RESEARCH REPORT

THE EFFECT OF DEVELOPMENT CHARGES ON URBAN FORM: AN ECONOMETRIC ANALYSIS

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THE EFFECT OF DEVELOPMENT CHARGES ON URBAN FORM: AN ECONOMETRIC ANALYSIS

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ABSTRACT

This report examines the connections between increasing development charges placed on residential construction and the spread and density of cities. It first reviews the literature on the extent to which increases in development charges increase housing prices and on the estimated coefficients describing the price elasticity of demand for housing. This gives a sense of the magnitude of the impacts.

The empirical work develops multivariate logit models of tenure and building type choice by examining the differences across Canadian cities attributable to differences in the price of housing services relative to consumers' income.

The study concludes that increasing development charges favours the growth of demand for higher-density building types, primarily by keeping a relatively large proportion of households out of the homeownership market. Both homeowners and renters are shown to react to higher price levels by increasing their propensity to move into a row or townhouse rather than a single-family detached house, or to move into an apartment rather than a townhouse. Young people are affected more than older people by increases in development charges.

While the quality of the estimates, as judged by their variance, is very good, the magnitude of the effect they depict is small. Although development charges of $25,000 per unit are estimated to reduce homeownership propensities by over 10 per cent in some cities, their effect on building type choice within each tenure category is less than one per cent.

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1 INTRODUCTION

The report addresses the effect of development charges on the spatial structure of cities. The primary focus is the effect of overall housing price increases on the mix of dwelling types offered in a city. Development charges are expected to increase housing prices which, in turn, reduce the amount of housing services people are willing to consume. The consumption of housing services is reduced by buying smaller homes with fewer amenities on less land. The reduction in housing consumption, if large enough, may lead to a change in building type. If development charges rise enough, some households will no longer buy single-family detached houses and will purchase an attached, semi-attached, row or townhouse. As the overall level of housing prices increases, the households that might have wanted a medium-density unit now select a unit in an apartment building. Price changes and housing consumption are related to the mix of building types that are offered by builders and bought or rented by households. The mix of building types in new construction determines urban spread and overall density. Development charges, by affecting housing costs, prices and rents, therefore, affect the shape of the city. The size of their impacts is the main question addressed in this study.

The structure of the report is as follows. Part One presents a literature review and the context for the empirical study presented in Part Two. Chapter 2 discusses the effect of development charges on the cost of producing housing services and concludes that the conventional practice of setting development charges is likely to increase the cost of new housing services. Chapter 3 discusses the link between increasing the cost of producing housing and the price consumers end up paying for housing services, and concludes by endorsing the belief that the institution of development charges leads to an increase in the price consumers pay for housing services in, at least, the short and medium terms. Eventually, the property tax reductions (relative to what they would have been), permitted by the reliance on development charges, reduce the consumer burden and lower housing costs.

Chapter 4 accepts the connection between increasing development charges and rising housing prices, and traces the likely consequences on the quantity of housing services demanded within a market. This work draws on the empirical literature on the effect of increasing housing prices on:

- the propensity of young people to save for a down payment and become homeowners;
- the amount of housing services consumed; and
- the choice of building type.

Chapter 5 presents the methods used in the empirical work to develop models of tenure and building type choice. Chapter 6 presents the estimated coefficients and findings, and Chapter 7 summarizes the conclusions and general recommendations.

PART ONE—LITERATURE REVIEW

2 DEVELOPMENT CHARGES AND HOUSING COSTS

The institution of development charges changes the way in which infrastructure is financed, and the allocation to new and previous residents, and to renters and homeowners, of the cost of expanding the city. This chapter examines the link between development charges and increases in the cost of producing new housing. It also considers the cost of the physical structure and the costs to the consumer, paid in the form of property taxes. The first part of this chapter explains why the introduction of development charges can be expected to increase the cost of housing for a time. Eventually, after everyone in the city has paid a development charge when buying a new house or has bought an existing house with a price inflated by development charges, the instrument affects primarily the timing of the payments for infrastructure rather than the total cost of the infrastructure borne by residents.

Elevated city growth rates increase infrastructure needs and costs. Higher growth rates also increase the size of the tax base sharing the burden for replacing the obsolete infrastructure built for the existing residents.

Through development charges, people buying new houses pay up front for the facilities that have to be expanded to serve their houses. Up-front payment results in lower property taxes than otherwise, but higher purchase costs, and hence higher mortgage payments. The difference in the overall burden brought about by the change in the way infrastructure is financed is due, in part, to the higher interest rates payable on mortgages than on municipal debt.

However, there are other considerations affecting the balance that should be struck between financing infrastructure through up-front development charges or taxation. Many of these suggest that development charges increase fairness between existing and new residents. We discuss a number of considerations:

- changes in the way overcapacity is financed;
- shifting of burdens for the incremental expansion of infrastructure;
- changes in the timing of infrastructure expansion;
- rising service standards over time;
- increasing cost of infrastructure over time;
- increasing external costs of urban growth; and
- changing fiscal environments.

Snyder and Stegman (1986) estimate the difference in the cost/debt burden for initial residents versus newcomers. The starting point for their work is a calculation of the economic cost of new infrastructure. Consider infrastructure projects that have a 40-year life and cost $100 per household to install, and where the real (net of inflation and net of tax) interest rate on debentures is three per cent. The economic cost of the infrastructure is calculated by considering the opportunity to gain a three per cent real rate of return on the money had it been invested elsewhere, plus the loss in the value of the infrastructure from deterioration and depreciation. Calculated as a level annual amount (basically equivalent to a sinking fund payment required to pay off the $100 cost with interest over the 40 years), the economic cost would be $4.33 a year per household.

Snyder and Stegman examine cases where additional infrastructure is built under a variety of assumptions concerning:

- the frequency and incrementality or lumpiness of the investment;
- the life of the infrastructure;
- the period over which the investment is financed;

- the rate of growth in the number of households;
- the rates of interest of inflation; and
- the economic life of the facilities.

Changes in the Way Overcapacity is Financed

Infrastructure components, such as water supply and wastewater treatment plants, involve lumpy investments whose size is determined by balancing the value gained through economies of scale and the cost of the overcapacity built to serve future residents. Financing these investments through property taxes makes initial residents bear a greater burden than future residents because initial residents have to pay to finance the overcapacity. As the number of households grows, more people share the debt and the overcapacity is consumed, so per household tax costs come down.

When the facilities have a 40-year life, the real interest rate is three per cent, the city is growing at four per cent a year and new investments are made every 20 years (e.g., a new water treatment plant is built every 20 years), the Snyder and Stegman simulations show that existing residents bear a burden that is 40 per cent above the economic cost of the facilities when 20-year bonds are used to finance the facilities. If instead, new facilities are built every five years and are financed with five-year bonds, existing residents bear a burden that is 280 per cent higher than the economic cost (Snyder and Stegman's Figure 4.9). In both cases, the municipal debentures have an amortization period equal to the expansion period of the facilities, but that period is less than the economic life of the facilities.

The difference in the burden between established residents and newcomers increases with inflation. In this case, not only do the newcomers enjoy sharing new infrastructure costs with the existing population, but they also gain the value of paying with lower-valued dollars. If the expansion period is 20 years, the city is growing at three per cent and there is an inflation rate of four per cent, newcomers in the 20th year pay infrastructure costs that are only 21 per cent of those borne by established residents.

As a result, growth is justifiably resisted, on financial grounds, in cities that are reaching capacity in their major water supply and water-treatment facilities. Instituting development charges that help pay for overcapacity increases the cost of housing to incoming residents, but reduces the incidence of the burden on existing residents, thereby reducing resistance to growth.

Shifting Burdens for Incremental Expansion

Snyder and Stegman show that intergenerational incidence, the distribution of the tax burden across existing and new residents, differs markedly for services that can be expanded incrementally and those that need major lumpy up-front investments. Incremental services are the ones that can be expanded at approximately the same rate as development occurs, such as residential streets, water and sewer systems, and to some extent schools (Snyder and Stegman, 1986: 40).

- If the financing period equals the economic life of the facilities, the household payments will equal the economic cost.

- If the financing period is less than the economic life of the facilities, costs will be higher than the economic cost unless they are more than offset by the effect of spreading the costs over a larger population, that is, through household growth. However, that same household growth increases the need for facilities, so if growth is too high, the higher costs for more facilities will not be offset by the cost-spreading effect of the growth.

- It turns out that for financing costs to be less than economic costs, the household growth rate must be less than the interest rate (Snyder and Stegman, 1986: 42). For example, in a steady-state model, when 20-year bonds with a real interest rate of three per cent are being used to pay for facilities with a 40-year life and are being expanded at a rate of two per cent a year to meet household growth at the same two per cent rate, each taxpayer will pay $4.02 a year. This tax burden is below the

economic cost of the incremental facilities because the financing period is shorter than the life of the infrastructure, and the growth rate is less than the interest rate.

- If the growth rate equals the interest rate, the two effects of increased need for facilities and more people to share the cost exactly offset each other, so household costs will equal the economic cost, regardless of the amortization period.

- When city growth rates are below the real interest rate, the shorter the term of the bond relative to (and below) the economic life, the greater are the savings that accrue to existing residents. When city growth rates are above the real interest rate, then the financing of incremental infrastructure through property tax payments to cover the debt leads to tax payments that are above the economic cost of providing the infrastructure as long as the financing period is less than the economic life.

- When the growth rate is above the real interest rate (currently at about 3.75 per cent), then development charges can be used to bring future property taxes for existing residents down to the economic cost of the service.

- In most Canadian cities, growth rates are below the real interest rate. This means that the financing of incremental services through development charges creates a redistribution of wealth from the incoming residents to the existing residents, as long as the new residents are paying taxes to pay the debt incurred in financing the older infrastructure. This redistribution is also reflected in the price of older housing, which rises in accordance with the development charge-induced price increases for new housing.

Change in the Timing of Infrastructure Expansion

Changes in expectations regarding the timing of infrastructure development have increased the cost of new housing units. In the past, many communities allowed residential construction to take place before the basic infrastructure was provided. The requirement that infrastructure expansion precede new residential construction can delay development. The old problems, such as inadequate facilities and services in new towns and subdivisions, have been replaced by new problems, such as over-regulation, unresponsive local officials, undue delays and requests for developer contributions for a broad array of new facilities.

The requirement that infrastructure precede construction is not always based on aesthetics or convenience, but on environmental concerns. Some major up-front cost items for which development charges are used include sewage treatment facilities and trunk lines. The public's growing environmental concerns prevent developers and municipalities from adopting the "pollute now and clean up later" approach that may have been possible when the natural environment was large in relation to the quantity of pollutants produced by a city. The need to build major facilities in advance of city growth means that existing residents have to pay the carrying cost of excess capacity.

The change in expectations regarding the timing of service delivery adds an item to infrastructure costs that was not borne in the past and can, therefore, be seen as a new benefit that should be paid by new homebuyers. The extra cost is the interest paid on the capital expenditure during the advanced service provision period. When infrastructure is built in advance of development, established taxpayers cover the debt financing costs until new residents enter the community and pay taxes. A development charge made payable at the time the raw land is zoned for residential development can help cover the interest on the bonds used to finance the infrastructure expansion. An additional charge may be warranted as a result of the need for more sophisticated forecasting and planning efforts to reduce the risk associated with the early provision of services. The change in the timing of infrastructure investments adds to the net cost of new housing, and this cost can then be shifted to the incoming residents by using development charges.

Rising Service Standards

As overall income levels increase, residents demand higher-quality goods and services. Wealthy communities may want larger and more diverse recreation facilities, better schools, a cleaner environment, wider streets, better pavement, underground rather than above-ground utilities, and better access to parks and open space. The demand for these services may grow at a faster rate than the demand for private sector goods and services. The relative size of the public sector can, therefore, be expected to increase with time as will the local tax burden.

Increasing service standards adds to the financial burden facing existing residents when these demands are not offset by cost-cutting advances in technology. Lower growth rates in productivity in the public sector, coupled with growing demands for public services, may force local governments to hold back on infrastructure expansion, thereby reducing housing supply and increasing costs. Charging new residents fees for the privilege of entering a municipality increases housing costs, but also offsets price increases resulting from a reduction in the supply of serviced land.

Increasing Cost of Providing Infrastructure

As a city grows, the cost of expanding infrastructure usually increases. Cost schedules for services usually exhibit S-shaped curves because the scale economies achieved at lower levels of output turn to scale diseconomies as output is increased. Major cost increases may occur when the existing overcapacity in treatment plants is used up and more expensive new treatment technologies have to be used to accommodate the larger population. In large cities, the cost of expanding infrastructure may increase as growth pushes the periphery toward sites that are more difficult to develop. The cost of new housing may therefore increase without the promise of a relative decrease in future property taxes. Development charges help finance some of the diseconomies associated with large-scale growth.

Increasing External Costs of Development

New development at the city's periphery reduces the extent to which established residents can enjoy the surrounding countryside. Redevelopment increases inner-city densities and is resisted because of its adverse impact on valued neighbourhood attributes. New non-residential development increases the attraction of the city centre to shoppers and commuters, and contributes to congestion. In some cases, the externalities of new development can be mitigated by expanding intra-urban highways or by building low-cost housing close to work. On the other hand, the expansion of highways creates external costs that may result in compensation and mitigation claims that increase the cost of developing infrastructure.

As a city matures and as redevelopment threatens more affluent neighbourhoods, the external costs created by growth increase and new projects are less likely to be accepted by city planning departments. As the external costs of new projects increase, existing residents become less willing to accept further growth without the mitigation of its adverse consequences. Mitigation measures will be difficult to implement should the people who see themselves hurt by new development have to pay for the mitigation of side effects. Increasing development charges may help mitigate external costs and allow development to take place. However, these increases should not be expected to be completely offset by later reductions in property taxes.

Changing Fiscal Environments

Increasing debt levels have discouraged municipalities from borrowing to finance new infrastructure. To avoid high interest payments, municipalities tend to reduce both the proportion of capital expenditures that are debt financed and the length of the amortization period on the bonds that they issue. This increases the burden existing residents have to bear, relative to the burden placed on the incoming residents who create the demand for the new services. A municipality's response to high real interest rates can increase

the amount existing residents would have to pay to accommodate growth in the absence of development charges. The introduction of development charges to reduce the financial burden created by low debt levels and short amortization periods makes new housing more expensive. Eventually, the burden is dissipated as the new residents become established and pay property taxes, and as the debt gets paid off.

Tax thresholds and no-growth sentiments are also limiting some municipalities' ability to finance new infrastructure. When service standards are fixed, when conditions of delivery are established by the province and when municipalities are unable to reduce or change the type of services they provide, their financial difficulties can inhibit growth. Municipalities are forced to look for new sources of funding due to the increasing pressure for growth and infrastructure expansion. Development charges may appear as the easiest and, possibly, the only new source of money for growing municipalities. Development charges have the further advantage, from a political point of view, that their impacts are difficult to identify and virtually impossible to measure directly. They are generally thought to affect only the people on the outside who want to move to the municipality. Their effects on local renters or on new households formed by children leaving home are rarely made explicit in policy discussions. The municipality's financial difficulties may encourage local officials to use development charges for revenue-generating purposes, thereby driving up the price of new housing.

Summary

While it is theoretically possible to design a development charge and a tax schedule that do not penalize new residents by increasing housing costs, it is unlikely that such a system would ever be implemented for the reasons described above. The introduction of development charges can be expected to increase housing costs and prices. While this increase may be more than the cost of the levy itself due to the developer's extra administration and financing costs, the magnitude of the impact depends on whether the market is in equilibrium. In overheated markets, prices are already above the equilibrium price and are, therefore, not as affected by costs. More of the development charge burden will, therefore, be borne by landowners.

While development charges increase up-front costs and prices, they can also be expected to protect new residents from higher future property taxes (although this benefit is rarely considered by prospective homebuyers). The extent to which development charges protect new residents from higher property taxes depends on service standards, labour and material costs, and expectations. If standards, costs and expectations are held constant, then the use of development charges can lead to a reduction in property taxes.

In summary, development charges raise the up-front costs of new housing to the consumer in stable markets. Over time, however, overall housing costs (which include property taxes), will likely rise by an amount that is less than the size of the levy because property taxes will be lower than they would have to be in the absence of development charges.

3 HOUSING COSTS AND HOUSING PRICES

This chapter examines the effect of development charges on the price of new housing. As prices go up, the quantity of services people are willing to buy decreases, preventing the forward shifting of the entire burden of the development charges. Consumers and producers share the burden. This chapter draws on the "new" urban economics that considers the investment aspects of landholding and the timing of decisions. The review of the dynamic model theory supports the empirical observations showing that land and housing prices increase by an amount that is larger than the increase in costs. Readers unfamiliar with mathematical models should simply skim the three pages describing the mathematical equations.

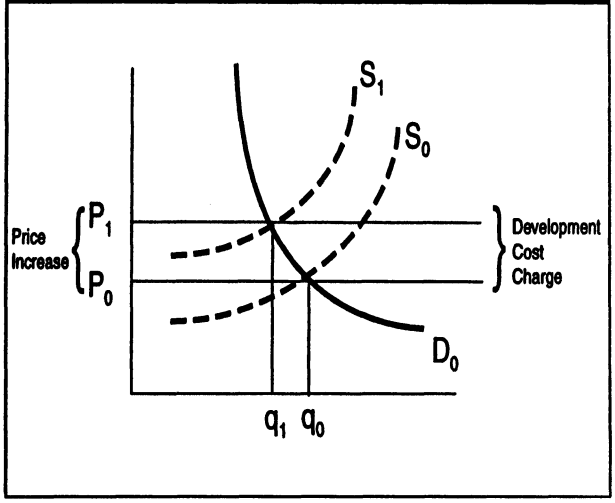
The conclusion to this chapter suggests that the further analysis of the effect of development charges on housing markets in the short and medium terms can proceed by accepting that housing prices will increase by an amount approximately equal to the size of the development charges. Knowledge of the effect of the charges, at least over the short and medium terms, can be advanced through the study of the effect of increases in the price of housing. In the long run, when development charges affect only the timing of payments, not the level of costs borne by new residents, the spatial consequences will be created by differentiations in development cost schedules and by their effect on the size of the down payment new households have to make to enter the homeownership market.

By increasing the costs of producing new housing, development charges will increase the price of new housing and, in some cases, reduce the price developers pay for land.[1] Increases in the price of new suburban housing will make more people want to buy the existing houses that have not been subject to development charges. This shift in demand will drive up the price of the existing houses by an amount that is, at least, equal to the price increase in the new homes sector.[2] If unconstrained, rents throughout the city will rise as new apartments become more expensive to build. Price increases that are generated by the introduction of development charges across the urban region are felt across the entire city and existing property owners gain windfalls. In-migrants, new households and renters bear the costs.

The Comparative Static Model

Within a stable housing market, development charges can be seen to increase the cost of building housing and thereby shift the new housing supply schedule from S_0 to S_1 in Figure 1. The demand schedule D_0 is seen as remaining constant while the city is growing by equal increments during each period. The upward shift in the supply schedule would raise housing prices from P_0 to P_1 but not by the full amount of the extra costs created by the development charges. A part of the cost would rest with builders, developers and construction workers. The distribution of the burdens between consumers and producers of housing depends on the relative price elasticities of demand and supply.

Figure 1:
The comparative static analysis of the effects of development charges on housing prices



The magnitude of the price increase depends on the relative elasticities which are determined by the degree to which consumers can cut back on the amount of housing they buy and on the mobility of production factors. If the development charge is limited to one part of the city, the entire burden would be passed forward to consumers. Housing prices would increase by the full levy because firms and labour are completely mobile within a city. Development would cease in this area until other factors, such as the extra costs of commuting over the longer distances from other municipalities, rise to equal the development charges. Spatially differential development charges will create housing price differentials that can affect the location of development.

The Dynamic Model

The comparative static model considers land development as a manufacturing process and ignores the effects of expectations and the investment value of land. Simulations of the land price effects of development charges by Snyder and Stegman (1986) show that developers can maintain a low 10 per cent profit margin after paying for the interest on the loans for the development charges when they raise house prices by 28 per cent more than the development charge. Singell and Lillydahl (1990) estimate the effect of development charges in a Colorado city and show that land prices increase by an amount that is larger than the development charges. The Skaburskis and Qadeer (1992) study of lot prices in Toronto concludes that development charges are passed forward with an added 33 per cent premium.

The explanation by practitioners suggests that the markup is due to the increased cost of borrowing by developers. The theoretical explanation starts by depicting a land market that is influenced by investors who are making development timing decisions that maximize profits. It recognizes that land at the urban periphery is priced far above its opportunity costs. Cappozza and Helsey (1989: 304) observed that the price of raw land at Vancouver's periphery exceeds the opportunity cost of the land by a factor of 30 even before the spectacular subsequent rise in Vancouver housing prices. Land supply at the urban periphery is often constrained by natural features or by agricultural land reserves creating scarcity rents (Rose, 1989). Brown, Philips and Roberts (1981) describe a complex investment market in land at the periphery of Canadian and United States cities and observe that investors start buying rural land 20 years before development pressures emerge. Expectations of future increases in land value determine present land prices. Higher land prices at the periphery create the possibility that development charge burdens are capitalized back into land prices. The stable growing city that is considered here has, at first, a housing price structure similar to the one depicted in Figure 1. But the growth of the city keeps shifting its periphery outward and this, in turn, moves the base price, which sets all housing prices within the city, farther from centre. The reduction in the accessibility of the sites that are coming up for development makes all locations inside the city relatively more attractive and increases their price. Since this increase is independent of construction cost, the value of the future increase in housing prices and rents is captured in current land prices.

The growth process may have gone on for a long time, and everyone may recognize that the city will continue to expand and that future growth will continue to increase housing prices throughout the city. The owners of land at the current edge of the city recognize that their land will increase in value relative to the land that will be at the city's edge after urban growth has pushed the suburbs further into the countryside. The expectation of future growth increases the amount people will pay to live in a particular location. The price of land is no longer set by its value in its best non-urban use but by the expectation of its future increase in value. Competition will keep land prices at a level that discounts the future value the land will generate when it is developed by using the interest rate that is obtainable in the landowners' next best investment opportunity.

Donald Shoup (1970) showed that landowners will convert the use of their land when the expected rate of return on the land in its new use

drops to a level that equals the rate of return on alternative investments. Investors will hold vacant land while its value is increasing at a rate that exceeds the returns available on other equivalent investments. Development fixes the use of land and prevents future increases in its value due to shifts in the relative demand for different types of housing.

Arnott and Lewis (1979) expand Shoup's work by developing the profit maximizing conditions associated with the optimal development time and density. Their model shows that the optimum timing for development is when the ratio of construction cost to the price of the developed property is equal to the difference between the interest rate and growth rate in future housing prices divided by the interest rate. Arnott and Lewis (1979: 162) determine the optimal timing of development by maximizing:

$$\max L(T,K) = r(t)Q(K)e^{-it}dt - pKe^{-it}, T.K \qquad (1)$$

Where:
L(T,K) = present value of a unit of land if it is developed at time T with capital stock K;
r(t) = rental rate of unit of housing at time t;
Q(K) = output of housing on a unit of land with capital K;
i = interest rate; and
p = price of a unit of capital.

The assumptions behind the model are:

- building will freeze the land forever in that particular use;
- rents prior to development (agricultural rents) are zero;
- the price of capital is constant;
- property taxes are zero;
- the building does not depreciate; and
- rental rates are expected to increase at a constant rate (Arnott and Lewis, 1979: 112).

The optimum development time is shown to be:

$$\frac{pK}{P(T)} = \frac{i-n}{i} \qquad (2)$$

Where:
p = the price of capital;
K = the amount of capital used to construct housing on one unit of land;
P(T) = the value of the developed property when developed at time T;
i = the interest rate; and
n = the continuous rate at which rents are increasing.

The economic interpretation of this condition suggests that "the developer will wait until the interest saved by postponing development one period, ipK, equals the rent foregone, (i-n) P(T)" Arnott and Lewis (1979: 63). The price of property is set by the demand for housing, which is assumed to be increasing at a constant rate.

This model can be used to show what happens when development charges are introduced. The charges add to construction costs and are assumed not to vary across building types or to change over time. The charges are collected at the time of construction. This last assumption is important because the distribution of burdens and their effect on density depend on the stage in the development process that the charge is levied. Evans (1983), for example, shows that development charges can have no price or density effects when they are collected at the time the raw land is rezoned for urban use because their payment will be seen as "water under the bridge" no longer affecting the marginal conditions determining the profit-maximizing development time or density.

The profit-maximizing conditions developed by Arnott and Lewis can be adjusted by adding the development cost levy to construction costs. The new timing conditions are described by equation (2), and simple manipulation relates it back to house prices in the absence of development cost levies (DCL).

Since:

$$\frac{pk + DCL}{P(T^*)} = \frac{(i - n)}{i} \qquad (3)$$

$$P(T^*) = \frac{ipk + iDCL}{(i-n)}$$

$$P(T^*) = P(T) + \frac{i}{(i-n)} DCL$$

and

$$\frac{i}{(i-n)} > 1$$

Development charges that are collected at the time of construction postpone optimal development times until housing prices have increased by more than the fees. The multiplier on development cost levies is equal to the ratio of (the interest rate) over (the interest rate less the rate at which rents are increasing). It is equal to the ratio of the property price of a new house by its construction cost. The faster the city grows, the greater the rate at which rents increase and the smaller the rental rate of return. The faster the growth rate, the larger the multiplier by which development charges increase housing prices.

David Mills (1981) extends the development timing model to consider a competitive equilibrium and shows that the Arnott and Lewis conditions hold only when a particular type of house ceases to be built as a result of a constraint on the supply of developable land. According to Mills' model, no rents in excess of the opportunity cost of land can accrue at the city's periphery while land supply is not constrained. Within such markets, development charges are added (without the multiplier described earlier) to construction costs as illustrated in Figure 1. Mills' explicit introduction of market competition does not change the basic conclusions developed with the Arnott and Lewis model but reduces the size of the multiplier effect. If land supply is permanently constrained at the city's periphery by natural conditions or by regulatory policy, then housing prices will be increased by the scarcity rents produced by the constraint. Housing prices will at all times reflect the discounted value of the stream of rents gained in the future after the land constraint stops the expansion of the city. The closer the city (or a housing sub-market within a city) is to exhausting its land supply, the larger is the multiplier by which development charges are expected to inflate house prices. The greater the city's growth rate, the larger the future increases in rents and the larger the multiplier that determines the extent to which development charges inflate housing prices. The more inelastic the demand for housing, the greater the price effects of a constraint on land. The models developed by Shoup, Arnott and Lewis, and Mills help confirm the developers' claim that development cost levies are added to housing prices and explain empirical findings that show that prices rise by more than the size of the development charges. Profit-maximizing landowners will delay development until housing prices have increased to a level that covers all conversion costs.

Summary

The distribution of the burden across consumers and landowners depends on the growth rate of the city, on the interest rate and on the price elasticity of housing demand. The faster the growth rate, the less time required for prices to rise to cover the development charge. The shorter the delay in development, the smaller the landowners' burden. The shorter the delay, the smaller the discount factor used to compute the present value of the price increase borne by consumers. The higher the interest rate, the greater the discount rate used to compute present value of the price increase faced by consumers and the lower their share of the tax burden. The higher the interest rate, the greater the loss landowners sustain while waiting for price increases to cover development cost levies. The relative elasticity of demand and supply also determines the distribution of burdens in stable and unconstrained land markets. While the development timing models assume an exogenously determined constant rate of price increases, an exogenously induced delay in development will accelerate the rate at which housing prices increase. The more inelastic the demand schedule, the more quickly housing prices will increase because of the reduced supply of new housing and, as in the comparative static case, the greater the consumer share of the tax burden. Even though the introduction of development charges encourages landowners and developers to wait for price increases to cover their extra costs, the burden also rests on the

landowners and builders who have to hold on to their investments while earning no profit. Developers, too, are affected by the delay, because no profits are gained while they wait for housing prices to rise enough to cover the development charges.

Whereas the last chapter concluded that the introduction of development charges did not increase the cost of housing by the full amount of the charge due to the later reduction in property taxes, this chapter shows that an increase in the size of the development charge raises the price of housing by an amount that is larger than the increase in the charges. Given that the use of development charges will eventually lead to lower property taxes, it is reasonable to assume that the effects of the delay and the reduction in property taxes cancel out in the short and medium terms. It is also reasonable to expect that development charges will raise housing prices by about the size of the levy over the short and medium terms.

The analysis presented in subsequent sections of this report develops the likely medium-term effects (five to 20 years) of financing municipal infrastructure through development charges. It focusses on the likely effects of an up-front increase in the overall level of housing prices.

4 HOUSING PRICES AND HOUSING CONSUMPTION

Increases in the level of prices consumers have to pay for new housing will reduce the housing services they are willing to buy and may dampen the rate of population growth in the region by discouraging immigration. The reduction in the quantity demanded of housing services will mean that people buying single-family houses may look for smaller, less well-finished buildings on smaller lots. Increasing housing prices also make entry into the homeownership market more difficult. In some cases, it will mean that people will buy or rent units in building types that occupy less land. Rising housing prices increase the density of new development and reduce the spread of cities. The extent to which housing consumption is reduced by increasing prices is the subject of this chapter.

While economic and demographic factors are considered to be the key determinants of tenure and building type decisions, the nature of the existing stock that has been molded by past decisions and past policies is also important. In an early study of the determinants of homeownership, Geoffrey Carliner (1974: 117) notes:

> The final factor increasing ownership rates has been suburbanization. The decrease in the density of housing in large metropolitan areas and the dispersion of employment and commercial activity away from the centre of large cities have been a result of the rise in ownership, but they have also been a cause.
>
> Once families began moving to the suburbs, stores and jobs soon followed, and better roads cut the travel time to city centres. These developments changed the trade-offs between the advantages of home ownership and the advantages of living close to downtown in a rented apartment. In this way, suburbanization contributed to the rise in ownership rates.

The nature of the city's spatial structure and the characteristics of its early stock have been determined by past housing decisions. The shape of the city, therefore, reflects the historical determinants of tenure and building type choices, and continues to affect the options available in the current market. Also, the housing types occupied by people today are determined, in part, by their current economic and demographic situation and, to a great extent, by the conditions they faced when entering the homeownership phase of their housing careers.

The study of housing choices and the role of increasing prices on choices would ideally use panel data that link changes in a person's life-cycle stage to changes in housing career. The importance of household changes or imminent changes in housing decisions has been made apparent in the recent literature on tenure choice (Michelson, 1977; Kendig, 1984; Clark et al., 1994; Ionannides and Rosenthal, 1994; Withers, 1998).

The most important movement in housing careers is the move to owner occupancy. Hazel Morrow-Jones (1989: 322) shows that the mode in the age distribution of movers from rental to homeownership in the suburbs is in the 25 to 29 age bracket; 32 per cent of all households moving from rental to suburban ownership are in this age group. In 1983, an additional 30 per cent of the movers were between 30 and 34 years of age. Neutze and Kendig (1991: 4) show that most Australian "heads of households who ever become homeowners do so by the time they reach 30 to 35 years of age. William Clark and Onaka (1983: 55) show that the frequency of housing adjustment moves that include tenure changes peak at the age of 27. Kendig (1984: 277) finds that:

> If people ever are to become homeowners, they almost invariably do so during the early adult years...very few people who do not buy before the age of 35 do so later.

Once homeownership is achieved, households rarely revert to renting unless the family unit is dissolved (Kendig, 1984; Michelson, 1977). However, rising prices are thought to delay entry into homeownership for households that have not prospered in the labour market (Gyourko and Linneman, 1996).

The lack of panel data will force the analysis to rely on cross-sectional data. The likely effects of the changing environments within which decisions are made will, in part, be seen from differences across age groups regarding the effect of price increases on the young households. Further qualifications may be needed as a result of the bias cross-sectional analysis introduces into the estimates of price and income elasticities of demand. Börsch-Supan (1990) finds that price elasticities, estimated by using cross-sectional data, overstate the true numbers that are found using panel data by 27 to 55 per cent. Pitkin and Myers (1994: 241), however, compare results of cross-sectional studies with their estimates of life-cycle schedules of housing demand from successive, linked cross sections and find that these methods show that demand is more stable over time than indicated by the cross-sectional measures.

The transition into homeownership is the most important determinant of the way urban structures evolve. Due to the difficulty of entering homeownership and the importance of the step, the decision leading to the selection of a building type can be studied best by looking separately at the tenure decision and then examining the building type decision as though it was conditional on the household making the tenure decision. This literature review is, therefore, divided into the factors affecting tenure decisions and those affecting choice of dwelling type.

The Effect of Price Increase on Tenure Choice

While demographic factors have been shown to be the key determinants of the move to homeownership, their importance is reduced by studies that consider the effects of market constraints. Jones (1989) and Kendig (1984: 272) suggest that life-cycle changes are correlated with improvements in a household's economic means. Marriage, for example, often brings together two wage earners to save for a down payment Struyk (1976) and McCarthy (1976) show that "the importance of the life cycle stage as a predictor of mobility and tenure is markedly reduced when other factors related to financial resources are taken into account" (Kendig, 1984: 272). The recent literature on tenure choice focusses on the financial factors and on the role of the constraints facing young people entering into the homeownership markets. Bourassa (1995a: 1172) relying on Linneman and Wachter's (1989) approach comments that:

> ...for constrained Australian households in the 25 to 34 age group, the magnitude of borrowing constraint gap is inversely related to the probability of ownership. Household expected income, transitory income and the relative cost of owning and renting have a smaller direct impact.

In the United States, homeownership rates among households (headed by a person 44 years old or younger declined by over 10 per cent between 1973 and 1992. Homeownership rates for households headed by persons 34 years old or younger declined by 20 per cent. In the Canadian context, the decline would have been from about 55 per cent to 45 per cent. Mayer and Engelhardt (1996: 61) recognize that a part of the decline is due to the rising user cost of homeownership, the drop in family formation rates, the decrease in renter incomes and the decline in the expected increase in future housing prices. Rising house prices and falling renter incomes are seen as important factors explaining the decline in homeownership among young households:

> The evidence that the down payment is a decreasing percentage of the purchase price, even though home purchasers are saving longer for a down payment, suggests that younger households are having an increasingly difficult time accumulating downpayment funds (Mayer and Engelhardt, 1996: 61).

Table 1:
Building type distribution by tenure

	Single Family Detached	Townhouse Rowhouse Attached	Apartments Under 5 Floors	Apartments 5+ Floors	Total	Number of Cases
Owner	79%	13%	5%	3%	100%	133,545
Renter	12%	18%	45%	25%	100%	87,080
Number of cases	116,087	33,353	46,151	25,034		220,625

Source:
1991 Census Public Use Micro Files.

Increases in housing prices due to development charges will increase the size of the down payment required and make it even harder for young people to buy their first home. The importance of the down payment constraint was recognized by Artle and Varaiya (1978) and formally examined by Brueckner (1986). Increased housing prices have at least three consequences that affect the homeownership market.

First, they force young households to save longer to accumulate the needed down payment. This keeps more households within the rental sector which tends to have proportionally more units within the higher-density building types than the ownership sector (see Table 1).

Second, increasing housing prices have been shown to discourage young renters from saving to buy a home (Haurin et al., 1996; Sheiner, 1995). Engelhardt (1994) uses the Survey of Consumer Finances in Canada data on the Registered Home Ownership Savings Plan (RHOSP) for prospective first-time homebuyers and shows that high housing prices significantly reduce the likelihood of saving for a down payment. A five per cent increase in house prices decreases the probability of saving for a down payment by one percentage point. Engelhardt (1994: 228) shows that increases in Canadian housing prices reduce the household's intention to buy a house. A development charge that would increase housing prices by 10 per cent would reduce the proportion of young renters who save for a down payment by two per cent.

Third, of the people who save for a down payment, rising prices reduce the rate of savings. Canadian renters were shown to have $294 less in accumulated assets for every $1,000 increase in housing costs (Engelhardt, 1994: 234). This means that renters who are still saving for a down payment do so at a slower rate and will have to spend more time in their higher-density rental options to gain the extra money needed to cover the larger down payment. They will add to that time as they spend more money on the current consumption of non-housing goods and services.[3] Engelhardt (1994: 229) shows that an increase of $1,000 in house prices decreases the probability of saving for a home by a married couple between 25 and 44 years of age by 0.0024. A $25,000 increase in the price of a home will decrease homeownership probabilities (for the group most wanting to buy a house) by six per cent as a result of their reducing their propensity to save for a house. Engelhardt (1994: 236) concludes that a five per cent increase in house prices reduces the probability a household saves for a down payment by one per cent. Using these estimates, the increase in prices would reduce homeownership rates in Canada for this group of households from 59 to 53 per cent.

Haurin et al. (1997) illustrate the importance of borrowing constraints as determinants of tenure choice by using data on a panel of young adults between 20 and 35 years of age in the 1985 to 1990 period. Using a method developed by Linneman and Wachter (1989), they estimate the elasticity of housing choice with respect to the

user cost of homeownership to be -0.93, meaning that a 10 per cent increase in the user cost of housing would result in a 9.3 per cent reduction in homeownership rates. Haurin et al. extend the analysis in a number of ways that include the use of exogenous proxies for permanent income and the treatment of wealth accumulation as endogenous to the tenure choice decision. Their estimate of the elasticity of homeownership with respect to the relative cost of owning is -1.25 for young households (Haurin et al., 1997: 147). A development charge that would raise the price of owning a home by 10 per cent would reduce the chance for a young household entering the homeownership market by 12.5 per cent.

Perhaps the most sophisticated study of tenure choice to date is by Henderson and Ioannides (1989) who developed estimates of the length of residency in a dwelling before a move, the choice of tenure upon a move and the characteristics of the demand for housing on condition that the household has selected a tenure option. They developed an exact specification of a simultaneous equation econometric model that allows several conclusions of interest here. Increases in age or family size, and being white or married, each increase the chance of owning. The effects of marriage are very large and increase the chance the average household head is a homeowner by 0.3. In Canada, marriage is associated with an increase in the probability a person is a homeowner from 26 to 56 per cent.

Henderson and Ioannides (1989: 225) did not find a statistically significant relationship between rents and the probability of homeownership. They did find that higher ownership prices affect renting decisions:

> ...Higher ownership prices dramatically increase the probability of renting. A 10 per cent increase in owner prices from the mean of 0.24 increases the probability of renting by 7 per cent.

The seven per cent ratio is lower than the rates estimated by Haurin et al. (1997) but they apply to the whole population, not just the young. A $25,000 development charge would have raised prices in the 1991 Vancouver and Toronto markets by approximately 10 per cent. In Regina and Saskatoon, a similar charge would have raised prices by over 25 per cent. The effect of any particular dollar amount of development charge differs depending on a city's prevailing average price of housing.

The empirical model used here, focusses on the effects of housing price differences across Canadian census metropolitan areas (CMAs) on the propensity for a household to be a homeowner. The specification recognizes the difficulty households have in entering the market as a function of the difference in the price of a basic dwelling that typically suits the household's size and the price the household can afford by spending one third of its income on a mortgage that finances 75 per cent of the purchase.

Changes in ownership prices affect various groups in the population differently. Households with more education and, therefore, higher permanent incomes can be induced to move into homeownership as a hedge against future price increases. The expectation of future price increases makes the ownership option a good investment for people who can afford it. Other authors have shown that increasing ownership prices make lower income people give up trying to become homeowners and stop saving for the down payment. Gyourko and Linneman (1996) explain the recent decline in homeownership among U.S. blacks as a result of increasing prices due to more restrictive regulations and higher development charges in the suburbs.

Changes in the ways young people save for down payments are reducing the effects of price increases. Mayer and Engelhardt (1996) find that from 1976 to 1993 the role of gifts increased in importance for the first-time buyers. As the average age of first-time buyers increased from 28.2 to 31.1, the average time needed to save the down payment increased from 2.4 to 2.8 years and the proportion of the down payment that came from savings dropped from 81.6 to 76.0 per cent. "Almost one quarter obtained gifts from relatives, with the average help constituting more than one half the down payment" (Mayer and Engelhardt, 1966: 68).

Table 2:
Building type distribution by census metropolitan area

	Single Family Detached %	Townhouse Rowhouse Attached %	Apartments Under 5 Floors %	Apartments 5+ Floors %
Halifax	53	16	21	10
Québec	44	14	36	6
Montréal	32	13	47	9
Toronto	46	23	13	18
Ottawa	46	18	9	27
Saskatoon and Regina	69	9	17	5
Edmonton	59	19	14	8
Winnipeg	63	9	15	13
Vancouver	52	15	24	10
Other	63	15	16	6
ALL	**53**	**15**	**21**	**11**
Number of cases	220,625			

Source:
1991 Census Public Use Micro Files.

Table 3:
Average income, proportion of homeowners, ratios of house value and rent to income

	Household Income $	Proportion Homeowners %	Value to Income	Rent to Income
Halifax	48,110	59.07	2.58	0.277
Québec	44,618	55.84	2.23	0.249
Montréal	45,529	49.38	3.13	0.267
Ottawa	56,604	57.59	2.83	0.255
Toronto	60,656	59.68	4.79	0.263
Saskatoon and Regina	45,266	66.11	2.01	0.258
Edmonton	53,368	61.90	2.95	0.264
Winnipeg	43,896	64.52	2.33	0.265
Vancouver	52,737	58.62	4.80	0.297
Other CMAs	46,267	65.62	3.02	0.265
ALL	**49,782**	**60.53**	**3.39**	**0.267**
Number of cases	220,654	220,654	132,589	87,033

Source:
1991 Census Public Use Micro Files.

As increases in development charges inflate the price of all housing in the city, the parents of adult children gain wealth, and many may give some of the wealth to their children to help them with the down payment. Increasing prices of homeownership options may further differentiate the population across tenure categories. The children of renters along with in-migrants may face the most obstacles to entry into homeownership.

The Choice of Building Type

The distribution of building type varies across Canada's major cities (see Table 2). Saskatoon and Regina have the highest proportion of single-family houses in their stock while Montréal has the lowest. The empirical research relates the differences in the probability that a household selects a building type within each metropolitan area to the relative differences in the price to income and rent to income ratios (see Table 3).

People usually cut back on the consumption of a good or service whose price has increased. Increases in housing costs make households within each tenure group want to reduce the amount of housing they consume. Increases in housing price, however, create wealth for homeowners and the expectation of continuing increases will make some homeowners try to increase the size of their housing purchase as an investment. Increasing housing price levels primarily affect renters and first-time buyers. People who are buying their first home, however, are likely to buy a smaller house or one using less land after prices have increased. Singell and Lillydahl (1990) find that the average lot size for houses in their Colorado case study decreased by about 10 per cent after development impact fees were introduced.

The literature yields estimates of the price elasticity of demand for housing in the -0.5 to -1.0 range. Goodman and Kawai (1982) estimate price elasticities of demand and find that they cannot reject the null hypothesis that suggests that the elasticity is -1.0. Gillingham and Hagemann (1983: 25) estimate the price elasticities of owner occupancy evaluated at the mean income level to be -1.119 for single people, -0.8511 for husband and wife households and -0.4882 for husband, wife and child households. Increasing prices, therefore, have a greater impact on housing consumption by non-families. The quantity of housing services demanded for homeownership options by families with children changes less with increases in housing prices. Goodman (1988) suggests that the value to rent variable in tenure models should identify the investment motive. Its omission would bias the price elasticity estimates toward zero. Goodman's simultaneous estimate of price elasticity of demand and tenure choice yields price elasticities of -0.499. This estimate of the tenure choice elasticity in respect to relative price is -1.436 and the owner price elasticity of demand is adjusted to -0.766 (Goodman, 1988: 348). Goodman's estimate for the renter's price elasticities are much smaller. However, the housing demands by owners and renters, after accounting for differences in their expected duration of stay and for differences in tenure were found to be similar to Henderson and Ioannides (1989). After all, most people have been both renters and owners and, therefore, have the same demand for housing services after controlling for the tenure difference.

Quigley (1973) develops a multinomial logistic (MNL) model of housing demand. He considers 18 categories of housing formed by three structure types, two quality levels as proxied by the age of the dwelling and three interior size measures as proxied by the number of bedrooms. The monthly rents are estimated by the average price in each of 50 zones in the Pittsburgh metropolitan area. He adds variables describing the commute costs and the number of dwellings in each area by housing type. He estimates the MNL model separately for each of 30 combinations of income and family size.

His findings indicate that "larger families with greater demands for necessities are more responsive to relative price in the choice of housing type" (Quigley, 1973: 95). He shows that single-detached units are preferred by families with three or more people to units sharing a common wall or to apartments. As family size increases, households are less likely to choose

multi-family units. Holding family size constant, the coefficients show that single-detached rental units are preferred by higher-income people. For lower-income levels, the probability of selecting an apartment declines from 0.84 for a one-person household to 0.06 for a five-person household; the probability of selecting a unit with a common wall increases from 0.11 to 0.69; and the probability of choosing a detached house increases from 0.04 to 0.25 (Quigley, 1973: 95). His model fails to gain good coefficients for the higher-income groups but they show that higher-income households "systematically choose less dense housing configurations." However, for small families the probability of choosing a structure type does not vary with income level.

Börsch-Supan and Pitken (1988) develop a multi-level tree model to examine housing choices that include the decision to stay in the parents' home, the decision to rent or own, and the choice of building type. They partition the data by age groups and household type to gain sub-samples with relatively homogeneous characteristics. The set of financial variables are regressed against the choice pattern. The results show that the choices of single women households are most responsive to changes in out-of-pocket costs, and married couples over 35 years of age are the least responsive. The elderly married couples are intermediate between these two groups (Börsch-Supan and Pitkin, 1988: 162).

The hierarchical model is shown to perform better than the MNL model especially in its yielding unbiased estimates of the price elasticities. The MNL overestimates the own-price elasticities of rental housing, but underestimates those of homeownership. If rents increase, the MNL model will underestimate by approximately five times the percentage increase in homeownership. If ownership prices go up, then the MNL model will overstate the effect on tenure choice (Börsch-Supan and Pitkin, 1988: 172). The authors present a strong argument for using the hierarchical model. They also show that the household formation decision is relevant and should be included in discrete choice models of housing demand.[4]

The reduction in housing consumption may be made by selecting smaller houses, less luxurious finishes, less attractive locations, smaller lots or higher-density building forms. Of interest here is the last change. The empirical literature on the choice of building types has a relatively short history and most of the economists dealing with the subject are still advancing the econometric methods for assessing the determinants of choice. One of the latest studies, by Cho (1997), uses utility maximization theory to show that the relevant variable is the price of housing divided by household income.[5] Cho finds that owners of single houses have higher price to income ratios. As one would expect, they make a greater financial sacrifice to buy a single-family detached house. The estimates, however, cannot be used to predict the effect of changes in prices as price in this work is endogenous to the choice of building type: people face higher prices because they choose to live in a single-family detached house.

The current study goes farther in the measurement of the effect of changing prices by using price indexes, rather than the price paid, in constructing the price to income ratio.

Summary

Increasing development charges can affect urban form by making it more difficult for young people to enter the homeownership market. The rental market offers smaller units in more dense building types. Higher prices, by keeping people out of homeownership, keep them from expanding their housing purchases. In turn, this helps maintain a more compact urban form.

The study of the effects of increasing development charges on urban form separates the decisions on tenure from those on building type. The tenure decision is based primarily on the price levels of the ownership housing options and their relationship to the price the household can afford to pay, given its current total income.

The study of choice of building type is conditional on the choice of tenure, and the key variable is the price to income ratio for

homeowners and the rent to income ratio for renters. Since price indexes will be used rather than specific prices for particular building types, the increase in the price index relative to the household's income is seen as an increase in the price of housing services relative to income. As prices increase, the quality of service consumed decreases in proportion to the price elasticity of demand. As the general price level increases, the household is expected to decrease its propensity to buy or rent low-density building types.

The work is carried out with the use of cross-sectional data which biases the projection of cohort reactions to increases in price levels. The importance of tenure choice in the decision on building type reduces the severity of the problem because the lasting choices tend to be made while the household is still young. A focus on the 25 to 34 year old population tells much about the future effects of development charges. Age effects will show both the transitions households make as they grow older and the effect of differences in the historical conditions at the time they were forming family households.

PART TWO—EMPIRICAL FINDINGS

This part of the study shows that increasing development charges increase the demand for higher-density building types, primarily by keeping a relatively large proportion of households out of the homeownership market. Both homeowners and renters react to higher price levels by increasing their propensity to move into a row or townhouse rather than a single-family detached house, or an apartment rather than a townhouse. While the quality of the estimates, as judged by their variance, is very good, the magnitude of the effect they depict is small. While development charges of the $25,000 per unit size may reduce homeownership propensities by over 10 per cent in some cities, their effect on building type choice within each tenure category is less than one per cent.

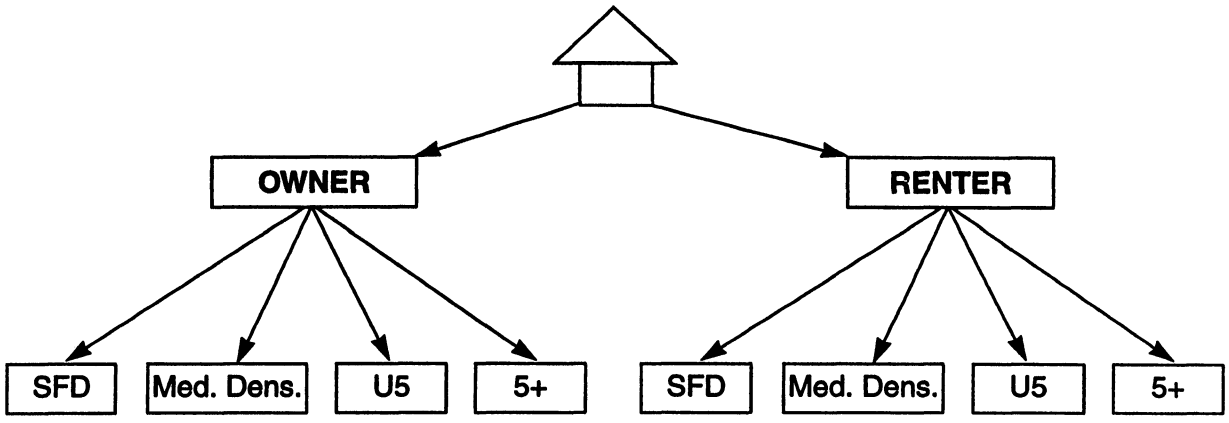
5 THE METHOD, THE MODEL AND THE DATA

Statistical models are developed to measure the relationship between housing prices and the propensity for households of different types and ages to occupy different types of dwellings. The models depict a sequential decision process (see Figure 2). Households are assumed to first make a decision on tenure and then decide on the type of building to occupy. Households can choose between single-family detached units, medium-density options, apartment buildings under five floors or apartments in buildings with five or more floors. The medium-density options include semi-attached houses, rowhouses, townhouses and duplexes. The development of the econometric specification and the choice of estimation methods is published in Skaburskis (1999).

The sequential models allow the use of different variable specifications describing how prices affect decisions on tenure and on building type. For the tenure decision, the focus is on the difference between the amount a household can afford to pay for homeownership and the price of a basic dwelling that would typically suit a household of that size. The difference is specified by two variables: one measures the gap when the affordable price is below the base price, the other measures the gap when the affordable price is above the base price. The use of two variables is justified by the belief that the effect of a threshold price on a purchase decision differs for people who can afford the price as opposed to the people who cannot afford the price. The effect of a gap between the amount a household can pay for a basic house and its price depends on the size of the gap and on whether it has a positive or a negative sign.

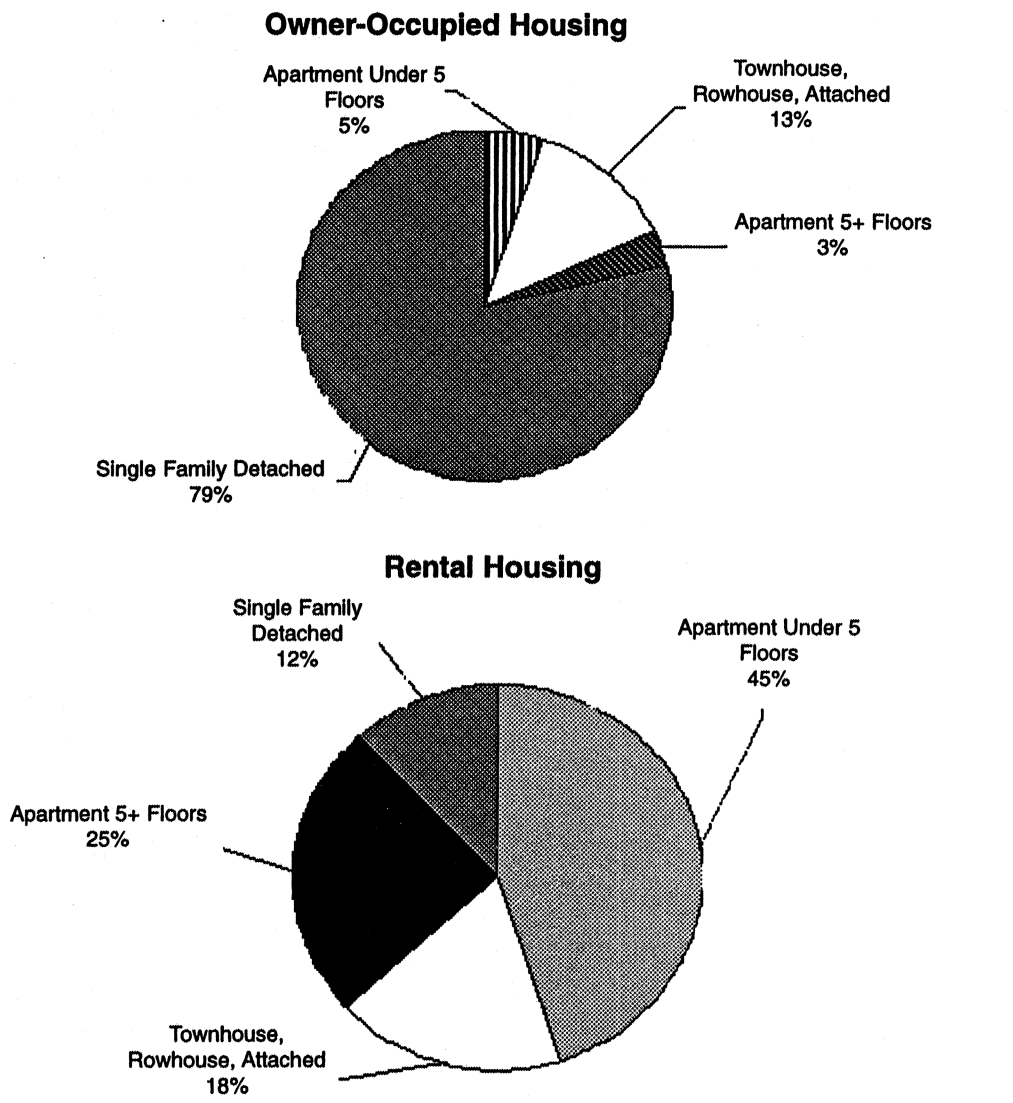
The effect of price increases on the choice of tenure will have a major impact on urban form as the two tenure options have a very different mix of building types (see Figure 3). Average household income, the proportion of homeowners, and the ratios of house value and rent to income (see Table 3) are the key variables used in the logistic regressions to relate differences in prices with differences in choice of tenure and building type.

Figure 2:
The structure of the tenure/building type decision model



SFD: Single Family Detached
Med. Dens.: Semi-attached, row houses, townhouses, duplexes
U5: Apartments under 5 floors
5+: Apartments 5 or more floors

Figure 3:
Building type distribution by tenure



Source: 1991 Canus Public Use Micro Files

The greatest effect of rising prices on tenure choice is expected to be on young households which do not gain equity as a result of the price increase but have to make higher down payments to cover a part of the development charge. The literature reviews show that most of the people who become homeowners, buy their first dwelling before they are 35 years old. The effect of development charges on first-time buyers is, therefore, an important determinant of how the charges are likely to affect city form.

Tables 5 and 6 show the average income of households whose primary maintainer is between 25 and 34 years of age for owners and renters, respectively. The value of the dwellings occupied by the homeowners is listed as well as the price they can pay by spending 33 per cent of their income on a mortgage with a 10 per cent interest rate that covers 75 per cent of the purchase price. The differences between the affordable prices and the value of the homeowner household's current dwelling (Table 4) show a large variation across cities. Most young homeowners can afford more expensive houses than they currently occupy.

Table 4:
Average income, assessed house value, predicted affordable house value for 25-34 year old homeowners by major census metropolitan area

	Average Income ($)	Assessed Value of Dwelling ($)	Affordable Price ($)	Difference ($)
	(1)	(2)	(3)	(3)-(2)
Halifax	53,570	98,800	181,320	82,510
Québec	53,990	92,790	182,730	90,120
Montréal	57,290	135,100	193,890	6,880
Ottawa	64,900	137,620	219,650	1,600
Toronto	70,640	237,530	239,090	82,000
Saskatoon and Regina	50,410	75,780	170,610	94,760
Edmonton	60,470	128,490	204,660	76,400
Winnipeg	48,830	86,660	165,290	78,610
Vancouver	61,680	201,450	208,750	7,550
Other CMAs	53,900	118,240	182,420	64,290
ALL	**58,030**	**141,640**	**196,410**	**54,890**

Source:
1991 Census Public Use Microdata Files (PUMF).

Table 5:
Average income, estimated house price, predicted affordable house prize for 25-34 year old renters by major census metropolitan area

	Average Income ($)	Estimated Price of Basic Unit ($)	Affordable Price ($)	Difference ($)
	(1)	(2)	(3)	(3)-(2)
Halifax	35,500	96,760	120,170	23,410
Québec	34,060	80,080	115,270	35,200
Montréal	33,610	110,080	113,770	3,680
Ottawa	39,460	131,990	133,570	1,580
Toronto	44,390	212,070	150,250	-61,820
Saskatoon and Regina	30,290	70,350	102,520	32,180
Edmonton	36,560	115,900	123,730	7,820
Winnipeg	30,440	79,400	103,030	23,630
Vancouver	38,420	183,950	130,050	-53,900
Other CMAs	33,920	105,510	114,810	9,300
ALL	**36,450**	**132,950**	**123,680**	**9,270**

Source:
1991 Census Public Use Micro Files.

Table 6:
Definition of the variables used in the regression analysis

NON-FAMILY GROUP	Household formed by more than one non-family person
COUPLE < 45 NO KIDS	Primary maintainer* under 45 years of age, no children in household
COUPLE PRE-SCHOOL	Couple with a child under 5 years of age
COUPLE SCHOOL KIDS	Households with child between 5 and 17 years of age
SINGLE PARENTS	Lone-parent family
SEPARATED NO KIDS	Separated or divorced, no children in home
COUPLE >45 NO KIDS	Primary maintainer 45 to 65, no dependent children in home
HOUSEHOLD SIZE	Number of people living in the household
FEMALE MAINTAINER	Primary maintainer is a woman
IMMIGRATED 1981-1991	Arrived in Canada, 1981-1991
IMMIGRATED 1971-1980	Arrived in Canada, 1971-1980
IMMIGRATED 1961-1970	Arrived in Canada, 1961-1970
IMMIGRATED PRE-1961	Arrived in Canada, before 1961
BORN IN EUROPE	Primary maintainer born in Europe
BORN IN ASIA	Primary maintainer born in Asia
OTHER MOTHER TONGUE	Maintainer's mother tongue not English or French
AGE 15-24	1 if household head 15 to 24, 0 otherwise
AGE 25-34	1 if household head 25 to 34, 0 otherwise
AGE 35-44	1 if household head 35 to 44, 0 otherwise
AGE 45-54	1 if household head 45 to 54, 0 otherwise
AGE 55-64	1 if household head 55 to 64, 0 otherwise
AGE 65-74	1 if household head 65 to 74, 0 otherwise
AGE 75 AND UP	1 if household head over 75, 0 otherwise
Rent.Inc	rent to income ratio
Val.Inc	value of house to income ratio
GAP	difference between household income and income needed to buy a starter house
GAP.UNDER	GAP when GAP<0; otherwise 0
GAP.OVER	GAP when GAP>0; otherwise 0
Log (#owner)	natural log of number of owners
Log (#renter)	natural log of number of renters

Note:
* The "primary" maintainer is the person taking the "primary" responsibility of household finances as seen by the census respondent. When both partners take equal responsibility, the person with the higher income is chosen.

Table 7:
Means of key variables in the regression analysis

Variable	All	Owners	Renters
NON-FAMILY GROUP	0.034	0.016	0.063
COUPLE <45 NO KIDS	0.084	0.067	0.111
COUPLE PRESCHOOL	0.093	0.105	0.075
COUPLE SCHOOL KIDS	0.156	0.207	0.076
SINGLE PARENTS	0.086	0.062	0.123
SEPARATED NO KIDS	0.077	0.046	0.124
COUPLE >45 NO KIDS	0.238	0.321	0.112
HOUSEHOLD SIZE	2.663	3.003	2.142
FEMALE MAINTAINER	0.315	0.224	0.454
IMMIGRATED 1981-1991	0.043	0.029	0.064
IMMIGRATED 1971-1980	0.054	0.057	0.048
IMMIGRATED 1961-1970	0.053	0.065	0.035
IMMIGRATED PRE-1961	0.087	0.110	0.053
BORN IN EUROPE	0.150	0.179	0.106
BORN IN ASIA	0.048	0.048	0.048
OTHER MOTHER TONGUE	0.176	0.199	0.142
AGE 15-24	0.043	0.008	0.096
AGE 25-34	0.225	0.165	0.316
AGE 35-44	0.240	0.265	0.201
AGE 45-54	0.170	0.207	0.113
AGE 55-64	0.134	0.163	0.089
AGE 65-74	0.115	0.126	0.097
AGE 75 AND UP	0.074	0.065	0.087
INCOME($1000)	49.769	60.244	33.700
PRICE($1000)	218.984	265.075	148.280
RENT.INC	0.210	0.165	0.279
VAL.INC	4.308	3.331	5.808
GAP.UNDER	14.508	7.906	24.636
GAP.OVER	-98.766	-133.109	-46.084
Log(#OWNER)	9.314	9.307	ne
Log(#RENTER)	8.901	ne	8.954
Number of cases	220,734	133,625	87,109

Note:
ne = not estimated.
Source:
1991 Census Public Use Micro Files.

Table 5 presents the comparable numbers for renters. Here, the second column lists the estimated price of a dwelling that would typically suit a household of the same size. The differences between the affordable and the market price, even where positive, are much smaller than for owners. This indicates that further price increases will make homeownership even more difficult to attain for many households in Montréal, Ottawa, Edmonton and Calgary. For Toronto and Vancouver, the differences are negative and large, indicating the difficulties already existing in these markets. The average difference in the "other CMAs" is $9,300, suggesting that a sizable development charge will make homeownership unaffordable to the average renter.

The variables used in the analysis are defined in Table 6. Table 7 lists their means. The demographic variables act as controls for the measurement of the effect of housing price differences on choice of tenure and building type. Thus the estimated parameters for the price and rent variables describe the effect of increases in price and rent relative to the household income while holding the effect of differences in demographic characteristics constant, and the estimated coefficient for the price to income variables describe the effects uniquely attributable to differences in income, prices and rents. The effect of demographic differences, holding price and income constant, are also assessed by the models.

The analysis recognizes that the choice a household can make depends on the characteristics of the available housing stock options. If a household lives in a metropolitan area that has mostly single-family houses, Regina or Saskatoon for example, then the household will most likely select a single-family house, regardless of price levels. To control for the effect of the existing stock distribution, variables listing the number of each building and tenure type in the metropolitan area are included in the model. The natural logarithms to the numbers are used for reasons given in Chapter 3 of Skaburskis (1999).

The results of the tenure model and the building choice models for renters and for homeowners are combined in the last step of the analysis to develop projections of the total effect of increases in housing prices. For homeowners, the effect of increasing prices by $5,000 increments (up to an increase of $25,000) is recorded. For renters, the effect of $500 annual rent increases is depicted based on the assumption that annual rents will increase by one-tenth of the increase in the building costs.

6 THE FINDINGS

Choice of Tenure

The data yield estimates of the effect of increases in the price of a basic dwelling relative to homeownership rates.

The first column (Table 8) lists the estimated coefficients for the logistic regression. All the estimated coefficients are different from zero at a probability level of 0.0001.

The standard error of the estimates are presented in the second column and help illustrate the quality of the estimated coefficients.

The standardized estimates in the third column show the relative importance of the variable in explaining tenure choice, that is, the variation due to the "typical" change in the variable.

The last column uses the estimated coefficients to show the contribution of the variable to the odds of homeownership. All the coefficients show how a person with the characteristics described by the variable differ from the "base" case—a non-family, one-person household, male, between 25 and 34 years of age, born in Canada. Should this person have a 33 per cent chance of being a homeowner, then the odds he is a homeowner are 0.33/(1-0.33) = 0.50. If this person was to be living with a group of unrelated people, the probability of ownership would change by a factor of 0.530 to become 0.50 * 0.53 = 0.265 and the new odds would be 0.265/(1 + 0.265) = 0.209.

The estimated coefficients for the demographic variables show that households formed by non-family groups are the least likely to own their own home. The coefficients show that childless couples under 45 are entering homeownership at higher rates, and when they have preschool children their propensity to become homeowners increases even more. Couples with school-aged children have high, but not quite as high, propensities to be homeowners as couples with preschool kids. Lone parents often have to leave homeownership, and separated or divorced persons, who do not have children living with them, are more inclined to be renters. The estimated model shows that ownership probabilities increase with household size. Women primary maintainers, even after controlling for income and household type differences, are more likely to rent their dwelling than male primary maintainers.

The coefficients for the immigration variables show a progression toward homeownership with the length of time the household maintainer has spent in Canada. Immigrants arriving during the last 10 years have a greater tendency to rent than people born in Canada. Immigrants living in Canada more than 20 years have a slightly greater propensity to own their homes than people born in Canada. Immigrants who have been in Canada more than 30 years have a 1.31 times greater chance of being a homeowner than a Canadian-born person with the same income and household characteristics. The homeownership propensities are even higher for people who immigrated from Europe or Asia more than 30 years ago. They are still higher if the primary maintainer's mother tongue was neither French nor English.

The age variables show an increasing progression in homeownership until the primary maintainer reaches the age of 75; after that, homeownership proportions decline among the independent elderly.[6] The estimates show that the largest increases, by a factor of 1/.274 = 3.650, in the odds of being a homeowner occur as the household maintainer reaches the 25 to 34 year old group. Maintainers who are over 35 years of age have twice the odds of being homeowners compared to the 25 to 34 year olds (see Figure 4). The estimates show that persons increase their chance of being homeowners until they are 75 years old but the increase is at a continuously decreasing rate. Changes in age are not only associated with changes in life cycle, but are also associated with the household's accumulation of wealth.

Table 8:
Estimated coefficients for the tenure choice model

Variable	Parameter Estimate	Standard Error	Standardized Estimate	Odds Ratio
NON-FAMILY GROUP	-0.634	0.032	-0.064	0.530
COUPLE <45 NO KIDS	0.345	0.022	0.053	1.411
COUPLE PRESCHOOL	0.693	0.024	0.111	1.999
COUPLE SCHOOL KIDS	0.546	0.023	0.109	1.726
SINGLE PARENTS	-0.082	0.021	-0.013	0.921
SEPARATED NO KIDS	-0.419	0.021	-0.062	0.658
COUPLE >45 NO KIDS	0.541	0.019	0.127	1.718
HOUSEHOLD SIZE	0.310	0.006	0.237	1.363
FEMALE MAINTAINER	-0.230	0.013	-0.059	0.795
IMMIGRATED 1981-1991	-0.961	0.034	-0.107	0.382
IMMIGRATED 1971-1980	-0.147	0.030	-0.018	0.863
IMMIGRATED 1961-1970	0.171	0.034	0.021	1.186
IMMIGRATED PRE-1961	0.269	0.034	0.042	1.309
BORN IN EUROPE	0.270	0.030	0.053	1.310
BORN IN ASIA	0.164	0.036	0.019	1.179
OTHER MOTHER TONGUE	0.312	0.019	0.066	1.367
AGE 15-24	-1.294	0.036	-0.145	0.274
AGE 25-34	1.000	1.000	1.000	1.000
AGE 35-44	0.737	0.016	0.173	2.089
AGE 45-54	1.072	0.021	0.222	2.922
AGE 55-64	1.431	0.023	0.268	4.184
AGE 65-74	1.548	0.023	0.272	4.701
AGE 75 AND UP	1.248	0.025	0.180	3.483
GAP.UNDER	-0.0098	0.0002	-0.1521	0.9900
GAP.OVER	-0.0063	0.0001	-0.4130	0.9940
Log(#OWNER)	0.846	0.019	0.463	2.331
Log(#RENTER)	-0.874	0.019	-0.491	0.417
Number of cases	220,713			
Percent owners	61%			
Concordant	83%			
Disconcordant	17%			
Gamma	0.662			

Source:
1991 Census Public Use Micro Files.

Figure 4:
The probabillity of being a homeowner by age group, after controlling for demographic and income differences

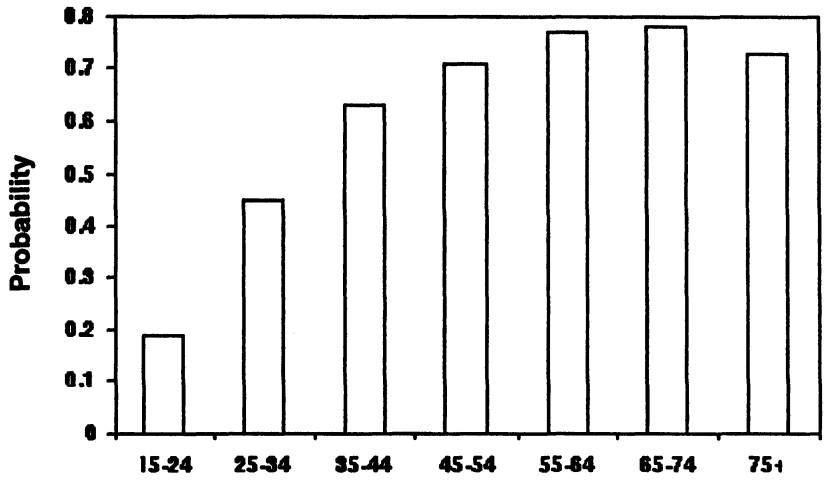


Table 9 summarizes the effect of increasing housing prices on homeownership for the major CMAs in Canada. A drop in the percentage of homeownership indicates the proportion of households which would become renters. On average, a $25,000 increase in the price of the basic ownership option would lead to a decrease in the proportion of homeowners from an average of 60 per cent to 56 per cent. Vancouver, Toronto and Montréal would have the largest absolute decline, Saskatoon and Regina the smallest.

Table 9:
Predicted changes in the percentage of homeowners with increases in housing prices

	Current	Predicted Proportions with Increase in Price of:				
		$5,000	$10,000	$15,000	$20,000	$25,000
Halifax	59.07	58.21	57.34	56.46	55.56	54.66
Québec	55.84	54.98	54.10	53.21	52.32	51.41
Montréal	49.38	48.45	47.52	46.58	45.63	44.68
Toronto	59.68	58.71	57.73	56.74	55.74	54.73
Ottawa	57.59	56.71	55.81	54.90	53.98	53.06
Saskatoon and Regina	66.11	65.34	64.55	63.75	62.93	62.10
Edmonton	61.90	61.05	60.18	59.30	58.40	57.50
Winnipeg	64.52	63.72	62.90	62.06	61.21	60.34
Vancouver	58.62	57.65	56.66	55.66	54.65	53.63
Other CMAs	65.62	64.83	64.02	63.19	62.35	61.49
ALL	**60.53**	**59.62**	**58.70**	**57.76**	**56.82**	**55.86**
Number of cases		220,654				

Source:
1991 Census Public Use Micro Files.

Choice of Building Type

Statistical models were estimated for the homeowner and renter markets to measure the relationship between differences in price and rent levels and choice of building type. (The estimated coefficients are listed in tables 10 and 11.) The homeowner analysis shows that in cities with high prices, homeowners have a greater propensity to select a medium-density or low-rise apartment option over a single-family house. As housing prices increase, homeowners are less likely to live in single-family detached houses. They are also slightly less likely to live in highrise condominiums, but this consequence has virtually no impact on city form as the proportion of homeowners living in highrise condominiums is very small to start with (some three per cent, see Figure 3). Homeowners formed by non-family groups do not tend to occupy single-family houses. The weak coefficient for the medium-density townhouse option shows that non-family group households do not differentiate across this and the detached housing types. The strongest relationships within the household type variables are between the choice of the apartment condominiums under five floors and the single-family house. All household types within the homeowner market have a lower chance of living in low-rise apartment condominiums in comparison to households formed by single people, non-family groups and separated or divorced persons. Most families select single-family houses over units in highrise condominiums. Couples over 45 years of age with no children at home show a slightly higher preference for highrise condominiums in comparison to other households but most stay in their single-family detached houses.

An increase in household size, regardless of household type, raises the likelihood that the household will choose to live in a single-family detached house. Women primary maintainers, however, more often select the higher-density options. The immigration variable yields good estimates for the first three decades and all show immigrant homeowners as being more likely to live in one of the higher density dwellings. Immigrants arriving before 1961 are not distinguishable from people born in Canada. Increases in age favour the single-family detached option. Homeowners that are between 15 and 24 years of age are more likely to select highrise condominiums than single-family detached houses. A weak positive relationship is also found between people over 65 years of age and the tendency to select a highrise condominium over a single-family detached house. The trend to condominiums increases noticeably for independent maintainers over 75 years of age.

The renter model yields less precise measures of the effect of rent increases on choice of building type due to the smaller number of cases and to rent controls affecting rental rates in some provinces. However, the general pattern of differences in the choice of building type is similar to that for owners. Larger households are more inclined to live in single-family detached houses. Women primary maintainers, holding other factors constant, are more likely than men to choose one of the higher density options rather than a single-family house. Differences across age groups show that increases in age after 44 are associated with a small shift toward highrise apartments. The trend toward low-rise apartments is weak and starts only after the age of 65. Only small differences were found across age groups in the household's propensity to choose a single-family detached house rather than a medium-density option. Higher rent to income ratios are generally associated with the selection of a higher-density option.

The Net Effect of Price Differences on Choice of Building Type

Table 12 presents the effect of price and rent differences on the mix of dwelling type. The first two blocks of rows describe the changes in the proportions within each tenure category, showing that increasing price and rent levels have a very small effect on building type choices. The third set of numbers combines the effect for owners and renters, adjusting for the change in tenure mix described under the "Current Distribution" column of the table. The fourth set expresses the combined effect as a per cent of the current proportions in each building type.

Table 10:
The estimated coefficients for building type choice model for homeowners

Variables	Townhouse Rowhouse Attached	Apartment Under 5 Floors	Apartment 5+ Floors	Chi-square
INTERCEPT	0.117	**1.282**	**4.055**	**110.6**
NON-FAMILY GROUP	**0.161**	**0.174**	0.424	**40.0**
COUPLE <45 NO KIDS	-0.058	**-0.216**	**-0.221**	**74.8**
COUPLE PRESCHOOL	-0.053	**-0.373**	-0.056	**120.8**
COUPLE SCHOOL KIDS	**-0.097**	**-0.271**	-0.126	**118.5**
SINGLE PARENTS	**0.127**	**-0.150**	-0.093	**100.0**
SEPARATED NO KIDS	**0.198**	**0.172**	0.128	**126.3**
COUPLE >45 NO KIDS	-0.031	**-0.117**	0.100	**49.6**
HOUSEHOLD SIZE	**-0.095**	**-0.339**	**-0.953**	**1,488.7**
FEMALE MAINTAINER	**0.140**	**0.179**	**0.207**	**283.4**
IMMIGRATED 1981-1991	**0.421**	**0.401**	**0.792**	**418.9**
IMMIGRATED 1971-1980	**0.281**	**0.247**	**0.462**	**248.5**
IMMIGRATED 1961-1970	**0.187**	**0.187**	**0.246**	**90.3**
IMMIGRATED PRE-1961	0.050	-0.049	0.072	8.1
BORN IN EUROPE	-0.048	0.030	-0.181	20.7
BORN IN ASIA	-0.015	-0.135	0.176	22.4
OTHER MOTHER TONGUE	0.033	**0.278**	**0.128**	**175.3**
AGE 15-24	**0.219**	**0.387**	**0.508**	**83.4**
AGE 25-34	1.000	1.000	1.000	
AGE 35-44	**-0.176**	**-0.174**	-0.098	**199.3**
AGE 45-54	**-0.220**	**-0.211**	-0.089	**212.5**
AGE 55-64	**-0.237**	**-0.141**	-0.035	**170.8**
AGE 65-74	**-0.294**	**-0.140**	0.067	**233.8**
AGE 75 AND UP	**-0.400**	-0.078	0.153	**295.8**
VAL.INC	**0.047**	**0.053**	**-0.037**	**289.1**
Log(SFD.OWN)	**-0.898**	**-1.222**	**-1.096**	**1,988.7**
Log(TOWN.OWN)	**0.908**	**0.283**	0.119	**729.7**
Log(LO.APT.OWN)	**0.044**	**1.046**	0.032	**4,187.4**
Log(HI.APT.OWN)	-0.020	**-0.132**	**1.022**	**734.2**
Number of cases	133,594			80,474.1

Note:
Those values that are bolded, represent values with a probability less than 0.001.

Source:
1991 Census Public Use Micro Files.

Table 11:
The estimated coefficients for building type choice model for renters

Variables	Townhouse Rowhouse Attached	Apartment Under 5 Floors	Apartment 5+ Floors	Chi-square
INTERCEPT	**3.389**	**7.530**	**9.589**	**2,180.0**
NON-FAMILY GROUP	**-0.122**	**-0.143**	**-0.196**	**49.8**
COUPLE <45 NO KIDS	0.040	0.022	-0.032	12.5
COUPLE PRESCHOOL	0.058	0.045	0.051	5.6
COUPLE SCHOOL KIDS	0.068	0.004	-0.014	11.2
SINGLE PARENTS	**0.155**	-0.011	**-0.161**	**204.8**
SEPARATED NO KIDS	0.063	0.058	0.002	18.5
COUPLE >45 NO KIDS	-0.010	-0.041	-0.029	3.5
HOUSEHOLD SIZE	**-0.158**	**-0.647**	**-0.844**	**3,737.4**
FEMALE MAINTAINER	**0.105**	**0.152**	**0.169**	**128.4**
IMMIGRATED 1981-1991	**0.183**	**0.396**	**0.649**	**391.6**
IMMIGRATED 1971-1980	0.093	**0.161**	**0.338**	**113.8**
IMMIGRATED 1961-1970	0.065	0.002	0.169	**34.3**
IMMIGRATED PRE-1961	-0.052	-0.060	0.019	8.2
BORN IN EUROPE	-0.036	-0.056	-0.092	7.4
BORN IN ASIA	0.145	**0.184**	**0.389**	**108.7**
OTHER MOTHER TONGUE	-0.017	**0.104**	**0.133**	**61.4**
AGE 15-24	0.064	**0.171**	**0.114**	**75.0**
AGE 25-34	1.000	1.000	1.000	
AGE 35-44	-0.030	**-0.078**	0.012	**44.6**
AGE 45-54	-0.049	-0.051	**0.136**	**102.8**
AGE 55-64	-0.031	0.015	**0.329**	**293.3**
AGE 65-74	0.035	0.099	**0.628**	**969.8**
AGE 75 AND UP	0.037	**0.183**	**0.942**	**1,929.3**
RENT.INC	**0.512**	**0.768**	0.047	**208.4**
Log(SFD.RENT)	**-0.721**	**-1.243**	**-1.336**	**0.8**
Log(TOWN.RENT)	**0.761**	**0.642**	**0.869**	**409.5**
Log(LO.APT.RENT)	0.034	**0.658**	**-0.201**	**8,393.9**
Log(HI.APT.RENT)	**-0.228**	**-0.248**	**0.522**	**2,759.0**
Number of cases	87,102.00			102,810.6

Note:
Those values that are bolded, represent values with a probability less than 0.001.

Source:
1991 Census Public Use Micro Files.

Table 12:
Predicted changes in building type distributions as a result of increasing price levels
(All Major Census Metropolitan Areas)

	Current Distribution	Proportions with Increase in Price Levels $5,000	$10,000	$15,000	$20,000	$25,000
Owners						
SFD	79.22	79.15	79.07	79.00	78.93	78.85
Med Dens	12.92	12.98	13.04	13.10	13.15	13.21
U5	5.23	5.26	5.28	5.31	5.34	5.37
5+	2.63	2.62	2.61	2.59	2.58	2.57
Total	100					
Renters						
SFD	11.82	11.70	11.58	11.46	11.35	11.23
Med Dens	18.49	18.51	18.54	18.56	18.58	18.60
U5	44.97	45.29	45.61	45.93	46.25	46.56
5+	24.72	24.50	24.27	24.05	23.83	23.61
Total	100					
Both owners and renters						
SFD	52.62	51.91	51.20	50.48	49.74	49.00
Med Dens	15.12	15.21	15.31	15.40	15.50	15.59
U5	20.92	21.42	21.94	22.47	23.00	23.55
5+	11.35	11.45	11.55	11.65	11.76	11.86
Total	100					
Both owners and renters						
SFD	100	98.66	97.31	95.93	94.54	93.13
Med Dens	100	100.63	101.26	101.88	102.51	103.13
U5	100	102.42	104.89	107.41	109.98	112.60
5+	100	100.90	101.80	102.70	103.58	104.46

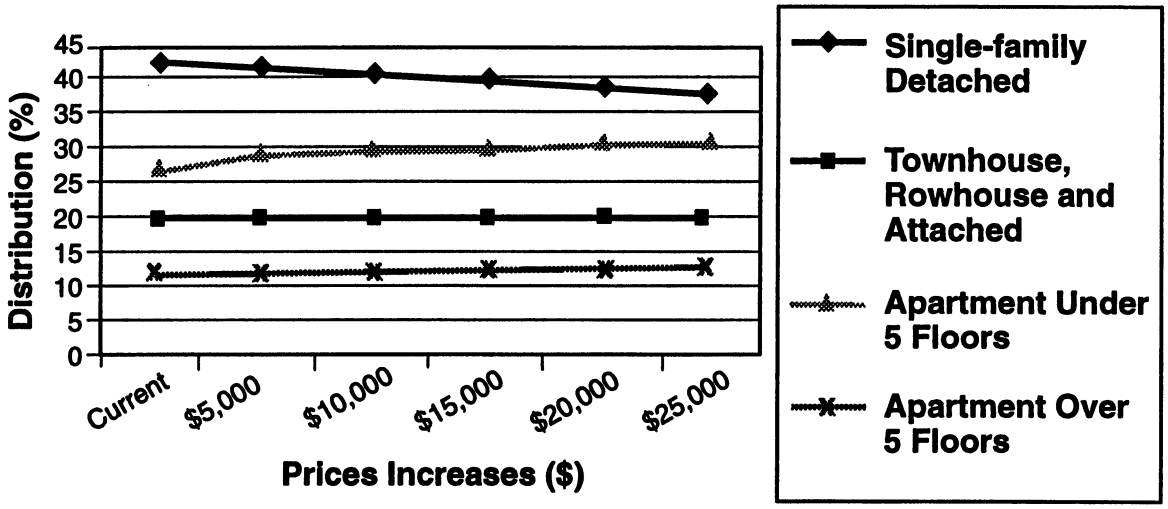
Notes:
* Rents are assumed to increase by one-tenth as much as for owners.
The annual rent increases depicted are for $500, $1,000, $1,500, $2,000 and $2,500.

Source:
1991 Census Public Use Micro Files.

Rising prices relative to income will increase the density of cities but will do so primarily by keeping people out of the homeownership market. The substitution effects within each tenure option are negligible when the price of all building types increases by the same amount.

Changing development charge schedules in ways that favour medium-density options over single-family houses can have a major effect on city form. The effect will be primarily due to the smaller price increase in the medium-density housing letting the people who want this kind of housing enter the homeownership market. The higher price of single-family houses keeps prospective buyers for longer periods of time in the higher-density rental housing. In addition, the change in the relative price of the options will also encourage people who plan to buy a detached house to accept a medium-density option. The extent to which changes in the relative prices of the options cause prospective buyers to move from one sub-market to another is beyond the scope of this study. However, most of the households that are induced to buy a higher-density option as a result of the differential in

Figure 5:
Changes in building type distribution as a result of uniform increases in housing prices for 25 to 34 year old heads of households



development charges will treat their purchase as a starter home and move to detached houses when they can afford the higher down payment.

The analysis carried out for each age group developed the expected results: the 25 to 34 year olds—the first-time homebuyers—are the most affected by price increases. Figure 5 shows the net effect of price increases on tenure and building type choice for young households. The effects are larger than for the older population, but the difference is not really as large as expected. The long-run effect of increasing development charges will be smaller than depicted in Figure 5 for the following reasons.

- In the long run, the effect of rising house prices due to development charges will be partially offset by reductions in property taxes.
- Some of the effect on first-time buyers will be reduced as new homeowners selecting a higher density option continue to save to buy their preferred single-family detached house.
- Some existing homeowners may react to the overall increase in housing prices by increasing their housing purchases for investment reasons. Some may move from medium-density housing to single-family houses in anticipation of higher future capital gains.
- Increasing house prices will drive more first-time buyers into the outer suburbs and ex-urban areas where land prices and development charges are lower.

7 CONCLUSIONS

Dramatic predictions have been made in the literature on the price effects of changing demographic profiles and many of these predictions have not borne out. Housing economists who have been examining past trends for a long time are pointing to the robustness of price levels and market demand. Housing markets are extremely complex with many determinants that are discovered only after the latest prediction fails and market demand appears to stay on course. Some people, it has been found, will put themselves into poverty to buy a home. Cash "gifts" from friends and relatives have been countering some of the difficulties young people face in saving for down payments. Other factors come into play that are not only economic, but political and social. As homeownership becomes more difficult to attain, new government programs may increase access for potential first-time buyers and counter all the spatial effects described above. The building industry's response to shifts in demand will also have an effect. Small shifts in demand may encourage builders to innovate to make medium- and higher-density options more attractive to a broader range of households.

A conservative estimate is a one per cent reduction in single-family houses for each $5,000 increase in housing price levels due to increasing development charges. The reduction is primarily due to reduced homeownership propensities. It will not occur if other government programs are initiated to help first-time homebuyers.

This study looked at the effect of uniform increases in development charges. Such charges made all housing options more expensive and, in response, people cut back on their housing purchases. The reduction involves a shift in demand toward higher density building types and a delay in the purchase of single-family detached houses. Higher development charges will make cities a little more compact.

However, a larger shift could be expected as a result of changes in the relative size of the charges applied to different building types. If townhouses had much lower charges than single-family detached units, for example, then a much larger shift would occur within the ownership options than depicted in this report. Implementing such a tilt in development charge schedules is sound policy for at least two reasons.

First, in today's fiscal and political climate, market-generated solutions to resource allocation problems are heralded. Markets, when working perfectly, yield the maximum social welfare that is possible given the constraints imposed by technology, resource endowments and the initial distribution of wealth. In efficient markets, people buy what they most value. Because the buyers have to recognize the cost of producing the goods and services, markets ensure that the value of the goods and services people buy exceed their costs of production. When development charge schedules do not properly reflect the differences in the costs of providing the infrastructure that is needed to expand cities, then markets cannot yield the welfare-maximizing allocation of land to different building types, urban density patterns are distorted and the evolution of the spatial structure of cities cannot be welfare maximizing. The large size of the infrastructure cost differences of alternative development patterns is illustrated by Pamela Blais' (1996) study, *The Economics of Urban Form*. It is also illustrated in a recently completed CMHC study entitled *Conventional and Alternative Development Patterns: Phase 1—Infrastructure Costs*. The land use implications of the fiscal instruments are discussed by Enid Slack (1993) and Skaburskis (1993). It is important, therefore, to design development charge schedules to reflect the full cost of infrastructure and service provision and to recognize the differences attributable to the different building types. In most cases, the rationalization of development

cost schedules will raise the charges on houses and lower charges on higher-density building forms and lead to more compact cities.

Second, markets yield optimal resource allocations when all costs and benefits are included in the consumers' and producers' decisions. Land development creates external costs, costs that are borne by people other than those involved in the direct transactions. A low-density subdivision pushes the urban periphery further out causing the occupants of the next development to have to travel even further to get to the city's centres of interest. Such costs are not recognized by the developer of the low-density subdivision. The external costs that vary with the density of development include the external costs of energy consumption, higher amounts of air pollution, loss of scenic amenity and loss of access to the countryside. External benefits, however, also vary with developmental type. Lower density reduces the concentration of the air pollution people are exposed to, provides green spaces within development and reduces the need for extensive stormwater collection and disposal systems. Most city planners, however, believe that the external costs of low-density development exceed the external benefits. This belief implies that the development cost schedules should be further tilted, beyond the tilt induced by the fiscal considerations, to favour higher-density options. The externality issue, however, is still controversial in some sectors and more research is needed to assess the external costs and benefits of varying project density.

Past Canadian and U.S. policies have successfully promoted the development of single-family residential subdivisions. The federal government's past policies have favoured suburban growth and have had tremendous success in giving the majority of Canadian households access to mortgage finance and to a supply of high-quality homes. Given the generally high standard of Canadian housing, it is timely for policy to shift focus toward the social and environmental implications of further development. More research should be carried out on the relationship between subdivision density and its fiscal, social and environmental consequences to help in the development of housing policies which consider the broader social and environmental consequences of development.

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ENDNOTES

1 In demand-driven markets in which new supply is constrained, landowners capture scarcity rents set by the extra amount buyers offer to enter the market. During such periods, development cost burdens are absorbed in the price of land.

2 The price of existing inner-city housing is expected to increase by more than the development charges due to the higher price levels raising the value of land closest to the city centre as described by Muth (1969, Chapter 2).

3 Yoshikawa and Ohtake (1998) use a Japanese data set to show that a one per cent increase in land prices increases the savings rate by 0.03 per cent for young households with plans to buy a house, but reduces by 0.6 per cent the savings of renters without such plans.

4 Kim (1992) studies the rental market in Korea and fins that a hierarchical model composed of the sets of binary logistic equations yields results that are similar to those of the MNL model. Nevertheless, he prefers the hierarchical model on account of the structure of the error terms.

5 Others have found household, rather than the head of household, income the better predictor of tenure and housing demand even though the latter variable is a better indication of the socioeconomic class of the households.

6 The decline may be due to elderly homeowners moving to rental units or to group homes.