99[2]	3.52[2]	2.92[2]	2.02[2]	3.80[3]	3.49[2]
Opportunity net worth	.58[2]	.37[3]	.47[1]	.15[1]	.31[3]	.47[1]
Constant	90.21[2]	99.15[2]	122.66[2]	76.77[2]	70.88[2]	78.95[2]
R^2	.153	.122	.226	.103	.178	.317
Number of observations	1424	1520	472	2547	2117	453
Income elasticity[7]	.185	.258	.273	.124	.338	.408

[1] $|t| \geq 1$.

[2] Significant at 1% level.

[3] Significant at 5% level.

[4] The F-statistic for the group of four age variables in rows 4 to 7 are 3.77, 4.11 and 3.08 for Toronto; 1.73, 1.40 and .42 for Montréal.

[5] Male head 55 or over, not in the labour force and last worked before 1970.

[6] Currently unemployed but worked during 1970-71.

[7] Household income.

Source: 1971 Census of Canada, Public Use Sample Household Tapes.

In all other cases both transitory and permanent income have a very significant effect statistically, and a $1,000 of permanent income invariably has a larger quantitative impact than has transitory income (Chart 7.2). It is noteworthy that while for owners the income coefficients do not differ much between the middle and high-income groups, for renters the coefficients of both income components in both cities are higher for the middle-income group than the high-income group, and in Toronto, are higher for the low-income group than the middle-income group.[21]

These results thus imply that income coefficients estimated using a sample of households from all income groups will give an unduly pessimistic impression of the efficacy of an income transfer in improving the housing conditions of poor and middle-income renters.

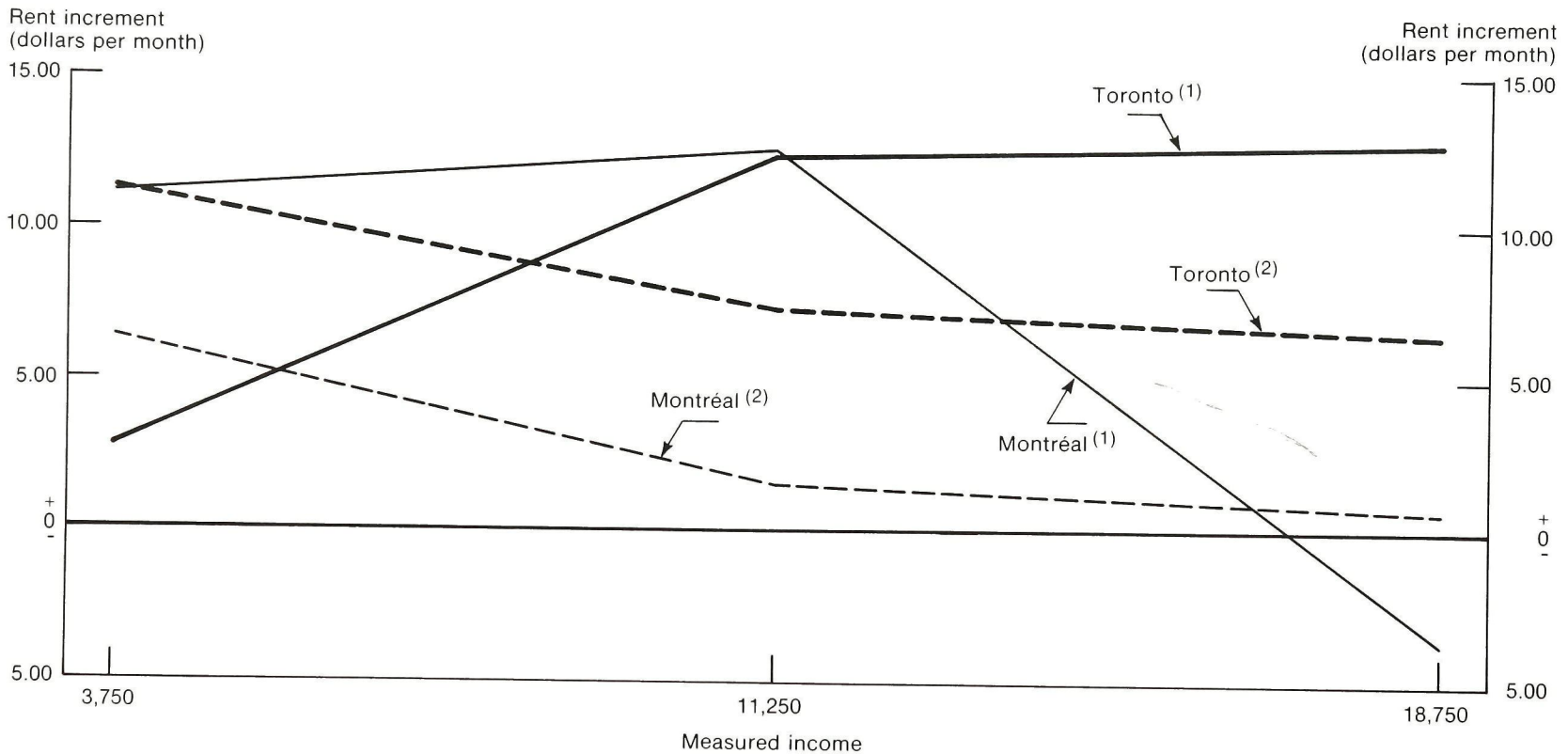
The pattern of effects for opportunity net worth is quite remarkable. A $1,000 increase in opportunity net worth almost invariably increases housing expenditure by more the higher the income group. This pattern is especially strong for owners. One interpretation of this is that the portfolio-balance motive for investment in housing is stronger, the higher the current income of the household.

Income and household composition interact quite strongly, especially for renters. The nature of this interaction is very different for children than it is for adults, once more indicating the inadvisability of specifying a household-size variable which does not distinguish between the two (David, 1962; King, 1972). In both cities the number of children has a negative effect on house value for the poor, a small positive effect for the middle-income, and, in Toronto, an even larger positive effect for the higher-income households. (None of these coefficients are by themselves statistically significant.) For renters the pattern of increasingly large positive impact with income is much stronger (Chart 7.3). The readiness of parents to use some of an increase in income to provide more space and better housing for their children is not at all surprising. What is quite surprising is the fact that poor renters spend more on housing the more children they have. This is contrary to what one would expect on the basis of U.S. findings

See footnote(s) on page 199.

Chart — 7.2

The Effect of the Number of Children and Adults on Rent by Income Level, Toronto and Montréal CMAs

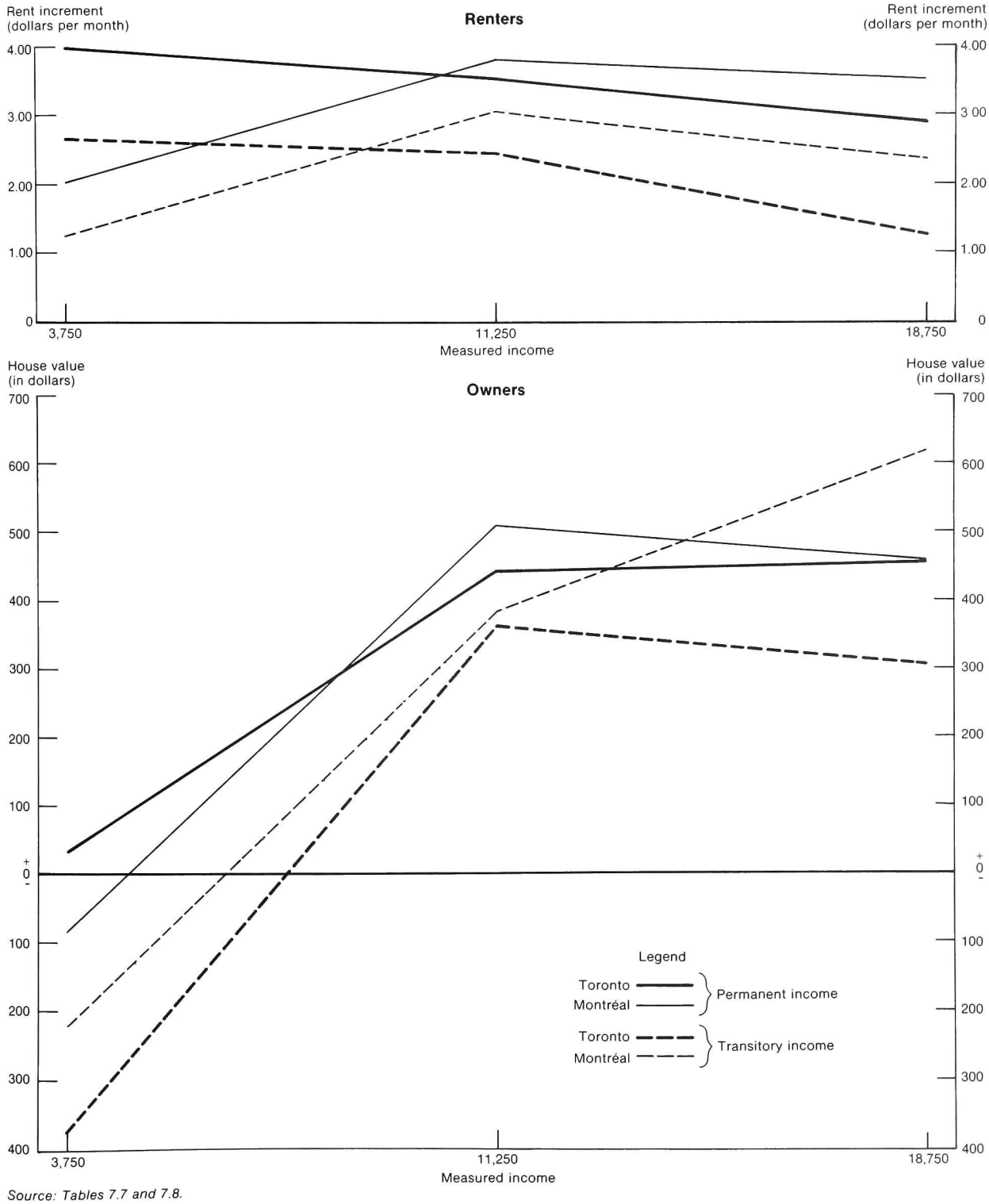


(1) Two children, at least one less than six years.
(2) One additional adult.

Source: Table 7.8.

Chart — 7.3

The Effect of $1,000 Transitory Income and $1,000 Permanent Income on Expenditure, Renters and Owners, Montréal and Toronto CMAs



Source: Tables 7.7 and 7.8.

(David, 1962). There, one of the ways poor families balance the strain of a large family on the budget is to reduce housing expenditure by living in low-quality accommodation. Perhaps in Canada, the fact that household income increases as the number of children increase because of family allowances encourages parents to increase housing expenditure.

Although the number of children increases expenditure more, the greater the household income, the number of adults does the reverse. In Toronto, an additional adult increases rent by $11.29 per month for the poorest group but only $6.44 for the richest. For Montréal, the increments are $6.38 and $0.64 respectively. We suspect this reflects the varying reasons for additional adults being members of the household. In poor households the adults are more apt to be sharing the household for largely economic reasons with the household renting larger accommodation as a condition of the sharing arrangement. In richer households the accommodation will be more spacious to start with and, additionally, the extra adults are apt to be there because of the non-economic benefits of their presence.

FOOTNOTES

[1]The "pure price" of housing is the concept referred to in Chapter 4. It is the price of a house with precisely specified characteristics. Within a given market area the quantity of housing embodied in a house is indexed by the ratio of its value to the value of the standard house. This means that houses close to the centre of a city, other things being equal, embody a greater "quantity" of housing than houses in the suburbs because the value of land is higher. This price concept, while the usual one in economic literature, including the economics of housing literature (e.g. Muth, 1960), is not always used in urban economics literature. For instance, Polinsky (1977) does not take price as the price of a standard house at a given location. He regards the variation in value of a house resulting from a variation in the value of the land on which it rests as a variation in pure price rather than a variation in quantity. A third price concept sometimes used is a gross price defined as the Polinsky-type price plus the cost of commuting to work. It will be seen that if all workers work at the centre of the city, and if land values rise with the distance from the centre of the city in such a way as to reflect commuting cost, this gross price is essentially the same as our price concept. On the other hand, if two household heads work at different locations then the price to them of a house at any given location will differ. This price concept is used by Straszheim (1975). Its usefulness has been questioned by those who doubt that place of work is the overriding determinant of housing location (Richardson, 1971).

[2]Let $h = \alpha + \beta y$, where h is housing expenditure. Then $\frac{dh}{dy}(y/h)$, the elasticity of h with respect to y, is $\frac{\beta y}{\alpha + \beta y}$. If α is positive, this expression is less than one. As y gets very large, $\frac{\beta y}{\alpha + \beta y} \rightarrow \frac{\beta y}{\beta y}$ 1.

[3]Assume $h = e^{\gamma 0} y^{\gamma 1}$. Then the elasticity of h with respect to y is $\gamma 1$. Note $h = e^{\gamma 0} y^{\gamma 1}$ may be expressed as $\log h = \gamma 0 + \gamma 1 \log y$.

[4]More precisely, the proportion of the variation in the natural log of housing expenditure (indicated by selling value, for homeowners, and gross rent, for renters) explained by variation in the natural log of income is generally much less than (for the linear specification) the proportion of the variation in housing

expenditure explained by the variation in income. Strictly, it has been usually held that the R^2s from these two equations are not comparable (Theil, 1961, p. 212) for the purpose of determining the relative desirability of the two specifications. Recently, however, it has been argued that these two R^2s may often be compared (Granger and Newbold, 1976).

[5]The pattern also exists, albeit less strongly, when the linear form elasticities are computed using for income the mean of the sample used for estimation.

[6]We use those of de Leeuw's, Carliner's and Kain and Quigley's results which come from their specifications most similar to ours. Carliner's specifications include prices, which increases their comparability to the single-market results of Kain and Quigley.

[7]In a very recent paper Smith and Campbell (1978) have argued that the much greater size of elasticities estimated using city averages than those estimated using micro data arise because using city averages amounts to grouping the data according to values of the dependent variable, and as Feige and Watts (1972) have shown, such a grouping yields upward-biassed estimates of the coefficients. Our point here, much expanded below, is that the reason that using city averages amounts to grouping the data according to value of the dependent variable, house value, is the existence of community norms.

[8]We note that the "minimum bundle" is somewhat akin to the subsistence minimum assumed in Stone's demand functions (Green, H. A. J., Consumer Theory, 1971, p. 136, 137). The minimum bundle here is imposed by the community, however. It is not one chosen by the household as its subsistence level.

[9]This probability can be computed as follows. The probability of a household being a high-quality demander is .05. Thus the population mean is .05 and the population variance is .0475, and the standard deviation is .218. For a sample of 90,000 households, the expected sample mean is .05 and the standard deviation of the sample mean is .218/300 = .00073. For a sample of 2,500 households the expected sample mean is .05, but the standard deviation of the sample mean is .218/50 = .00436. Appealing to the central limit theorem, assume the sample mean

is normally distributed. Then there is a probability of essentially zero in the first case that the vacancy rate will be more than 10% while in the second case the probability is 12.5%

[10]These comments are based largely on the linear-regression results.

[11]His specification is log and so these R^2s refer to the explanation of percentage deviations in purchase price. His specification includes a number of variables besides current income but does not include any average lifetime income proxy such as years of education (King, 1972, Table V.3, p. 175).

[12]In the renter equations "no stove or fridge" is also included. This takes the value one if the household has neither a stove nor a refrigerator provided by the landlord. Since the tenant in this case has to provide the stove or fridge himself gross rent must be adjusted downwards. The parameter estimates for Toronto indicate that the cost (imputed or actual) of renting the appliance is about $10 per month. For Montréal, the estimate is so high, at $19, as to suggest that this variable in Montréal is picking up other influences. Perhaps households who provide their own stove also provide their own heat in Montréal and perhaps the census adjustment for this is not large enough. (Kain and Quigley's estimated correction is $20 despite a much lower mean rent (1975, pp. 158, 201).)

[13]Based on the second specification.

[14]The owner figure assumes that each hundred dollars of house value implies a monthly expenditure of $1. This assumption is derived from the common rule of thumb in the real estate trade that a dwelling is worth 100 times its monthly rent. If a property is not mortgaged, cash outlay will be much less than this amount although imputed expenditure may not be.

[15](1971, pp. 144, 145, 157). Goldstein's sample is one confined to recent movers.

[16]In 1976, the practice was so widespread that the City of Toronto passed legislation outlawing it in some circumstances. It is worth noting that Goldstein's study uses data for the San Francisco Bay Area while Kain and Quigley, who find a negative impact of children on rent (1975), use data for St. Louis. One may speculate that in prosperous San Francisco with a low vacancy rate landlords were less willing to rent to families with children than in depressed St. Louis and so one may infer that, in San Francisco, households with children paid higher rent not through choice but because they were forced to pay a scarcity premium.

[17]Computations based on Public Use Sample household tape.

[18]For owners these elasticities from the model with income as the only independent variable are for Toronto, .23, and, for Montréal, .45. For renters they are both .24.

[19]Computed by noting that for Toronto the effect of $1,000 of additional transitory income, as indicated by the second specification, is in absolute terms 3.76/17.47 of the effect of more than one income earner.

[20]For owners, the t-statistic is 14.3 in specification one in Toronto, 11.0 in Montréal; in specification two it is respectively 6.3 and 5.1. For renters the t-statistics are 12.9 and 16.6; and 6.3 and 9.5 respectively.

[21]The permanent income t-statistics for the three owner income groups starting with the lowest income group are, for Toronto, .1, 3.7, 8.4; for Montréal -.3, 3.9, 3.9. The t-statistics for renters are, for Toronto, 5.9, 5.4, 4.3; for Montréal 4.3, 8.0, 3.9. The transitory income t-statistics are roughly similar except for high-income Montréal owners (11.4) and renters (6.0).

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