Tax Effects on Rental Housing in Halifax, Nova Scotia

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PRÉCIS

Cette étude constitue une analyse de l'incidence des impôts sur le coût en immobilisations, les taux effectifs marginaux d'imposition et le montant brut des loyers en ce qui a trait aux investissements qui sont généralement faits dans le secteur de la location de logements à Halifax, Nouvelle-Écosse. L'étude porte sur tous les principaux éléments du régime fiscal canadien qui s'appliquent aux investissements faits dans le secteur de la location de logements à Halifax, y compris les impôts sur le revenu fédéral et provincial, la taxe fédérale sur les produits et services (la «TPS»), la taxe de vente provinciale, les taxes foncières municipales et la taxe d'aménagement (ou impôts sur les lotissements). Cette analyse fait appel aux deux théories complémentaires suivantes : le modèle d'établissement du prix des immeubles locatifs et la théorie relative aux taux effectifs d'imposition. Le modèle élaboré est normalisé en fonction des données récentes sur le secteur de la location de logements à Halifax, y compris les variables fiscales et financières. Une série de simulations empiriques sont entreprises afin d'évaluer l'incidence de diverses variations des variables exogènes. Il se dégage de cette étude la conclusion suivante : les impôts influent considérablement sur le marché de la location de logements à Halifax. Le taux effectif marginal d'imposition dans ce secteur est d'environ 61 pour cent. Dans l'ensemble, les impôts entraînent une hausse de 63 pour cent du montant brut des loyers, dans des proportions de 37 pour cent pour les impôts sur le revenu, de 35 pour cent pour les taxes de vente fédérale et provinciale et de 28 pour cent pour les taxes foncières municipales. L'harmonisation éventuelle de la TPS et de la taxe de vente applicable en Nouvelle-Écosse entraînera une augmentation d'environ 4 pour cent des loyers et aura une incidence négligeable sur les taux effectifs marginaux d'imposition. Compte tenu du récent degré d'augmentation de la valeur des propriétés à Halifax, un assouplissement des règles relatives à l'impôt sur les gains en capital n'aurait aucune incidence sur le marché de la location de logements. Une baisse générale du taux d'intérêt réel, qui passerait d'un taux actuel de 6 pour cent à un taux plus normal, d'après les données historiques, de 3 pour cent, entraînerait une diminution d'environ 25 pour

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cent des loyers. L'incidence de l'inflation sur le marché de la location de logements est hautement tributaire de l'hypothèse d'arbitrage ou de la réaction présumée des marchés des capitaux aux écarts d'impôts.

ABSTRACT

This study analyzes the effects of taxes on the cost of capital, marginal effective tax rates, and gross rents for typical rental housing investments in Halifax, Nova Scotia. The study encompasses all major elements of the Canadian tax regime affecting rental housing investments in Halifax, including federal and provincial income taxes, the federal goods and services tax (GST), provincial sales tax, municipal property tax, and impact fees (or lot levies). Two complementary theoretical frameworks are used in conducting the analysis: the rental housing asset-pricing model and the theory of effective tax rates. The model developed is calibrated using current data for the Halifax rental housing sector, including tax and finance variables. A series of empirical simulations is undertaken to assess the effects of various changes in exogenous variables. The study concludes that taxes have significant effects on rental housing markets in Halifax. The marginal effective tax rate on the sector is about 61 percent. Taxes, in total, cause gross rents to be about 63 percent higher than they otherwise would be. The percentage contributions of the individual taxes to the total are as follows: income taxes, 37 percent; federal and provincial sales taxes, 35 percent; and municipal property taxes, 28 percent. The pending harmonization of the GST with the Nova Scotia sales tax will cause rents to rise about 4 percent and will have negligible effects on marginal effective tax rates. Given recent levels of property appreciation in Halifax, relaxation of the capital gains tax rules would have no effect on rental markets. A decline in the general level of the real interest rate from its current level of about 6 percent to the more historically normal level of 3 percent would cause rents to decline by about 25 percent. The effect of inflation on rental markets depends crucially on the arbitrage assumption, or the way in which investment markets are assumed to respond to tax differences.

INTRODUCTION

Any rental housing investment in Canada is affected by a range of taxes levied by all three levels of government. Empirical studies for the United States have highlighted the substantial effects that taxes can have on rental housing markets.[1] In this article, I analyze the effects of taxes on the cost of capital (COC), marginal effective tax rates (METR), and gross rents for typical rental housing investments in a Canadian rental housing

[1] See, for example, Denise DiPasquale and William C. Wheaton, "The Cost of Capital, Tax Reform, and the Future of the Rental Housing Market" (May 1992), 31 *Journal of Urban Economics* 337-59.

market—that of Halifax, Nova Scotia. Two complementary theoretical frameworks are used in conducting the analysis: the rental housing asset-pricing (RHAP) model and the theory of effective tax rates. The RHAP model uses tax, finance, and sectoral parameters to estimate equilibrium market variables, including gross rents and components of equilibrium taxes paid. The theory of effective tax rates applies economic analysis to estimate the difference between the gross of tax return that an investment must earn in order to be economically viable and the net of tax return accruing to savers, after adjusting for the effects of inflation. Certain tax information produced by the RHAP model is necessary to complete the effective tax rate calculations. The model developed is calibrated using current data for the Halifax rental housing sector, including tax and finance variables. A series of empirical simulations is undertaken to assess the effects of various changes in those parameters.

The study encompasses all major elements of the Canadian tax regime affecting rental housing investments in Halifax, including federal and provincial income taxes, the federal goods and services tax (GST), provincial sales tax (PST), municipal property tax, and impact fees (or lot levies). In addition to assessing the effects of the current tax regime, a number of simulations are undertaken to assess the effects of changes in taxes and the general economic environment. To my knowledge, this research project provides the first integrated theoretical and empirical analysis of the joint effects of federal, provincial, and municipal taxes on key aspects of a selected Canadian metropolitan rental housing market. The model and analysis used in this study could readily be applied to other local, regional, or national rental housing markets and is constrained in this regard only by the availability of data on parameter variables.

The study concludes that taxes have significant effects on rental housing markets in Halifax. In order for rental housing investors to achieve market rates of return, increases in taxes must translate into increased rents for renters. The following are among the specific conclusions of the study. The METR on the sector is about 61 percent—that is, 61 percent of the return from a new investment goes to taxes. Taxes, in total, cause gross rents to be about 63 percent higher than they otherwise would be. The percentage contributions of the individual taxes to the total are as follows: income taxes, 37 percent; federal and provincial sales taxes, 35 percent; and municipal property taxes, 28 percent. The pending harmonization of the GST with the Nova Scotia sales tax will cause rents to rise about 4 percent and will have negligible effects on METR. Given recent levels of property appreciation in Halifax, relaxation of the capital gains tax rules would have no effect on rental markets. A decline in the general level of the real interest rate from its current level of about 6 percent to the more historically normal level of 3 percent would cause rents to decline by about 25 percent. The effect of inflation on rental markets depends crucially on the arbitrage assumption, or the way in which investment markets are assumed to respond to tax differences. For example, if markets adjust to equilibrate pre-tax rates of return, an increase in expected inflation from 2 percent to 6 percent will cause rents to fall by

almost 7 percent. On the other hand, if the adjustment is to equate post-tax rates of return, rents will rise by almost 10 percent. The study recommends additional research to determine the most appropriate arbitrage assumption.

Because of differences in estimating periods and differing methodologies, it is not possible to compare accurately the findings of this study for rental housing with those found for other sectors in other studies. Also, the model used in this study does not track the adjustment between equilibria or assess the aggregate effects of taxes on rental housing capacity. It is suggested that future research aimed at applying the methodology of this study to other sectors and extending the analysis for the rental housing sector to examine adjustment dynamics would be potentially useful contributions.

The remainder of the article is structured as follows. The next section presents the theoretical model, which incorporates the influence of tax and financial variables within a rental housing investment model. The third section presents the results of the model simulations. The final section contains concluding comments.

THE THEORETICAL MODEL

The Asset-Pricing Model

I use a variant of the rental housing asset-pricing model[2] to reflect the effects of taxes on a typical rental housing investment. Underlying the RHAP model framework is the assumption that rental housing investors achieve a target after-tax rate of return from the net present value of total cash flow from the property over an optimal holding period. The target rate of return is assumed to equal the risk-adjusted expected return on alternative marginal investments. All sources of return—including net after-tax rents, capital gains, accelerated capital cost allowance (CCA), tax preferences on interest deductions, property taxes, sales taxes, and so on—factor into the calculation of total return from an investment.

The RHAP model developed in this study is based on the premise that adjustment to changes in exogenous parameter values is instantaneous. In

[2] A partial list of studies applying an asset-pricing framework in the context of US rental markets includes the following: Patric H. Hendershott and David C. Ling, "Trading and the Tax Shelter Value of Depreciable Real Estate" (June 1984), 37 *National Tax Journal* 213-23; Patric H. Hendershott, James R. Follain, and David C. Ling, "Effects of Real Estate," in Joseph A. Pechman, ed., *Tax Reform and the U.S. Economy* (Washington, DC: Brookings Institution, 1987), 71-102; Anthony J. Pellechio, "Taxation, Rental Income, and Optimal Holding Periods for Real Property" (March 1988), 41 *National Tax Journal* 97-107; DiPasquale and Wheaton, supra footnote 1; and James Alm and James R. Follain, "Shocks and Valuation in the Rental Housing Market" (September 1994), 36 *Journal of Urban Economics* 117-42. I present only a basic outline of the model in this article. For a complete description and references to US studies, see Alex MacNevin, "Effects of the Tax System on Rental Housing: The Case in Halifax," Research Report, External Research Program, Canada Mortgage and Housing Corporation (July 1996). That study also contains a more complete description of the tax rules applying to rental housing.

reality, a change in an exogenous parameter will temporarily affect the net return from the investment. Only in the longer run will the target return be re-established at new equilibrium values for the endogenous variables, at an equivalent after-tax discount rate. While the RHAP model developed does not provide information on the adjustment path between equilibria, it does provide complete information on the equilibrium values for the endogenous variables, including those required to calculate METR and the COC. The model also does not provide any information on the magnitude of any induced changes in the stock of rental housing units. Information on the adjustment path and on stock changes would require a full-blown econometric model, which would be a logical next step for research on tax and cost-of-capital influences on Canadian rental housing markets.

The simulations in this study are based on the assumption that property values are fixed; adjustment to any exogenous shock is assumed to take place through the level of rents.[3] This is consistent with empirical evidence of a high long-run supply price elasticity for housing.[4] In a series of simulations, Alm and Follain[5] show that price oscillates only slightly around the equilibrium price in response to even quite substantial demand and supply shocks, including changes in the user cost of capital.

Based on current tax law, the value of a rental housing investment is determined by the following equation, where the variables are as defined in the appendix at the end of the article:[6]

$$V_0(h) = (1-t_y)(1-t'_s)\sum_{j=1}^{h} R_j/(1+d)^j - t_s b V_0(h) - \theta(1-S)V_0(h) - t_p V_j/(1+d)^j$$

$$-\sum_{j=1}^{h} P_j/(1+d)^j - \sum_{j=1}^{h} I_j/(1+d)^j + t_y \sum_{j=1}^{h} I_j/(1+d)^j + t_y \sum_{j=1}^{h} CCA_j/(1+d)^j$$

$$+ V_{h+1}/(1+d)^h - t_g(V_{h+1} - UCC_{h+1} - E_h)/(1+d)^h - t_y X_h/(1+d)^h. \quad (1)$$

The intuition behind the model is fairly straightforward. It is consistent with the assumption that the rental housing sector is competitive in the sense that there is relative freedom of entry and exit and that investors in rental housing must make a target rate of return on their rental housing investments that is equal to that earned in other sectors. If the value of the property is set, the level of rents will adjust to be consistent

[3] Alternatively, one could assume that the stream of rents was fixed so that the value of the property would be determined to be consistent with that stream and the equilibrium values of the other endogenous variables.

[4] See Robert Topel and Sherwin Rosen, "Housing Investment in the United States" (August 1988), 96 *Journal of Political Economy* 718-40.

[5] See Alm and Follain, supra footnote 2.

[6] Stock values are measured at the beginning of the year in question; flow values are earned or paid at the end of the year.

with that value, given the required rate of return and the values that the other endogenous variables will take on in equilibrium. The terms on the right-hand side of equation 1 show the variables that give rise to positive or negative cash flow for a rental housing investment and therefore are of relevance in determining the price that a profit-maximizing investor would be willing to pay for it.

The 1st term reflects the stream of discounted rental income, net of income tax and sales taxes on rents or operating costs. This will grow at the rate of increase in the property value each year (net of depreciation on the building component of the property). In the long run, real property value will be determined by construction costs, which are assumed to be exogenously given and constant. As discussed in the next section of the article, if the ratio of net rental income to the gross amount of rent charged tenants is known, it is possible to calculate the latter from the equilibrium stream of net rental income forthcoming from simulating the model.

The 2d and 3rd terms in equation 1 reflect, respectively, the sales taxes on capital inputs, including land and construction costs, and impact fees or lot levies expressed as a proportion of the initial land value. The 4th term represents the payment of yearly property taxes. The 5th, 6th, and 7th terms incorporate the effects of mortgage payments. The 5th and 6th terms reflect the cash flow effects of repayment of mortgage principal and payment of interest. In the simulations, the ratio of debt to property value is held constant each year through a continual process of refinancing, so as to isolate the pure effects of tax and other exogenous changes. The 7th term shows the positive cash flow effects resulting from the deductibility of interest payments in each year. The 8th term reflects tax savings from CCA claims permitted for tax purposes. In the simulations, the CCA claim made in a year is defined to be the lesser of the CCA amount earned and the "tax room"—that is, any positive amount left after deducting interest payments from rental income in determining income for tax purposes. This reflects the restriction that a CCA claim cannot be used to generate a rental loss. Unclaimed CCA is added back into the undepreciated capital cost (UCC) base to be claimed as earned in subsequent years. For simplicity, in equation 1 I have ignored the "half-year" rule for CCA during the first year, although it is taken into account in the simulations.

The 9th term in equation 1 shows the proceeds received upon sale of the property at the end of the holding period. The 10th term accounts for capital gains taxes paid upon sale of the property at the end of the holding period; the base for tax purposes is the sales price after subtracting both the UCC of the property and any capital gains exemption available. Finally, the last term reflects any "recapture" tax payable at the time the property is sold. In the simulations, this is defined to equal the tax rate times the amount by which the depreciable portion of the property at the end of the holding period exceeds the UCC at that time.

In its fully specified form, the model consists of a set of simultaneous equations. With assumed values for the exogenous variables, it is possible to

solve the model empirically. This involves an iterative optimization procedure during which the equilibrium values of the endogenous variables—such as rental income, gross rents, capital gains, the accrual-equivalent capital gains tax rate, annual CCA claims, annual property taxes, and so on—are computed under assumed values for the exogenous parameters.[7]

Marginal Effective Tax Rates and the Cost of Capital

It is possible to derive the METR and the COC on the rental housing investment using exogenous parameters and equilibrium parameter values forthcoming from the optimizing process described above. Indeed, as discussed briefly later in the article, this approach can have significant advantages over the traditional King and Fullerton methodology for calculating METR and COC. In the case of an unincorporated rental housing investment[8] for which there is replacement investment exactly sufficient to maintain the property in its original state, the required gross rate of return (r_g) would be given by the following equation, where again the variables are as defined in the appendix:[9]

$$r_g = S[r_f + \delta - \Delta q/q)(1-Z) - (\delta - \Delta q/q)](1+t_{sb}) + (1-S)(r_f - \Delta q'/q')(1+\theta)(1+t_{sl}) + t_p. \quad (2)$$

The logic behind equation 2 can be briefly described. The term multiplied by S on the right-hand side of the equals sign relates to the building

[7] In this study, I do not attempt to solve the model for the optimal holding period. However, optimizing behaviour should lead investors to retain the property for the holding period h that maximizes the value of the discounted cash flow from the property.

[8] As discussed in MacNevin, supra footnote 2, it does not really matter empirically whether the investment is assumed to be made through an unincorporated or an incorporated business structure, so long as in the case of the latter, the investment is not financed from retained earnings and rental profits are distributed as earned. The reason for this is that the combined personal-corporate tax rate on dividends at average weighted statutory tax rates of investors is identical to the average statutory tax rate on unincorporated rental profits. I am not aware of any direct data for Canada that show the proportion of rental housing investment that is through incorporated versus unincorporated firms. However, from Revenue Canada's personal taxation statistics for the 1986 taxation year (Revenue Canada, Taxation, *Taxation Statistics: 1988 Edition* (Ottawa: Supply and Services, 1988), table 3, net rental income was $974.6 million dollars, while for the same year, incorporated real estate operators and developers had profits of $1.4 billion (Statistics Canada, *Corporation Financial Statistics, 1987*, catalogue no. 61-207, table 2B). While I do not know what portion of this latter figure is accounted for by developers, and bearing in mind methodological differences in the two concepts of income, the situation in Canada may not be much different from that in the United States. According to a recent US study (J.L. Goodman and M.R. Grupe, "Top Ten Surprises About Ownership and Financing of Rental Housing" (Winter 1995), 11 *Real Estate Finance* 42-48), personal investments currently account for about 60 percent of the number of units and total investment value in that country.

[9] See Robin W. Boadway, Neil Bruce, and Jack M. Mintz, *Taxes on Capital Income in Canada: Analysis and Policy*, Canadian Tax Paper no. 80 (Toronto: Canadian Tax Foundation, 1987), chapter 2, for derivation of an equation similar to this in the case of corporate investments. Boadway, Bruce, and Mintz do not, however, include property taxes, sales taxes, or impact fees in their analysis. Equation 2 reflects the fact that investment tax credits have not applied in the case of rental investments.

component of the investment, while the term multiplied by $(1-S)$ relates to the land component. What r_g measures is the return that an investor must earn to cover all of his or her costs before the payment of taxes and before taking into account the effects of depreciation. In the case of the building component of the investment, each dollar of investment costs the investor each year the real rate of finance plus any real net depreciation in the asset value, all adjusted down to reflect the tax saving from CCA claims per dollar of investment. Net depreciation must then be deducted, and the amount must be grossed up to reflect any sales taxes on the asset. The calculation for the land component is similar, except that depreciation does not have to be taken into account, CCA is not earned for tax purposes, and the rate must be adjusted for any lot levies or impact fees. The property tax rate must then be added to both components.[10] The real cost of finance, r_f, in equation 2 is a weighted average of the cost of debt and equity finance—that is, $r_f = \beta i + (1-\beta)\rho - \pi$. The "cost of capital" is measured by factoring in the effect of net depreciation in the building value—that is, before deducting the second $\delta - \Delta q/q$ term in equation 2.

The equation for the after-tax rate of return to savers (r_n) is:

$$r_n = \beta i(1-t_y) + (1-\beta)[a\rho(1-t_y) + (1-a)\rho(1-t_c)] - \pi \qquad (3)$$

where the accrual-equivalent tax rate on capital gains (t_c) is defined as the rate of tax on the annual accrued value of capital gains that would yield the same present value of revenues as the actual tax levied at the time of realization of the gain.[11]

METR on an investment may be defined as (1) the absolute tax wedge $(r_g - r_n)$; (2) the "tax-inclusive" effective tax rate $[(r_g - r_n)/r_g]$; or (3) the "tax-exclusive" effective tax rate $[(r_g - r_n)/r_n]$. Obviously, each of these measures reveals different aspects of the dispersion between r_g and r_n and the effects of taxes on a marginal investment project. The tax wedge is simply the difference between the rate of return earned on a marginal investment (net of depreciation) and the rate of return on savings used to finance it. In the case of the tax-inclusive effective tax rate, the denominator includes the tax paid as well as the net income received. It expresses the tax wedge in proportion to the total return to the investment, thus emphasizing the fraction of total return appropriated as taxes. The tax-exclusive effective tax measure emphasizes the magnitude of the component of total return going to taxes relative to the component actually accruing to the saver. In the empirical analysis, I calculate measures 1 and 2—the two most commonly used measures.[12]

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[10] This treatment is consistent with the view that the property tax is most appropriately viewed as a tax on capital rather than a benefit tax.

[11] It is assumed that the required rate of return through rental profits is the same as that through capital gains—ρ.

[12] These are the primary measures used by Mervyn A. King and Donald Fullerton, *The Taxation of Income from Capital* (Chicago: University of Chicago Press, 1984), and
(The footnote is continued on the next page.)

Measuring METR requires precise measures of Z (the net present value of capital cost allowances), t_c (the accrual-equivalent tax rate on capital gains), and a (the proportion of equity return received as rental income instead of as capital gains). These variables are endogenous and depend on a number of factors, including the holding period, the debt-equity ratio, real interest rates, inflation, and the initial price of the property. Moreover, these factors will affect the initial price that a profit-maximizing investor will be willing to pay for the property. Thus, values for all of the endogenous variables are determined simultaneously. The values for Z, t_c, and a are derived as an integral component of the model output during the optimization process with the RHAP model.

The Arbitrage Assumption[13]

The manner in which the investment market is hypothesized to adjust to differences in effective tax rates is referred to as the arbitrage assumption. The adjustment process can affect the METR and COC estimates. In this study, I use two alternative arbitrage assumptions. The first assumption is that arbitrage leads to an outcome in which all projects offer the same real rate of return to savers before personal tax. I call this the "fixed-r_f" case. Given the assumed value for r_f and given the investment tax rules and the assumed marginal tax rate for the saver, it is possible to derive both r_g and r_n and to calculate both METR and the tax wedge. In the equilibrium, r_g would differ among investments facing different investment tax rules, as would be expected. An implication of the fixed-r_f approach to arbitrage is that savers with the same characteristics for tax purposes (that is, those in the same personal tax bracket) receive the same after-tax real return (r_n) from the investment, but taxpayers in different personal tax brackets receive different net returns after personal tax. This arbitrage assumption is consistent with the well-known Fisher relationship that nominal interest rates move point-for-point with the expected inflation rate. This can be seen from the expression for r_f presented in the preceding section of the article. For example, if $\rho = i = r_f = 5\%$ when $\pi = 0$, then $\rho = i = r_f = 10\%$ when $\pi = 5\%$. Post-tax real returns to savers (r_n) will not, however, be impervious to changes in inflation rates; the post-tax real return to debt will be $i(1-t)-\pi$. For example, if the target r_f is 5 percent when the inflation rate is 0 percent, then at a tax rate of 50 percent,

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[12] Continued . . .
Boadway, Bruce, and Mintz, supra footnote 9. Michael J. Daly and Jack Jung, "The Taxation of Corporate Investment Income in Canada: An Analysis of Marginal Effective Tax Rates" (August 1987), 20 *Canadian Journal of Economics* 555-87, used the tax-inclusive measure exclusively.

[13] For discussions of alternative arbitrage assumptions, see King and Fullerton, supra footnote 12; Daly and Jung, supra footnote 12; Robin W. Boadway, "The Theory and Measurement of Effective Tax Rates," in Jack M. Mintz and Douglas D. Purvis, eds., *The Impact of Taxation on Business Activity* (Kingston, Ont.: Queen's University, John Deutsch Institute for the Study of Economic Policy, 1987), 60-98; and Boadway, Bruce, and Mintz, supra footnote 9.

the real after-tax return to savers will be 2.5 percent. If the inflation rate increases to 5 percent and as a result r_f increases to 10 percent, then the real after-tax return on debt will be 0—that is, $10(0.5) - 5 = 0$.

The second arbitrage assumption used is that savers receive the same net after-tax return from different investments—the fixed-r_n assumption. In the extreme, this is obviously impossible since savers may be in different tax brackets.[14] If personal tax circumstances of investors are the same, the fixed-r_f and the fixed-r_n cases are equivalent.[15]

An issue that arises under both the fixed-r_f and the fixed-r_n cases relates to the arbitrage assumption across returns from different sources for the same project. Returns may accrue to a saver through a number of routes, including debt, directly distributed rental profits, dividends, and capital gains. Since these different sources of income may be subject to quite different personal income tax rules, it is impossible for them to be equivalent after personal taxes, even if either r_f or r_n is assumed to be fixed. For example, under the fixed-r_n case, with different tax treatment of capital gains in comparison with rental income, the net after-tax return from the two sources must differ, even for the same taxpayer. One possible explanation is that such differences, in equilibrium, encompass average taxpayer circumstances with respect to liquidity and financial risk and that they are thus consistent with market equilibrium.[16]

EMPIRICAL SIMULATIONS

The Base-Case Assumptions

The base-period model parameters are specified in this section. I am not aware of any currently available data on the average holding period for rental housing properties in Canada. I therefore assume that the holding period for the rental investment is 15 years, which is close to the optimum values commonly found in optimal holding period studies for the United States.[17]

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[14] Savings channelled to investment projects through certain institutions, such as pension funds, registered savings plans, and insurance companies, may receive preferential tax treatment. Available data suggest that insurance companies and tax-exempt institutions are inconsequential in the case of rental housing investments. For example, from Statistics Canada, the *National Balance Sheet Accounts, Annual Estimates, 1984-1993*, catalogue no. 13-214, table 3, life insurance companies and pension funds hold no residential structures in their portfolios and only 0.6 percent of the total land. This undoubtedly reflects legislative restrictions, such as pension investment rules that place very tight constraints on the ability of pension and registered retirement savings plan funds to hold real property.

[15] In the simulations for the fixed-r_n calculations, I assume that a 1 point increase in the inflation rate causes the market interest rate to rise by $1/(1-t_{ya})$ points, where t_{ya} is the average tax rate on personal income. This assumption ensures that the real return to savers is constant across inflation rates.

[16] On this point, see Boadway, Bruce, and Mintz, supra footnote 9, at 45-48.

[17] See Hendershott and Ling, supra footnote 2, and Pellechio, supra footnote 2. Sensitivity testing I undertook indicated that the tax wedge $(t_g - t_n)$ declines marginally but consistently with increases in the holding period for up to at least 25 years.

The depreciation rate applicable to buildings (δ) is set at 3.3 percent, which from corporate financial statistics was the average ratio of book depreciation to the value of buildings for real estate operators and developers in 1986 and 1987.[18] As noted earlier, long-run adjustment in response to an exogenous shock is assumed to take place through the level of rents, while the value of the property is assumed to remain constant. The initial-period property value is arbitrarily set at $1 million in the simulations. Data supplied by Canada Mortgage and Housing Corporation show that the average multiple-listing service price per unit of new apartment units in Halifax in 1995 was about $55,000. Thus, the assumed price is roughly consistent with an 18-unit property. The average ratio of building value to total property value from the balance sheets of real estate operators and developers in 1986 and 1987 was 0.79, leaving a residual figure for the ratio of land value to total property value of 0.21. This means that the lot cost for a $1 million apartment building would be $210,000. Real estate developers inform me that these ratios are not unreasonable for some regions of Halifax but that the land component might be a bit light on average. They suggest that a ratio of 23 to 25 percent would probably be more representative; accordingly, I use a figure of 24 percent in the simulations.

Data suggest that the sector is very highly leveraged.[19] From corporate financial statistics, the average ratio of equity to total book value of assets in 1986 and 1987 for real estate operators and developers was 28 percent, which leaves a debt proportion of 72 percent.[20] Average data for 1993 and 1994 show an equity to total asset value ratio for real estate developers, builders, and operators of 12 percent, which leaves a debt proportion of 88 percent.[21] In the simulations, I therefore set the debt-to-property value ratio at 80 percent, the average for the two sources cited. The debt ratio assumed in a particular simulation is maintained constant over the entire holding period by a process of continual refinancing that consists of annual adjustments to the principal amount of the mortgage, as required.

The expected inflation rate in the base-case simulations is assumed to be 2 percent, which was the average actual annual rate of increase in the

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[18] Statistics Canada, *Corporation Financial Statistics, 1987*, catalogue no. 61-207, table 2A. The ratio of book depreciation to capital assets for real estate developers, builders, and operators for 1995 is 3.0 percent: Statistics Canada, *Financial Statistics for Enterprises, Fourth Quarter 1995*, catalogue no. 61-219, table 18.

[19] The debt ratio is important because the total nominal amount of interest payable on debt is deductible in calculating taxable income from a rental property. High interest payments can therefore restrict the ability of an investor to claim the full amount of CCA earned in a year.

[20] Statistics Canada, *Corporation Financial Statistics, 1987*, catalogue no. 61-207, table 2A.

[21] Statistics Canada, *Financial Statistics for Enterprises, Fourth Quarter 1995*, catalogue no. 61-219, table 18.

all-item consumer price index in Halifax over the five-year period 1991 to 1995. In the simulations, it is assumed that both the building and the land components of property increase at the expected rate of inflation.[22]

The real interest rate for any given expected increase in inflation depends on the arbitrage assumption made. For the fixed-r_f case at an expected inflation rate of 2 percent, the real rate of interest is assumed to be 6 percent. This is equal to the average one-year mortgage rate over the five-year period 1991 to 1995 minus the actual rate of inflation in each year. The nominal rate of interest is therefore 8 percent (consistent with the Fisher relationship). Under the fixed-r_n arbitrage assumption at an expected inflation rate of 2 percent and a taxpayer marginal tax rate of 37 percent, the nominal rate of interest is 9.2 percent. It is assumed that the real rate of interest also equals the certainty-equivalent real rate of return expected by investors on equity.

For the federal income tax rate, I use the dollar-weighted average rate applying to marginal savings in Canada. Unpublished and unofficial data from the tax simulation model of the federal Department of Finance show the average marginal tax rate for taxpayers reporting interest, dividends, or capital gains in 1993 (the latest year available) to be 23.6 percent.[23] In the case of provincial income taxes, the best measure in my view is the dollar-weighted average across all provinces since this reflects average provincial tax rates on national savings. The provincial income tax rate in Nova Scotia would affect the relative attraction of the province as a place of residence but not as a potential site to invest in rental housing. I therefore use a figure of 37 percent for the combined federal and provincial marginal personal tax rate of savers.[24] The inclusion rate for capital gains purposes is assumed to be 75 percent, its current level, and it is assumed that, as is currently the case, no capital gains exemption applies in the case of rental properties. The CCA rate for the base case is 4 percent, the current rate, and the half-year rule is imposed.

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[22] Over the same five-year period, the cost of rented accommodation in Halifax increased on average by 1.6 percent per year (CANSIM data). In recent years, new house prices in Halifax have not even kept pace with inflation. Over the seven-year period from 1988 to 1995, house and land values increased a total of 6 percent, while the CPI increased 18 percent: Statistics Canada, *Construction Price Statistics, Second Quarter 1996* and *Construction Price Statistics, Second Quarter 1992*, catalogue no. 62-007, table 5.1.

[23] The average (dollar-weighted) marginal tax rates and dollar amounts of income reported in the individual investment income categories are as follows: interest, bonds, annuities, etc., 21.5 percent, $19.5 billion; dividends, 26.5 percent, $8.2 billion; and capital gains, 24.9 percent, $14.3 billiion. This gives an overall dollar-weighted average of 23.6 percent. Owing to technical complications arising from the large number of taxpayers reporting small amounts of negative rental income, a meaningful average statutory marginal tax rate could not be calculated for that source. However, there is no reason to suspect that it would be significantly different from that of interest, dividends, and capital gains.

[24] This is based on an average provincial tax rate in Canada—excluding Quebec, which has its own personal income tax—of 56 percent of basic federal tax. Since the Quebec rate may be a bit higher than the average for the rest of the country, this may be a slight underestimate of the true average provincial rate.

GST is levied at the rate of 7 percent on the purchase price of newly constructed or substantially renovated housing. The tax applies to both the land and the building components of the property. Builders can claim an input tax credit in respect of GST paid on materials, land, and services used to construct a new residential complex. The full initial price of the property is assumed to be subject to GST in the base-case simulations, while a GST credit is given for tax paid on land and construction costs. Rents are not currently taxable under the GST. Because the making of an exempt supply does not qualify as a commercial activity, landlords cannot claim input tax credits in respect of rental operating expenses.

Nova Scotia levies a general sales tax on "tangible personal property" under the Health Services Tax Act. Construction labour costs and the purchase price of land are not taxable. Virtually all material inputs to the construction of a rental housing property are taxable at the full rate. The general rate is 11 percent and is imposed on top of the GST. Thus, for items subject to both GST and PST in Nova Scotia, the effective combined rate is 18.77 percent. Rent paid by long-term (non-transient) tenants is not taxable. No credit or rebate is given in respect of any tax paid on the inputs used in the construction, improvement, or maintenance of a rental housing property. Proceeds received from the sale of a rental housing property, whether the unit is new or used, are not subject to tax.

The Nova Scotia Department of Finance has estimated that about 54 percent of the value of a newly constructed residential property is currently subject to PST;[25] this is the figure used in the base-case simulations and in simulating the effects of PST-GST harmonization (see below). I am not aware of any direct data on the portions of operating expenses that are currently subject to GST and PST; however, PST is payable only on certain material purchases, while GST is payable on both taxable goods and services. In the light of this, I make the following assumptions: that operating expenses (such as maintenance, insurance, building supervision, advertising, and legal services) constitute 35 percent of gross rents;[26] that one-third of operating expenses are material inputs that are subject to both PST and GST; that an additional one-third are service inputs that are subject to GST only; and that the remaining one-third are wages and salaries not subject to GST or PST.

Nova Scotia has legislation providing for the assessment and taxation of property.[27] Real property is the principal component and includes land,

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[25] Based on Nova Scotia, Department of Finance, *Nova Scotia Tax Reform: Economic and Fiscal Analysis* (Halifax: the department, May 1996), 26, and conversations with tax analysts in the department.

[26] For 1986 and 1987, materials, salaries and wages, and repairs and maintenance expenses accounted for 35 percent of total income for real estate operators and developers: Statistics Canada, *Corporation Financial Statistics, 1987*, catalogue no. 61-207, table 2B. See also the discussion relating to the base-case simulation results below.

[27] Nova Scotia Assessment Act, RSN 1989, c. 23, as amended. On April 1, 1996, the city of Halifax and the other cities, towns, and units of the county of Halifax amalgamated

(The footnote is continued on the next page.)

buildings, and structures. The entire assessment function is the responsibility of the provincial government. Currently (that is, for 1996), assessment for a residential property, including a rental property, is based on the property's fair market value in 1988. (For commercial properties, the reference year is 1991.) A recent change, which will take effect in 1997, will use market conditions in 1995 to evaluate the property. Eventually, the intent, with the assistance of a new computerized system, is to have assessments just one year behind the taxation year. The tax rate (the mill rate) is set annually by the municipal government. Normally, a rental housing property is assessed at the residential rate, as long as it consists only of rental units. For simplicity and because the mill rate can be arbitrarily adjusted to keep up with average property values, I assume in the simulations that the property assessment value is based on current-year market value. The current tax rate is 1.49 percent, which is the rate used in the base-case simulations.

In the simulations, I also examine the comparative effects of impact fees on rental housing markets. Over the past few years, municipalities in Nova Scotia have begun to show an interest in imposing direct levies on developers to cover development costs and/or ongoing maintenance of additional infrastructure resulting from development. Under the Nova Scotia Planning Act, municipalities can require developers to provide, at the subdivision stage, parkland or cash in lieu of the same, roads, and sewer, water, and drainage services. Municipalities typically impose these levies for services clearly related directly to development (for example, local roads as opposed to collector and arterial roads, which are paid for by the province or urban municipal units). Development charges are additional to these established developer responsibilities. Such charges are normally levied on a per lot basis, as lots are sold in approved subdivisions, and are intended to cover the impact of the development on existing facilities or to assess the development its share of the cost of a new facility coming on-line in response to it. These charges are referred to variously as "municipal lot levies," "impact fees," and "development charges." Impact fees are not subject to GST or PST. For income tax purposes, impact fees are generally added to the capital base for the land. The impact fee or lot levy rate is assumed to be 0 in the base-case simulations.

The Base-Case Simulations

Given the assumptions, it is possible to calibrate the model and to derive the base-case simulation results. The calibration procedure is as follows: the target initial-period price for the property is set at $1 million; the values for the exogenous variables are set as discussed above; and the model is simulated over the assumed 15-year holding period and solved iteratively for equilibrium values of the endogenous variables.

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[27] Continued . . .
into one metropolitan unit. Since, at the time of writing, the implications of this for the property tax are unknown, the description in this section is that for the old city of Halifax, before amalgamation.

The first two lines of table 1 present the results for selected variables for the base-case assumptions described in the preceding section.[28] The base-case simulation results are presented for the two different arbitrage assumptions—fixed-r_f and fixed-r_n. Rents and tax variables are expressed in proportion to initial property value. Under the fixed-r_f arbitrage assumption, the net present value (NPV) of gross rental payments over the 15-year holding period totals over $2 million; total tax payments are $545,000 (about 55 percent of initial property value). Of the various taxes, income taxes make the largest contribution (37 percent), followed by sales taxes (35 percent), and property taxes (28 percent). While not reported separately in table 1, the tax values of interest and CCA deductions have significant positive effects, with net present values of, respectively, 24 percent and 9 percent of property value.

Under the fixed-r_f arbitrage assumption, the required gross rate of return on the investment (r_g) is 7.9 percent, while the net after-tax return to the saver (r_n) is only 3 percent. The low return to savers partly reflects the erosive effects of inflation—because tax is payable by the investor on the inflation component of interest—and has nothing specifically to do with the fact that the investment is a real estate investment. The cost of capital (that is, the required return after adjusting for depreciation of the building and any real increase in the property value) is 10.7 percent. The tax wedge ($r_g - r_n$) is about 5 percentage points, while the "tax-inclusive" measure of METR is 61 percent. Because of the greater effect of inflation under the fixed-r_n arbitrage assumption, equilibrium rents and required rates of return are higher than under the fixed-r_f assumption—a difference that, as we will see, is accentuated at higher levels of expected inflation.

It is useful to check the base-case simulation results for plausibility. The value of pre-tax rental income for the first year under the fixed-r_f arbitrage assumption is $195,000.[29] A rough rule of thumb in the real estate industry is that the value of a rental housing property typically averages five to six times annual rent. In the base-case simulations, property value is 5.1 times first-year equilibrium rents, which is consistent with the rudimentary industry measure.

Policy Simulations

The remainder of the data reported in tables 1 and 2 show the results from simulating the model after making various changes to the base-case assumptions. All of the simulations reported in table 1 are based on an expected inflation rate of 2 percent, while in table 2 the inflation rate is increased.

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[28] Note that there may be minor rounding errors in the tables.

[29] As mentioned in the preceding section of the article, gross rent is derived from equilibrium net rental income based on an assumed margin for operating expenses of 35 percent of gross rents (over and above all interest payments, taxes, and depreciation).

Table 1 Simulation Results: Inflation 2 Percent

	Rent		Rates of return, METR and COC					NPV of taxes				
	1st yr. rent	NPV rent	r_g	r_n	$r_g - r_n$	METR	COC	Total tax	Income tax	Sales tax	Property tax	Impact fees
Base-case assumptions												
Fixed-r_f	0.195	2.047	0.079	0.030	0.048	0.613	0.107	0.545	0.201	0.194	0.150	0.000
Fixed-r_n	0.213	2.148	0.091	0.038	0.054	0.587	0.120	0.544	0.203	0.197	0.143	0.000
Changes to fixed-r_f base case												
Income tax changes												
Decrease income tax rate to 32%	0.190	1.955	0.079	0.034	0.045	0.566	0.108	0.498	0.160	0.192	0.146	0.000
Increase income tax rate to 42%	0.200	2.152	0.078	0.026	0.052	0.662	0.106	0.600	0.249	0.198	0.154	0.000
CCA rate decreased to 0%	0.208	2.188	0.083	0.030	.053	0.633	0.111	0.637	0.288	0.199	0.150	0.000
CCA rate increased to 10%	0.188	1.972	0.076	0.030	0.046	0.602	0.105	0.496	0.154	0.192	0.150	0.000
Eliminate CCA loss restriction	(no effect)											
Change capital gains inclusion rate	(no effect)											
Introduce capital gains exemption	(no effect)											
Eliminate income tax	0.172	0.154	0.083	0.060	0.023	0.276	0.111	0.304	0.000	0.180	0.124	0.000

(Table 1 is concluded on the next page.)

Table 1 Concluded

	Rent		Rates of return, METR and COC					NPV of taxes				
	1st yr. rent	NPV rent	r_g	r_n	$r_g - r_n$	METR	COC	Total tax	Income tax	Sales tax	Property tax	Impact fees
Sales tax changes												
Increase tax rate to 13%	0.199	2.091	0.079	0.030	0.049	0.617	0.108	0.574	0.211	0.213	0.150	0.000
Decrease tax rate to 9%	0.190	2.003	0.078	0.030	0.048	0.610	0.106	0.517	0.190	0.177	0.150	0.000
Eliminate PST/GST on land and construction	0.161	1.695	0.071	0.030	0.041	0.573	0.096	0.316	0.116	0.050	0.150	0.000
Costs (PST on operating expenses)												
Harmonize GST and PST	0.202	2.120	0.080	0.030	0.049	0.618	0.108	0.593	0.218	0.225	0.150	0.000
Change rate of harmonized sales tax												
Increase rate to 17%	0.209	2.201	0.081	0.030	0.050	0.623	0.110	0.645	0.238	0.258	0.150	0.000
Decrease rate to 13%	0.194	2.041	0.078	0.030	0.048	0.612	0.107	0.541	0.199	0.192	0.150	0.000
Eliminate harmonized sales tax	0.149	1.572	0.071	0.030	0.041	0.573	0.096	0.236	0.086	0.000	0.150	0.000
Tax rent (credit PST/GST on operating expenses)	0.180	1.898	0.079	0.030	0.048	0.613	0.107	0.676	0.165	0.362	0.150	0.000
Property tax changes												
Increase tax rate by 20%	0.202	2.126	0.082	0.030	0.051	0.627	0.110	0.596	0.220	0.197	0.180	0.000
Decrease tax rate by 20%	0.187	1.968	0.076	0.030	0.045	0.598	0.104	0.494	0.182	0.192	0.120	0.000
Eliminate property tax	0.157	1.652	0.064	0.030	0.033	0.523	0.092	0.288	0.106	0.183	0.000	0.000
Impose 5% lot levy	0.198	2.078	0.079	0.030	0.049	0.617	0.108	0.565	0.208	0.195	0.150	0.012
Eliminate all taxes	0.120	1.078	0.060	0.060	0.000	0.000	0.085	0.000	0.000	0.000	0.000	0.000
Lower real interest rate to 3%	0.147	1.729	0.046	0.012	0.034	0.750	0.074	0.548	0.192	0.185	0.171	0.000

Note: Rents and taxes are expressed in proportion to initial-period property value.

The rest of the simulation results reported in table 1 are based on the fixed-r_f arbitrage assumption. A 5 percentage point decrease in the average marginal personal income tax rate would cause the tax wedge and METR to fall to 4.5 percent and 5.7 percent, respectively, while first-year rents would fall by $5,000 (2.6 percent). Similarly, a 5 percentage point increase in the marginal tax rate increases first-year rent by almost 2.6 percent and increases the tax wedge and METR.

The next set of policy changes in table 1 relates to assumed CCA rate changes of 0 percent and 10 percent from the current rate of 4 percent. In the first case, first-year rents rise to $208,000, while in the second case, they fall to $188,000. Thus, even fairly substantial CCA rate changes are not a very effective way to influence rents. It is notable that, in the case of the rate increase here, the full amount of the extra CCA claims may be used by the investor; they are not restricted by the CCA loss restriction. Thus, as reported in table 1, the elimination of the CCA loss restriction does not have any effect on the sector. As discussed below, this is not the case at higher rates of inflation. It is also notable that under the base-case inflation rate, the introduction of a capital gains exemption or a change in the inclusion rate has no effect since the assumed 2 percent inflation rate is insufficient to generate taxable capital gains with an assumed depreciation rate of 3.3 percent for buildings.

The last income tax simulation is for complete elimination of the tax. This simulation shows the total effect on the rental investment of the existence of the income tax. First-year rents would fall by 12 percent and METR would decrease to 28 percent. The required rate of return on the investment (r_g) and COC both increase slightly because of the elimination of the tax value of CCA deductions.

The next section of table 1 reports simulations for various sales tax changes. An increase in the PST from its current level of 11 percent to 13 percent would cause first-year rents to increase only very slightly to $199,000, while a drop in the rate to 9 percent would cause rents to drop to $190,000. Elimination of GST and PST on land and construction costs would cause rents to fall to $161,000 (17 percent).

The next four simulations reported relate to a possible harmonized GST-PST. On October 18, 1996, the government of Canada and the governments of Nova Scotia, New Brunswick, and Newfoundland and Labrador signed a comprehensive agreement to harmonize the federal and provincial sales taxes, beginning April 1, 1997.[30] This will bring to four the number of provinces with harmonized sales tax systems—Quebec's

[30] See "Comprehensive Integrated Tax Coordination Agreement Between the Government of Canada and the Government of Nova Scotia," October 18, 1996; Canada, Department of Finance, *Harmonized Sales Tax*, technical paper (Ottawa: the department, October 1996); Canada, Department of Finance, *Towards Replacing the Goods and Services Tax* (Ottawa: the department, April 1996); Canadian Press, "Federal Government, Three Provinces Reach Sales Tax Harmonization Agreements," *News Release*, April 23, 1996; and *Nova Scotia Tax Reform*, supra footnote 25.

sales tax will be fully harmonized in November 1996.[31] Under the agreement, the PST and GST are to be levied "side by side" at a combined rate of 15 percent (8 percent PST, 7 percent GST). (Under the present system, the taxes are stacked.) There will be a common base that matches the current GST base; goods and services will be taxable or tax-exempt in accordance with the current GST rules. As far as the rental housing sector is concerned, sales of new or substantially renovated properties will be fully taxable, a tax credit may be claimed in respect of tax paid on construction and land costs, and rents will continue to be non-taxable.

Harmonization will cause first-year rents to increase by 4 percent because the elimination of PST on building materials does not quite compensate for the higher rate (15 percent versus the current 7 percent) charged on the full value of new construction and land. Elimination of the harmonized tax would have a significant positive effect of the sector, as reported in the table: first-year rents would fall by 24 percent. The final sales tax simulation reported relates to the possible taxation of rents under the new harmonized tax, while allowing a credit for both PST and GST paid on operating expenses. Perhaps surprisingly, first-year rents and the NPV of total rent payments do not increase dramatically ($180,000 and $1,898,00, respectively, net of sales tax, and $207,000 and $2,183,000 gross of sales tax). The reason for this is that the higher rate of tax on rents (15 percent versus 0 percent) is partly offset by the elimination of PST and GST on operating expenses.

The effects of property tax changes are reported in the next section of the table. A 20 percent change in the rate would cause first-year rents to change by 3.6 percent. In full, the property tax accounts for 20 percent of first-year rents and about 31 percent of the tax wedge. The imposition of a 5 percent impact fee or lot levy would cause first-year rents to increase by only 1.5 percent. The tax would generate $12,000 in revenue—(0.24) ($1,000,000) (0.05).

The next simulation in table 1 reflects the effect of completely eliminating all taxes applying to rental housing investments. First-year rents would fall by just under 40 percent. The required gross rate of return to investors would decrease to 6 percent, while the net return to savers would increase dramatically to the same level.

The final section of table 1 shows the effect of a fall in the real interest rate from 6 percent to 3 percent. Real interest rates in recent years have been high by historical standards, and a fall to 3 percent would put them more in line with very long-term trends and economic rates of growth.

[31] Quebec introduced a value-added tax similar to the GST in its 1992 budget. The rates at that time were 8 percent on goods and 4 percent on services and new properties. In the 1994 budget, the Quebec government changed its rate to 6.5 percent on goods and services. It also introduced a rebate mechanism for new housing below $200,000 in value. Quebec sales tax is levied on top of GST so that the combined rate is 13.96 percent. The federal government has made it clear that it will try to seek agreement with other provinces interested in harmonization.

Such a change would have a substantial effect on rental markets: first-year rents would fall by about 25 percent and the tax wedge would decline by almost one-third. This indicates that the general level of investment returns is quite important to the sector.

Results in table 2 show that inflation can have significant effects on rental markets, even if, as for these simulations, property values are assumed to increase at the rate of inflation. Moreover, the effect depends crucially on the arbitrage assumption. Consider the results for 6 percent inflation reported in table 2. Under the fixed-r_f arbitrage assumption, rents fall by almost 7 percent; under the fixed-r_n arbitrage assumption, rents *rise* by almost 10 percent. If the expected inflation rate increased to 10 percent, the results show that under the fixed-r_f arbitrage assumption, first-year rents would decrease by 10 percent, while under the fixed-r_n assumption, they would *increase* by 19 percent (from 0.213 to 0.253). The reason for the difference is that higher inflation erodes the after-tax return to savers under the fixed-r_f assumption, while under the fixed-r_n assumption, the after-tax return to savers is preserved through higher rent charges.

The next portion of table 2 reports the results of the CCA and capital gains simulations that had no effect at an inflation rate of 2 percent, as reported in table 1. Eliminating the CCA loss restriction when the inflation rate is 10 percent causes first-year rents to fall by 4 percent. The reason is that all of the CCA claim is disallowed at an inflation rate of 10 percent, because high nominal interest payments reduce rental income for tax purposes to the point where no CCA can be claimed.

There has long been talk in policy circles of increasing the capital gains inclusion rate to 100 percent (from 75 percent). The effect of this at an inflation rate of 10 percent would be to increase first-year rents by about 5 percent. A decrease in the inclusion rate to its pre-tax reform level of 50 percent would cause first-year rents to decrease by 5 percent. The introduction of a $100,000 capital gains exemption would prevent a one-time decrease in first-year rents of only 1 percent, while a $500,000 exemption would permit a drop of 5 percent. Therefore, a capital gains exemption has to be quite large to have any significant effect on rents in the case of medium-sized to larger rental properties.

The final simulations in table 2 replicate additional simulations reported in table 1 but under the assumption of 10 percent expected inflation.

Comparisons with Other Sectors

There are a number of studies that calculate METR rates for different industries in Canada.[32] The study by Daly and Jung[33] is the broadest in

[32] See Robin Boadway, Neil Bruce, and Jack Mintz, "Taxation, Inflation, and the Effective Marginal Tax Rate on Capital in Canada" (February 1984), 17 *Canadian Journal of Economics* 62-79; Boadway, Bruce, and Mintz, supra footnote 9; and Daly and Jung, supra footnote 12.

[33] Supra footnote 12.

Table 2 Simulation Results: Alternative Inflation Rates

	Rent		Rates of return, METR and COC					NPV of taxes				
	1st yr. rent	NPV rent	r_g	r_n	$r_g - r_n$	METR	COC	Total tax	Income tax	Sales tax	Property tax	Impact fees
Fixed-r_f assumption												
2% inflation	0.195	2.047	0.079	0.030	0.048	0.613	0.107	0.545	0.201	0.194	0.150	0.000
6% inflation	0.182	2.099	0.080	0.016	0.064	0.797	0.109	0.508	0.152	0.196	0.160	0.000
10% inflation	0.175	2.204	0.083	0.003	0.080	0.970	0.111	0.483	0.112	0.199	0.171	0.000
Fixed-r_n assumption												
2% inflation	0.213	2.148	0.091	0.038	0.054	0.587	0.120	0.544	0.203	0.197	0.143	0.000
6% inflation	0.234	2.378	0.119	0.038	0.080	0.676	0.147	0.498	0.155	0.204	0.139	0.000
10% inflation	0.253	2.596	0.146	0.038	0.107	0.731	0.175	0.438	0.092	0.211	0.135	0.000
Changes to fixed-r_f 10% inflation												
Income tax changes												
Decrease income tax rate to 32%	0.175	2.105	0.083	0.010	0.073	0.876	0.111	0.448	0.090	0.196	0.162	0.000
CCA rate increased to 10%	0.175	2.204	0.083	0.003	0.080	0.970	0.111	0.483	0.112	0.199	0.171	0.000
Eliminate CCA loss restriction	0.168	2.109	0.080	0.003	0.077	0.968	0.108	0.421	0.053	0.196	0.171	0.000
Increase capital gains inclusion rate to 100%	0.183	2.301	0.083	0.002	0.080	0.975	0.111	0.546	0.173	0.202	0.171	0.000
Decrease capital gains inclusion rate to 50%	0.166	2.093	0.083	0.003	0.080	0.964	0.111	0.410	0.043	0.196	0.171	0.000
Introduce $100K capital gains exemption	0.173	2.181	0.083	0.003	0.080	0.969	0.111	0.468	0.098	0.198	0.171	0.000
Introduce $500K capital gains exemption	0.166	2.089	0.083	0.003	0.080	0.964	0.111	0.408	0.041	0.196	0.171	0.000
Eliminate income tax	0.179	1.639	0.083	0.060	0.023	0.276	0.111	0.301	0.000	0.182	0.118	0.000

(Table 2 is concluded on the next page.)

Table 2 Concluded

	Rent		Rates of return, METR and COC					NPV of taxes				
	1st yr. rent	NPV rent	r_g	r_n	$r_g - r_n$	METR	COC	Total tax	Income tax	Sales tax	Property tax	Impact fees
Sales tax changes												
Harmonize GST and PST ...	0.181	2.274	0.084	0.002	0.081	0.971	0.113	0.528	0.127	0.230	0.171	0.000
Decrease rate to 13%	0.175	2.199	0.083	0.003	0.080	0.970	0.111	0.479	0.111	0.197	0.171	0.000
Eliminate harmonized sales tax	0.137	1.718	0.075	0.003	0.072	0.962	0.100	0.166	-.005	0.000	0.171	0.000
Property tax changes												
Decrease tax rate by 20% ...	0.168	2.114	0.080	0.003	0.077	0.968	0.108	0.424	0.090	0.196	0.137	0.000
Eliminate property tax	0.139	1.753	0.068	0.003	0.065	0.959	0.096	0.189	0.004	0.186	0.000	0.000
Eliminate all taxes	0.128	1.176	0.060	0.060	0.000	0.000	0.085	0.000	0.000	0.000	0.000	0.000
Lower real interest rate to 3% ..	0.131	1.847	0.049	−0.016	0.065	1.335	0.077	0.487	0.103	0.189	0.196	0.000

Note: Rents and taxes are expressed in proportion to initial-period property value.

scope in terms of taxes considered. In addition to corporate income taxes, they included in their calculations the effects of sales taxes on business inputs and tested the sensitivity of the estimates to different arbitrage assumptions. However, it is not meaningful to compare the Daly and Jung estimates with the rates for rental housing in this study. There are a number of reasons for this, including tax reform changes subsequent to the Daly and Jung study, differences in estimating methodologies (Daly and Jung use the King and Fullerton rather than the asset-pricing model methodology),[34] and differences in asset mix and sources of financing across sectors. Further research is necessary to determine the comparative status of the rental housing sector. In particular, it would be interesting to conduct a comparison across sectors using the asset-pricing model approach, since this approach captures complex tax, inflation, and financing interactions not reflected in the King and Fullerton approach.

The Advantages of the Asset-Pricing Model Approach[35]

The asset-pricing model has a number of significant advantages over the traditional King and Fullerton approach to calculating METR and COC. First, the model can be readily adapted to different assumed holding periods for the investment. The King and Fullerton methodology, on the other hand, assumes an infinite asset holding period; it does not permit tax planning or strategic investor behaviour that may, in part, be based on the desire of the investor to minimize his tax liability under different economic circumstances. Second, with the asset-pricing model, it is possible to incorporate complex interactions among tax and finance variables—for example, the relationships between expected inflation, nominal interest payments, and the ability to claim the full amount of CCA earned under different debt-equity ratios—that cannot be captured in the King and Fullerton approach. Finally, the asset-pricing model formally reflects the simultaneous relationship between the asset stock value of the rental housing investment and the various flows that determine it. Thus, the calculated values for METR and COC are fully endogenous. They will vary under different assumptions about the way in which changed tax and financial parameters are capitalized in asset values or reflected in altered rent streams. The King and Fullerton methodology does not capture the simultaneous relationship between asset prices and financial flows.

I undertook simulations to compare the differences forthcoming from the two different methodologies when only income tax rules applying to the rental housing investment are taken into account. The results show

[34] In Alex MacNevin, "Marginal Effective Tax Rates on Rental Housing Investments: An Asset Pricing Model Approach" (*Public Finance Quarterly*, forthcoming), I describe the theoretical differences between the two approaches and quantify some of the empirical differences in the case of income taxes.

[35] The discussion in this section is a brief summary of some of the results obtained in a separate study: see MacNevin, supra footnote 34.

that the estimates for the tax wedge ($r_g - r_n$) can differ substantially under the two different estimating methodologies. The magnitude of the difference tends to vary positively with the inflation rate, the CCA rate, the debt-equity ratio, and the capital gains inclusion rate, and negatively with real interest rates and the assumed holding period under the asset-pricing model approach. Thus, use of the asset-pricing methodology can result in significant improvements in the estimated magnitudes of METR and COC.

The "Optimal" Tax on Rental Housing

As discussed earlier, the simulations in this study are based on the assumption that the price of the rental housing property is fixed. The adjustment to an exogenous change in a tax or financial variable takes place through an adjustment in the stream of rents that is just sufficient in magnitude to restore the required rate of return. This assumption was justified on the basis of evidence from the United States of a relatively high long-run investment supply price elasticity for housing.[36] A high long-run supply price elasticity is consistent with high mobility of investment capital to other sectors in response to altered rates of return and relatively constant costs of construction.

One question that naturally arises is how much of an effect such an adjustment has on the equilibrium level of rental units demanded. If rental demand price elasticity is low, the demand for units will not change very much; if it is high, the demand effect will be more pronounced. Because this study does not model rental housing dynamics, it is not possible to say anything about the effect of the change in rents in response to a change in taxes on the equilibrium quantity of rental units demanded. Earlier studies[37] have recommended a fairly high marginal tax rate on shelter based on a fairly low estimated demand elasticity for shelter. While this may appear to violate basic principles of equity, the prescription is based on the implications of optimal tax theory that a low demand elasticity results in a small deadweight loss from an increase in rents. One logical direction for future work in this area is determination of the current magnitude of the demand elasticity for rental housing in national and regional rental housing markets in Canada. This would shed further light on the validity of prescriptions that have evolved from application of optimal tax theory to this sector.

CONCLUDING COMMENTS

In this study, I have analyzed the effects of taxes on the cost of capital, marginal effective tax rates, and gross rents for typical rental housing

[36] See supra footnotes 4 and 5.

[37] See Harry F. Campbell, "An Input-Output Analysis of the Commodity Structure of Indirect Taxes in Canada" (August 1975), 8 *The Canadian Journal of Economics* 433-41; and Anthony B. Atkinson and Joseph E. Stiglitz, "The Structure of Indirect Taxation and Economic Efficiency" (1972), 1 *Journal of Public Economics* 97-119.

investments in Halifax, Nova Scotia. To my knowledge, this research project provides the first integrated theoretical and empirical analysis of the joint effects of federal, provincial, and municipal taxes on key aspects of a selected Canadian metropolitan rental housing market. The study encompassed the major elements of the Canadian tax regime affecting rental housing investments, including income taxes, sales taxes, property taxes, and impact fees. The theoretical methodology used in the study entailed empirical simulations of a rental housing asset-pricing model and the theory of effective tax rates. The policy simulations show that if rental housing investors are to achieve market rates of return, increases in taxes on the sector must translate directly into higher rents on new investments. The simulations provide empirical evidence of the relative effects of different tax changes.

There are a number of important areas relating to the work in this study where additional research would improve information available to policy makers and others. On the purely technical side, the study has noted a number of areas where the availability of better statistical data for the sector would be useful. While not unique to the assessment of rental housing investments, additional research is needed on the most appropriate arbitrage assumption to improve knowledge of how equilibrium is achieved in inflationary circumstances.

This study has assumed that long-run adjustment to changes in tax, finance, and other exogenous parameters was reflected in rents and not property values. While this assumption seems reasonable in a competitive environment, it should be confirmed through additional research. If markets are not competitive and property values adjust to new equilibrium values, the values of endogenous variables will be altered, as will the calculated METR and COC.

One important future direction for research lies in the assessment of tax effects on equilibrium stocks and rental housing dynamics. It would be useful, for example, to know how tax-induced changes in rents might affect the quantity of rental units demanded. Research on the effects of tax changes on rental housing dynamics would provide useful insights into the comparative advantages of different types of tax changes to stabilize the sector in alternative macroeconomic environments.

An additional potential area for future research is a detailed assessment of the effects of taxation on the decisions of individuals to allocate some of their savings to the supply of rental housing as an investment (as compared with bonds, mutual funds, stocks, and so on). An implicit assumption underlying this study is that investors are indifferent between rental housing investments and other investments paying an equivalent risk-adjusted rate of return. Future research could explicitly analyze the tax advantages of various rental housing investment instruments as compared with other types of investments, and assess tax effects on flows of capital to the sector. Such research might make an important contribution to our understanding of the relative efficiency of capital markets and help to identify ways of improving capital flows to rental housing.

APPENDIX: DEFINITION OF VARIABLES

Stock values are measured at the beginning of the year in question; flow values are earned or paid at the end of the year to which they relate.

a ≡ the proportion of the equity return accruing as rental income;

$1-a$ ≡ the proportion of the equity return accruing as capital gains;

b ≡ the proportion of initial property value subject to sales tax;

β ≡ the proportion of the property finance that is debt;

$1-\beta$ ≡ the proportion of the property finance that is equity;

CCA_j ≡ CCA claim in year j;

d ≡ the nominal discount rate [that is, $(1+d)=(1+\omega)(1+\pi)$];

δ ≡ the economic depreciation rate;

$\Delta q/q$ ≡ the rate of change in the real value of depreciable property (that is, buildings);

$\Delta q'/q'$ ≡ the rate of change in the real value of non-depreciable property (that is, land);

θ ≡ the impact fee or lot levy rate;

E_h ≡ the capital gains exemption available for the rental property at the end of the holding period;

h ≡ the investment holding period;

i ≡ the market rate of interest;

I_j ≡ the mortgage interest payment in year j;

P_j ≡ the mortgage principal payment in year j;

π ≡ the inflation rate;

ρ ≡ the required (pre-tax) rate of return on equity;

ω ≡ the real after-tax discount rate;

r_f ≡ the real cost of finance;

R_j ≡ rental income in year j, net of operating costs but gross of sales and income taxes;

S ≡ the proportion of the property investment that is in depreciable capital (that is, buildings);

t_c ≡ the accrual-equivalent tax rate on capital gains;[38]

[38] I define the variable t_c as the rate that equates the equation

$$t_g(V_{h+1} - UCC_{h+1} - E_h)/(1+d)^h = \sum_{j=1}^{h} t_c(V_{j+1} - V_j)/(1+d)^j$$

where the term to the left of the equals sign (reproduced from equation 1) represents the net present value of capital gains tax payable under realization-based capital gains taxation and the term to the right of the equals sign is the net present value of capital gains tax payable under an annual accrual-based capital gains tax.

t_g ≡ the effective rate of tax on realized capital gains, which in Canada equals the inclusion rate ("inc.") times the taxpayer's marginal tax rate (that is, $t_g = \text{inc.}t_y$);

t_p ≡ the property tax rate;

t_s ≡ the sales tax rate;

t_s' ≡ the effective sales tax rate on rental income;

t_y ≡ the income tax rate;

UCC_{h+1} ≡ the undepreciated capital cost of the property remaining at the end of the holding period;

$V_0(h)$ ≡ the initial value, gross of sales tax, that a profit-maximizing investor is willing to pay for a property held for h years;

V_{h+1} ≡ the revenue realized upon sale of the property at the end of the holding period;

X_h ≡ the CCA recapture amount at the end of the h-year holding period;

Z ≡ the net present value of CCA deductions for tax purposes.