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Economic Issues in the Taxation of Capital Gains

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Ce texte passe en revue la littérature sur les effets de l'imposition des gains en capital aux États-Unis en mettant l'accent sur trois questions. Premièrement, le texte examine les effets à long terme de l'imposition des gains en capital sur l'ampleur de ces gains et sur les revenus fiscaux, en essayant de voir si les effets sont tels que l'imposition des gains en capital entraîne une augmentation de revenus pour les gouvernements. Deuxièmement, nous examinons les effets de ces impôts en termes d'efficacité, en incluant l'effet sur l'épargne, sur l'investissement, sur la déclaration de gains latents et sur le comportement face au risque. Finalement, le texte passe en revue plusieurs études sur les effets distributifs de l'imposition des gains en capital.

This paper reviews the literature on the effects of capital gains taxes in the United States, focusing on three major issues. First, it considers the long-run effects of capital gains taxes on the level of realizations and revenues, including the extent to which the literature has resolved the issue of whether the realizations response to a capital gains tax will be large enough to result in a revenue increase. Second, it examines the efficiency implications of capital gains taxes, including effects on saving and investment, the 'lock-in' effect, and effects on risk-taking. Finally, the paper reviews several recent studies of the distributional effects of capital gains taxation.

I Introduction

The issue of the appropriate tax treatment of capital gains is a contentious one that appears to be a permanent fixture of tax policy debates in both Canada and the United States[1] Although there is a wide variety of reasons for the continuing debate, an important one is the considerable uncertainty in the public finance literature regarding the effects of capital gains taxation. This paper provides an overview of many of the economic issues addressed in this literature. Although the articles reviewed address the effects of capital gains in the US context, this survey will hopefully both be of interest to those thinking about capital gains tax reform in Canada and serve as a useful supplement to the papers in this special issue that assess the effects of capital gains taxation in Canada.[2]

The paper examines three major issues. The first is the effect of taxes on capital gains realizations and revenues. Relative to economic analyses of other tax topics, the capital gains literature is rather unusual in its focus on revenue effects, especially the question of whether the increase in realizations attributable to a capital gains tax cut will be large enough to result in a revenue increase, and thus provide policy-makers with the fabled 'free lunch'. This focus is not surprising, given the interest in the revenue question itself, as well as the inter-

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actions of the revenue question with other items of policy interest. Nevertheless, a number of articles, including some very recent research, have also examined the issues that are more commonly addressed in tax-related economic research – the efficiency and equity properties of alternative tax policies; these are the other two issues examined in this paper. The intent of the paper is to provide an intuitive understanding of the economic effects of capital gains taxes; accordingly, mathematical and econometric jargon is largely either avoided or relegated to notes.

It should be noted that the paper ignores a number of related and important topics. For example, the paper assumes that capital gains will be taxed on a realization basis; thus, no attempt is made to address the question of the theoretically correct treatment of capital gains either in the context of an ideal income tax,[3] or under the alternative of a consumption-based tax.[4] Moreover, the review does not include an analysis of the effects of inflation indexing of capital gains – an often-recommended reform.[5] In addition, the many administrative problems associated with preferential treatment of capital gains receive no attention, and alternatives to capital gains taxation that might more effectively achieve the goals sought by proponents of capital gains preferences are not considered.[6] Finally, the literature on theoretical models of the capital gains realizations decision – a topic worthy of a separate survey – is largely ignored; it is discussed only when it has a direct bearing on the other issues analysed in the paper.[7]

II Tax Effects on Capital Gains Realizations and Revenues

Although the vast majority of the literature on capital gains taxes has focused on the question of whether a capital gains tax cut could induce a long-run increase in realizations sufficiently large to increase revenues, considerable disagreement still exists on this issue; this question is often simply – if inappropriately, as will be discussed below – characterized as whether the elasticity of realizations with respect to the capital gains tax rate is less than -1 (i.e. greater than 1 in absolute value).[8] Although a comprehensive discussion of the various theoretical and empirical studies that have investigated this issue is far beyond the scope of this paper,[9] it will be useful to provide a broad overview of this literature.[10] This section focuses on discussing (1) general problems encountered in estimating the effects of capital gains taxes on realizations and revenues, (2) the relative advantages and disadvantages of the four empirical approaches that have been used to investigate this issue – time-series studies, cross-section analysis, panel studies, and approaches pooling cross-section and time-series data,[11] and (3) the contributions of a number of recent papers that have attempted to deal with many of the points raised in critiques of earlier research.

Problems in Estimating Realizations and Revenue Effects

A wide variety of problems are common to all attempts to measure the effects of capital gains tax changes on realizations and revenues. First, despite some interesting recent attempts, there is no widely accepted model of the capital gains realization decision.[12] As a result, the factors motivating the decision to realize gains are not well-specified, and the appropriate specification of econometric models analysing this decision is unclear. For example, Auten, Burman and Randolph (1989:353) argue that, 'absent a clear behavioral model, econometric analysis is as much art as science and artistic interpretations clearly vary on this subject'.

Second, there is disagreement over whether time-series or cross-section analysis is better-suited to determining the effects of taxation on realizations, since both approaches suffer from serious problems (to be discussed below). There does, however, appear to be a consensus emerging that the use of panel data – especially if

the data extend over a fair number of years – is a promising approach, since it combines most of the advantages of both techniques (although to some extent it also shares the problems of both approaches).

Third, there are few reliable data on several variables that would appear to be critical to realization decisions under any reasonable behavioural model. This is especially true for estimates of the stock of accrued capital gains (although the recent work of Joulfaian, 1989 is an exception), the stock of total wealth, the amount of gains transferred at death, the level of transactions costs, and the distribution of realizations by asset type.

Fourth, relating revenues to realizations is much more difficult than suggested by the 'unitary elasticity rule' mentioned above. As detailed in Gillingham and Greenlees (1992), the relationship between realizations and revenues depends on a host of variables, including the details of the rate structure, differences in responsiveness across individuals, the effects of simultaneous changes in other tax variables, and a detailed modelling of the nature of the tax change being evaluated. Revenue effects can be predicted only from detailed simulations, and the simple unitary elasticity rule may be highly misleading in many cases.

Fifth, the focus of most studies on the effects of tax cuts on capital gains revenues may be misleading if there are important feedback effects on other components of income tax revenues. There are several such feedback effects, including changes in dividend payouts, portfolio reallocations, and the use of tax avoidance strategies. Attempts to discern the importance of these factors have led to mixed results (Cook and O'Hare, 1987; Jones, 1989; Auten, Burman and Randolph, 1989).

Sixth, separating the short-run and long-run responses to changes in capital gains taxes represents a significant problem in all empirical (and theoretical) analyses of realizations behaviour. Although there is general agreement that the short-run response to a capital gains tax change will be greater than the long-run response (when investors arrive at a new equilibrium that reflects the new tax structure) and that increases in current realizations at least to some extent imply a reduction in future realizations (and revenues), the precise dynamics are far from clear.[13] A related point is that standard econometric techniques assume that the economy is at an equilibrium; unfortunately, changes in capital gains tax rates typically have effects that would be expected to last many years, so that estimated regression coefficients may reflect the effects of several past rate regimes, making it very difficult to disentangle the effects of various policy changes.

Seventh, realizations are presumably strongly affected by expectations of future tax rates; this plausible idea is supported by the surge in realizations in the US toward the end of 1986 in anticipation of the significant increase in rates announced for 1987 (Burman, Clausing and O'Hare, 1994). Unfortunately, modelling expectations is inherently difficult. Empirical results presented by Auerbach (1989) suggest that expected future tax rates can play an important role in predicting realizations behaviour; this in turn implies that estimates of realization elasticities that ignore future tax rates are suspect.

Finally, the econometric problem of 'simultaneity' – a situation in which changes in the dependent or explained variable in a regression affect one or more of the independent or explanatory variables – is common to all four types of empirical analyses. In particular, the explanatory variable of most policy interest – the marginal tax rate on capital gains – depends positively on the level of capital gains realizations, since individuals with large realizations will be in higher rate brackets under a progressive rate structure. A wide variety of approaches has been used to deal with this problem; however, these corrections have not always been successful in removing all elements of endogeneity from the tax rate variable, and the choice of estimating

technique used to deal with the simultaneity issue has been a source of controversy. More importantly, as will be shown below, the simultaneity problem in capital gains equations is much more pervasive than just the relationship between rates and realizations, and greatly complicates the estimation problem for all four empirical approaches.

Time-Series Analyses

Critical Features of Time-Series Analysis

The main advantage of the time-series approach is that the primary sources of variation in the tax rate variable are exogenous changes in the tax law, which implies that the regression coefficient on the tax rate variable can be readily interpreted as measuring the effect on realizations of legislated tax rate changes. In marked contrast, under the cross-section approach, tax rate variations occur across individuals, and it is difficult to determine whether these variations are attributable to differences in individual tastes or to changes in individual behaviour rather than legislated rate changes. Nevertheless, time-series analysis also faces a variety of problems; the three major issues are as follows.

First, an inherent problem is that the sample period in a time-series analysis is generally confined to the post-Korean war period and is thus fairly small. As a result, the number of explanatory variables that can be used in a regression analysis is limited; in particular, it is difficult to capture the dynamics of the realizations response. In addition, Jones (1989) notes that time-series estimates of realizations behaviour appear to be unusually sensitive to the choice of sample period.

Second, and in contrast to a cross-section analysis in which individual-specific tax rates can be calculated, a time-series analysis requires the calculation of a single economy-wide tax rate. Unfortunately, a change in capital gains taxes virtually always affects individual incentives to realize gains in ways that cannot be accurately captured by the change in a single summary variable; Auten (1993) notes that the resulting errors in measuring the tax rate variable tend to bias its coefficient toward zero. In addition, the use of a single average marginal tax rate in a time-series analysis eliminates variations in tax rates and mutes differences in responses across individuals; as a result, the coefficient on the tax rate variable suffers from 'aggregation bias' and will be biased toward zero.

Third, due both to data limitations and to the difficulty of using many explanatory variables in a time-series analysis, a number of variables that would be expected to influence realizations typically are not included in a time-series analysis. As a result, the estimated effects of capital gains tax changes suffer from 'omitted variable bias'. In particular, Gravelle (1990) argues that in several cases the omission of a potentially important explanatory variable from most time-series regressions would be expected to result in estimates of the coefficient of the tax rate variable that are too large.

Time-Series Studies

The following discussion summarizes the results of various time-series analyses of capital gains realization behaviour. It focuses on the estimate (or range of estimates) of the permanent realizations elasticity obtained in each study.[14,15]

The early time-series studies consistently found that reductions in capital gains tax rates have a significant positive impact on the level of realizations. In some cases, especially the U.S. Department of the Treasury (1985) analysis of the 1978 capital gains tax cut in the US, this effect was estimated to be sufficiently large to result in increased revenues (although the same analysis indicated that the 1981 tax cut did not raise revenues); the estimated permanent realizations elasticity in this study, at the 25.4 per cent tax rate, was -0.8. The Congressional Budget Office (1988) – hereafter, CBO – estimated a variety of alternative specifications of time-series equations, generally similar to those used by the

Treasury, over the period 1954–85; its estimates of the permanent realizations elasticity ranged from -0.79 to -0.99. Darby, Gillingham and Greenlees (1988) also updated the Treasury study to include data through 1985 and made a variety of changes in model specification; their estimates of the realizations elasticity ranged from -0.41 to -0.67. Thus, these early time-series estimates of the permanent capital gains realizations elasticity range from about -0.4 to nearly -1.0. Several more recent studies have clarified and extended the literature in numerous ways.

For example, Auerbach (1988; 1989) builds on the time-series equations estimated by CBO in two important ways. First, he estimates his equation in first differences (rather than levels), noting that such an approach is appropriate since the capital gains realizations time series is highly 'non-stationary' – that is, both realizations and some of the variables used to explain realizations vary systematically with time; this modification increases his estimates of the realizations elasticity by roughly 50 per cent. Second, he stresses that expected future tax rates are an important determinant of current realizations but have been ignored in most studies; accordingly, he includes such a variable – calculated either from current information on tax rate and other variables or by assuming that taxpayers accurately predict future tax changes – in his regressions. The effects of this modification are dramatic. For example, using 1956–1986 data, the elasticity of realizations with respect to the future tax rate, evaluated at a tax rate of 20 per cent, is roughly seven, while the long-run realizations elasticity is virtually zero; interestingly, adding 1987 data increases the future tax rate elasticity slightly, but dramatically increases the long-run realizations elasticity to nearly -0.5. Auerbach (1989:393) concludes that 'anticipated tax rate changes have an important impact on economic behavior,' so that equations that ignore this factor are seriously misspecified and appear likely to overstate the long-run responsiveness of realizations to tax rates.

Jones (1989) also argues that capital gains regression equations should be expressed in differences and that expectations of future tax rates can be important; however, he stresses that this appears to be the case only when the 1986 experience is included in the data. His preferred estimating approach – which includes data over 1948–86, treats the 1986 experience as an extraordinary one (by including a zero-one 'dummy' variable for 1986), and includes a measure of the stock of accrued gains – results in an estimate of the permanent realizations elasticity of -0.89; the coefficient on the expected tax rate variable is insignificantly different from zero.

Gillingham and Greenlees (1992) also begin with one of the CBO equations over the period 1954–85; they then extend the data through 1989 and make several technical modifications – including changes in the estimating technique and in the capital gains tax variable[16] – which they argue improve the accuracy of the regression estimates. Their estimate of the permanent realizations elasticity with all of these changes (and using a 1986 dummy variable) is -1.07.

A rather different approach is used by Bogart and Gentry (1993), who use interstate variation in income tax rates over 1982–90 to estimate the long-run relationship between capital gains tax rates and realizations. They argue that use of aggregate state data largely eliminates tax rate variations due to temporary deviations in tax rates and incomes (since they tend to cancel out in aggregate state-level data), so that their estimates should reflect the effect of permanent tax rate changes. On the other hand, they still face many of the problems of time-series analysis described above and, since their data are not in panel form, they are not able to make most of the adjustments (discussed below) that several recent panel studies have suggested are quite important. Their point estimate of the permanent elasticity for all taxpayers is -0.67, and they obtain a modestly higher

estimate for high income taxpayers of -0.82.

Finally, a recent study by Auten (1993) focuses directly on capital gains tax revenues by using regression equations with revenues, rather than realizations, as the dependent variable. Although this approach bypasses the need for a specification of the relationship between revenues and realizations, its results are somewhat difficult to interpret since, as noted above, a given realizations response to a marginal tax rate change can yield very different revenue effects, depending on the structure of average tax rates. Auten estimates the revenue elasticity for each of 42 different equations that are variations of six time-series equations taken from the literature. In all but five of the equations, the tax rate coefficient is statistically insignificantly different from zero, prompting Auten (1993:10–11) to conclude that 'capital gains tax rates have no statistically discernible impact on capital gains tax revenues'.

In summary, the many problems with time-series analysis noted above suggest that one should exercise great caution in basing policy prescriptions on any particular set of time-series estimates. At the same time, recent research has helped to clarify some of the most important issues, which will hopefully achieve resolution with further research. For example, it is clear that the treatment of expectations regarding future tax rates is critical; in particular, the approach used to model the experience surrounding the introduction of the *Tax Reform Act* of 1986 has dramatic effects on the estimated elasticities. In addition, recent results suggest that several issues regarding the choice of tax rate variable need further investigation. In any case, a solid consensus has not yet emerged, especially in light of the high degree of sensitivity of the results to fairly minor changes in sample period and model specification. Indeed, Jones (1989:1) stresses that, 'In general, we find evidence that suggests that aggregate time-series tax elasticities are *not* at all robust with respect to specification of the regression model. The implication of our findings is that the elasticity can be made either large or small depending on how the estimating equation is specified. Because of this troublesome sensitivity, aggregate time-series equations cannot be relied on to produce what could be termed a definitive elasticity estimate.' Given the wide range of time-series estimates of realizations elasticities, it is natural to inquire whether alternative studies based on cross-sectional micro-data can reduce the level of uncertainty. The following subsection examines this issue.

Cross-Section, Panel and Pooled Time-Series Cross-section Analyses

Critical Features of Cross-Section, Panel and Pooled Time-series Cross-section Studies

The earliest empirical studies of the effects of capital gains tax rates on realizations and revenues were in fact not time-series studies but rather cross-section analyses of individual tax return data for a single year; the most prominent example is the seminal paper by Feldstein, Slemrod and Yitzhaki (1980), which first argued that realizations were very sensitive to tax rates and that a tax cut from the levels existing at that time (the study used 1973 data) would increase capital gains revenue. Cross-section studies have several advantages over time-series analyses. In particular, marginal tax rates can be calculated on an individual-specific basis and are thus measured more accurately than under the single-rate approach used in time-series analyses, and the number of observations is typically very large. In addition, the data are rich enough to enable examination of differences in behaviour across classes of investors and, in some cases, differences in realizations behaviour by asset type. However, cross-section studies also suffer from a number of problems.

The most commonly cited difficulty is that the variation in tax rates across taxpayers in a cross-section study may be attributable to factors other than legislated differences in tax rates – including differ-

ences in tastes, especially with respect to risk aversion, choice of investment vehicle, and/or a tendency to invest in highly-leveraged 'tax shelter' types of investments – in which case the estimated regression coefficients suffer from 'heterogeneity bias'.[17] In addition, a single-year cross-section analysis cannot separate the effects of permanent and temporary rate change. Finally, cross-section studies suffer from a number of econometric problems, including 'sample selection bias' (which arises when dealing with many observations with zero realizations) and difficulties in identifying accurately the separate effects of income and tax price on realizations.

Fortunately, several of these problems – especially heterogeneity bias and the separation of the effects of permanent and temporary rate changes – can be addressed in panel studies by tracking the behaviour of individuals across time. Pooled cross-section time-series analyses can also deal with some of the problems of cross-section studies; however, this approach is less promising because it is inherently unable to cope with the problems of heterogeneity bias and the difficulty of separating permanent and temporary effects (at an individual level) because it cannot identify changes in individual-specific variables or behaviour across time periods.

Cross-Section, Panel and Pooled Time-Series Cross-Section Studies

The study by Feldstein, Slemrod and Yitzhaki (1980) analyszed a 1973 Treasury data set that contains a disproportionately large number of high income taxpayers and considerable information on asset sales. It found that capital gains realizations on corporate stocks held by high income taxpayers were highly sensitive to tax rates; the estimated elasticity of -3.75 strongly suggests that a rate cut would increase revenues.[18] They acknowledged that there was 'no way of knowing how important' the temporary component of this estimate might be (Feldstein et al., 1980:785).

Auten and Clotfelter (1982) performed the first panel study of realizations behaviour, using data on gains on all types of assets realized by a sample of taxpayers over 1967–73. Their primary innovation was to separate the effects of temporary and permanent tax rate changes on realizations by defining an individual's permanent tax rate as the average of the rates for the current and previous two years, and the temporary rate as the deviation of the current rate from the permanent rate. Their results indicated that the short-run realizations elasticity was more than twice the magnitude of the long-run elasticity, clearly suggesting that a significant portion of the response obtained in a cross-section study of a single year was likely to be attributable to temporary individual rate effects. In addition, the range of their estimates of the permanent elasticity was fairly wide, as one estimate (-0.37) was similar to those obtained in the time-series studies, while another (-1.45) was more typical of a cross-section study.[19] A similar study by the U.S. Department of the Treasury (1985) found even larger permanent elasticities, which ranged from -1.16 to -2.20; this study also estimated separate elasticities by asset type, and found that the estimate for corporate shares (-2.07) was significantly greater in absolute value than that for real estate (-0.71) and all other assets (-0.43).

Lindsey (1987a) used pooled time-series cross-section analysis, examining aggregate net long term gains realized by taxpayers in six adjusted gross income classes over the 18-year period 1965–82. Lindsey decomposed individual wealth into 'tradable wealth' and 'non-tradable wealth' components and found that the former variable has a positive effect on realizations while the latter has a negative effect. Lindsey found realizations to be quite sensitive to changes in tax rates; his preferred estimate of the permanent realizations elasticity (used in Lindsey, 1987b to argue that the capital gains tax increases in the *Tax Reform Act* of 1986 in the US would reduce revenues) is -1.37.[20]

In summary, most of the early cross-sec-

tion, panel and pooled time-series cross-section studies suggested permanent realizations elasticities larger in absolute value than those estimated in the time-series studies. Moreover, the range of estimates is quite large, varying from -0.36 to -3.75. The following discussion briefly describes three recent studies that have attempted to identify the effects of taxes on realizations more clearly.

Slemrod and Shobe (1990) examine a six-year panel consisting of 307 high income taxpayers over the period 1979–84. They address the issue of heterogeneity bias by using a 'fixed effects' model which assumes that deviations from average realizations behaviour are a function of deviations from average values of the explanatory variables; in this case, if the sources of heterogeneity bias are individual-specific and constant over time, they drop out of the estimating equation. They find that introduction of this correction for heterogeneity bias generally increases their estimates of the responsiveness of realizations to tax rates, and their estimates of the realizations elasticity generally exceed one in absolute value.[21] However, Slemrod and Shobe note that since the explanatory variables in the fixed effects model are measured as deviations from averages, the coefficient on the tax rate variable tends to measure the temporary, rather than the permanent – or a combination of the temporary and permanent – effect of tax rate changes. Thus, it is certainly possible that a reduction in the absolute value of the tax rate coefficient due to the elimination of heterogeneity bias is swamped by an increase in its value since the coefficient is capturing more of the temporary effect of the tax change than in the basic model.[22] Nevertheless, this result is a striking one, and future research will undoubtedly involve further attempts at separating out the effects of individual-specific differences from the temporary effects of tax rate changes. Slemrod and Shobe also stress that although most of their point estimates suggest a realizations elasticity greater than one (in absolute value), the estimates are often insignificantly different from zero and are extremely sensitive to the choice of specification; they conclude (p.24) that the 'fragility of these results suggests great caution in drawing policy conclusions from these and similar exercises'.

Auten, Burman and Randolph (1989) – hereafter ABR – use panel data on a large group of high income taxpayers over 1979–83 in an attempt to resolve several of the problems described above. First, they note that capital gains regressions suffer from simultaneity problems beyond the obvious positive relationship between realizations and rates; in particular, taxpayers exert some control over various deductions and sources of income and one would expect many individuals to engage in 'tax planning' – that is, arranging their realizations and discretionary income and deductions so as to minimize their tax burden. In order to eliminate this source of simultaneity bias, ABR estimate separate equations that explain those deductions and components of income that are endogenous (e.g., charitable contributions and business losses); the realizations equation then includes only the remaining sources of income, which are exogenous or independent of individual behaviour, as explanatory variables. Second, they attempt to eliminate the sample selection bias that arises when many observations of the dependent or independent variables are equal to zero; they accomplish this by constructing a separate 'criterion function' for those variables for which sample selection bias might be a problem – realizations and the endogenous components of income. These criterion functions, which model the decision of whether or not to realize a positive amount of the relevant item of income (including capital gains), are then estimated; the results are used to adjust the equations explaining the levels of the various variables to correct for sample selection bias. In addition, ABR construct a variable that imputes wealth to each taxpayer in their sample, include state tax rates in their tax

rate variables, and include the marginal capital gains tax rate in the previous year as an explanatory variable (in a limited attempt to capture the dynamic response to tax rates). Note, however, that they do not (1) include any modelling of expected future tax rates in their model, (2) correct for heterogeneity bias, or (3) separate the effects of temporary and permanent changes in individual tax rates.

ABR simulate the effect of a small reduction in the capital gains inclusion rate from 40 per cent (using 1982 data) and find that the long-run capital gains realizations elasticity is -1.63; -0.30 of this response is due to an increase in the number of taxpayers who realize any gains, with the rest attributable to an increase in realizations by taxpayers who were already realizing gains.[23] They also find that the short-run gains elasticity, which equals -1.98, exceeds the long-run elasticity. In addition, they show that significant biases result if one does not correct for the endogeneity between rates and realizations and if their correction for selectivity bias is eliminated; they suggest that previous studies that have ignored sample selection bias are likely to have seriously overestimated the responsiveness of realizations to rates.[24]

Finally, in a subsequent paper that is sure to be a provocative addition to this literature, Burman and Randolph (1994, and hereafter referred to as BR) extend the ABR model in order to focus on a critical issue that was largely ignored in that model – separating the responses to temporary and permanent changes in individual tax rates. They argue that previous attempts to accomplish this (described above) are flawed because an average rate defined over a relatively short two- or three-year time period is almost certain to be inaccurate, and because the measure of the permanent rate is clearly correlated with the measure of the temporary rate.

To remedy these problems, BR construct separate 'instrumental' variables to use as explanatory variables for both the permanent and temporary tax rates faced by taxpayers. Specifically, they construct an instrument for the permanent rate that is based on the sum of the maximum federal rate and the maximum state tax rate in the taxpayer's state of residence.[25] They argue that such a variable should be closely correlated to an individual's permanent statutory tax rate on capital gains – the total statutory rate applied to an average level of gains at an average level of income for that individual; at the same time, it should also be uncorrelated with temporary variations from the individual s permanent rate. Second, to find an instrument for the temporary tax rate, Burman and Randolph use a 'first dollar' rate, similar to that utilized in the ABR model in that it is defined as the tax rate that would be applied to the individual s income net of its endogenous components, including capital gains realizations, and various items of discretionary income and deductions; their instrumental variable for the temporary tax rate is based on this first dollar rate.[26] They argue that the resulting variable is highly correlated with temporary variations in tax rates but is purged of its endogenous components.

The results obtained by Burman and Randolph, using the same data over 1979–83 as those utilized by ABR, are striking. Their estimate of the capital gains realizations elasticity with respect to a permanent tax rate change, taking into account both the effect on the number of individuals realizing any gains and the amount of gains realized by each individual who realizes a positive amount, is only -0.18. This value is not only much smaller than the estimates obtained in other panel or cross-section studies, it is smaller than the results obtained in virtually all of the time-series studies. In marked contrast, the estimated temporary elasticity is -6.42, which exceeds (in absolute value) all previous estimated elasticities. Burman and Randolph conclude that previous cross-section and panel studies have estimated a mixture of temporary and permanent elasticities, and that their estimate of the permanent elasticity is more consistent with (and in fact lower than)

time-series studies which inherently estimate the permanent elasticity.

It is of course too early to proclaim these results as definitive. For example, BR note that their coefficient estimates are not very precise in a statistical sense, and their model does not account for the heterogeneity bias analysed by Slemrod and Shobe (1990) or the effects of expectations of future tax rates emphasized by Auerbach (1988; 1989). Moreover, although their description of the importance of the distinction between the permanent and temporary effects of changes in capital gains taxes emphasizes the 1986 experience in the US, their data set does not include that year. At a more fundamental level, the approach used by BR to separate temporary from permanent changes in tax rates raises some questions. Although their instrumental variable for the permanent tax rate is exogenous, it is based on only tax rate information for the current year and the previous year. However, it would be preferable to use data over a longer time span to obtain a more accurate indicator of the permanent rate; in addition, the use of the current maximum tax rate rather than the actual average rate implies the loss of some information regarding the actual permanent tax rate relevant for realizations decisions. Moreover, note that the definition of the temporary tax rate instrumental variable is based on a first-dollar rate that does not include endogenous components of income and deductions. This approach may be problematical, because it is in fact these changes in the endogenous components of income and deductions that provide taxpayers with the means to lower their capital gains tax rates temporarily and increase realizations accordingly; that is, the instrumental variable for the temporary tax rate might be improved if its construction were to consider such behaviour explicitly. Finally, since the instrumental variable for the temporary tax rate is based in part on the actual tax rate in the previous year, it would appear to include some elements of the permanent rate; that is, there is likely to still be some correlation between the Burman and Randolph measures of the permanent and temporary tax rates, especially since the equations that define these two variables are so similar.[27]

Despite these caveats, the BR results are certainly provocative, and provide a rigorous and intuitively plausible reconciliation of the wide disparity between previous time-series and cross-section/panel study results. They should give pause to those who propose cuts in capital gains tax rates on the grounds that they are likely to result in long-run revenue increases.

Conclusion

This discussion has identified a wide variety of problems that plague empirical attempts to determine the relationship between capital gains realizations, revenues and tax rates. A large number of innovative papers have attempted with varying degrees of success to deal with these problems. A cynic might observe that the net result of these efforts, however, has been to increase the level of uncertainty. After all, the message of this literature as of several years ago was that time series studies suggested realizations elasticities in the range from -0.4 to -1.0, while cross-section and panel studies generally suggested realizations elasticities in excess of one and as large as nearly four (in absolute value). However, the literature now includes several time-series studies that estimate realizations elasticities well in excess of one (in absolute value), and a panel study that estimates a permanent elasticity lower than those found in any of the previous time-series studies. In addition, several prominent researchers in the field have commented on the unsettling lack of robustness of the results in both time-series and panel studies.[28]

However, an alternative interpretation is that the implication of many of the time-series studies, especially when coupled with the theoretical models examining the implications of the long-run relationship between realizations and accruals (noted

briefly below), is that the long-run realizations elasticity is likely to be somewhat less than one (in absolute value). This view is supported by the Burman and Randolph study, which suggests that earlier panel and cross-section studies were identifying a mixture of the effects of permanent and temporary tax changes, and that the long-run realizations elasticity is quite small; this study thus potentially reconciles the wide differences in the earlier time-series and cross-section/panel studies. The fact that the Burman and Randolph estimate of the realizations elasticity is even smaller than the lowest time-series estimates is not inconsistent with this view, since it seems likely that these estimates include at least some temporary effects.

Nevertheless, it must be admitted that the econometric evidence on the relationship between capital gains realizations, revenues and tax rates is still open to alternative interpretations, especially since a significant number of studies indicate realizations elasticities in excess of one. Critical areas for future research that might help to narrow differences of opinion on this issue include further investigation of (1) the identification of the separate effects of temporary and permanent tax changes to determine the robustness of the Burman and Randolph findings, (2) the empirical implications of correcting for heterogeneity bias, including the robustness of the Slemrod and Shobe results regarding the relative lack of importance of this correction and the somewhat unexpected sign of the effect of the correction on estimates of the realizations elasticity, (3) the dynamics of the realizations response, including both the role of expectations of future tax rates and the identification of the short- and long-run responses to tax changes, (4) the appropriate choice of the tax rate variable and estimating technique, (5) the values of various critical variables on which fairly little data are available, and (6) the impact of tax avoidance techniques on realizations behaviour.

III Efficiency Issues

Although the question of how capital gains taxes affect realizations and revenues is interesting in its own right, tax effects on realizations and revenues also play an important role in determining the efficiency effects of the capital gains tax. For example, a large realizations elasticity suggests that capital gains taxes have important efficiency costs, since it indicates significant distortions of individual decisions. In particular, if the long-run realizations response indicates a negative relationship between capital gains tax rates and revenues, then a tax cut will allow reductions in other distortionary taxes and thus is very likely to result in a significant increase in overall economic efficiency.

Unfortunately, the efficiency properties of capital gains taxes are even more difficult to ascertain than their effects on realizations and revenues. Capital gains taxes potentially distort a large number of individual decisions, and it is difficult to model many of these distortions – not to mention all of them simultaneously. Indeed, as noted previously, formal models of the effects of capital gains taxes are still in the early stages of development. Moreover, most analyses of the efficiency implications of capital gains taxes ignore the arbitrage opportunities created by taxation on a realization basis coupled with whatever exemptions are allowed for gains transferred at death; such arbitrage creates inefficiencies as revenue losses must be offset by increases in other distortionary taxes and resources are wasted in arranging tax avoidance schemes.[29] The issue is further complicated by the fact that most existing models either implicitly or explicitly assume a closed economy setting, and are thus of limited relevance in the open economy context. Finally, one must be very careful to identify the elements of any capital gains reform that affect the cost of capital for future capital investments from those that merely confer windfall gains to existing capital; only the former type of re-

form will have significant efficiency effects. For example, the lifetime capital gains exemption in Canada is not likely to have significant effects on saving (and perhaps investment), because it is a broad exemption that applies to gains on both old and new capital assets, and because the limits on the exempt amounts imply that the exemption will apply only to inframarginal investments for some wealthy investors (who have capital gains in excess of the lifetime limits).[30] Despite these limitations, it will be useful to examine a number of studies that have attempted to gauge the efficiency effects of capital gains taxes.

Effects on Saving, Investment and Economic Growth

The determination of the effects of changes in capital gains taxes on saving, investment and economic growth is a contentious issue in the US. As will be described below, however, most analyses suggest that the effects of proposed capital gains tax reforms would be fairly small. However, the results of these studies are of limited applicability in Canada – and arguably in the US context as well – because they assume a closed economy setting.

Indeed, in the simplest small open economy model, capital gains taxes – and indeed any individual level taxes on saving – have absolutely no effect on the national level of investment.[31] In such models, the economy faces a fixed required rate of return determined in international markets, and the cost of capital to firms and thus the level of investment in the nation is determined solely by business level taxes. Under this scenario, capital gains taxes – as well as any other individual level taxes on the return to saving – affect only the level of domestic saving. Thus, if domestic saving is responsive to the after-tax rate of return, a change in the capital gains tax will affect the fraction of investment that is financed domestically, but it has no effect on the overall level of investment.[32]

The implications of this analysis for the capital gains tax must be drawn carefully. A standard result in the small open economy model is that the optimal business level tax on capital income is zero. That is, since the supply of capital to the economy is perfectly elastic, capital will leave the country until the before-tax return increases to the point at which the after-tax return equals the rate of return available in the international capital market. As a result, the burden of the tax is not borne by capital in the country, but is instead shifted to local factors of production. Moreover, the emigration of capital induced by the tax creates an efficiency cost or excess burden that is also borne by local factor owners. Thus, a direct tax on local residents is preferable to the capital income tax, since it at least avoids the excess burden due to capital emigration.

This analysis does not, however, necessarily imply that taxes on saving, including the capital gains tax, should be zero; instead, taxation should reflect a balancing of the various distortions in individual behaviour caused by the taxation of capital and labour income.[33] Tax exemption of capital income – or taxation on the basis of consumption – has been shown to be desirable on efficiency grounds under several sets of circumstances; however, these results are to some extent dependent on assumptions about the nature of the individual utility function.

For example, within the context of a two-period partial equilibrium life-cycle model with no bequests, consumption taxation is optimal under the arguably plausible assumptions that individual utility is (1) weakly separable in leisure and consumption, and (2) homothetic in the two consumption goods; an alternative interpretation of these conditions is that a consumption tax is optimal if consumption in each of the two periods is equally complementary with leisure.[34] More generally, however, if consumption in the second 'retirement' period is more complementary with leisure, some level of taxation of interest income is desirable; indeed, depending on parameter values, an income tax or even

a capital income surcharge may be optimal.[35] In addition, several general equilibrium analyses of infinitely-lived individuals with perfect foresight have concluded that the long-run optimal tax rate on capital income is zero.[36] However, in a recent contribution to this literature, Jones, Manuelli and Rossi (1993) show that this result does not obtain in a similar model that includes human capital accumulation, as positive tax rates on capital are generally optimal in this case.[37]

Finally, note that lower capital gains taxes will be desirable if saving is responsive to after-tax rates of return and it is deemed desirable to increase the fraction of national investment that is financed domestically. For example, Summers (1988) stresses that an insufficiency of domestic saving relative to domestic investment inevitably creates problems with a nation's balance of trade. However, in general the issue of whether increased domestic saving is desirable depends on a host of factors, including social evaluation of intergenerational redistributions and the effects – economic and social – of increased foreign holdings of domestic assets.[38]

Thus, it is rather difficult to determine the optimal tax rate on capital gains even in the context of a small open economy. As a result, the efficiency properties of any change in capital gains taxes are ambiguous; they depend on the structure of the model used to analyse the tax and the parameter values chosen in simulations of the model – which determine the efficient level of taxation – as well as on the initial capital gains tax rate.

Matters are even more complicated when the economy is obviously not closed but is too large to be characterized as a small open economy – the case that presumably applies to Canada (and indeed to the US as well). In this situation, taxes on capital imports (or exports) are generally desirable from a purely nationalistic perspective, as a country should take advantage of any market power that it enjoys in international markets. For example, if the supply of capital schedule faced by a nation is upward-sloping, a tax on capital imports will reduce the level of imports and thus reduce the price paid to foreign capital owners. Since discriminatory taxes on capital imports may be legally impossible or deemed politically undesirable, taxation of all capital income may be viewed as an indirect means of achieving this result.

The market power of a nation in international markets may manifest itself in a number of ways. The most obvious example is when the country is large enough to affect the world rate of return to capital. In this case, the size of the tax a nation should assess on capital imports is inversely related to the elasticity of the foreign supply of capital (Hartman, 1985). Alternatively, a capital exporter should assess a tax on such exports that is inversely related to the elasticity of the foreign marginal product of capital (Kemp, 1966).

These results obtain in a world of perfect certainty; additional factors must be considered in the presence of uncertain returns to investment coupled with a desire for diversification on the part of risk-averse investors. In particular, Gordon and Varian (1989) show that even small countries may wish to tax foreign owners of domestic capital in order to take advantage of their market power in supplying diversification attributable to country-specific risk.[39]

Moreover, even under the assumptions of perfect certainty and assuming that a nation faces a perfectly elastic supply of foreign capital, a country may have some market power in the international market for some of its exports. In this case, an export tax would be desirable to restrict exports to the socially optimal level (thereby improving the nation's terms of trade). However, Burgess (1988) shows that if an explicit export tax is impossible (e.g., due to free trade agreements) and the alternative of a tax on capital imports is also infeasible (e.g., due to restrictions that preclude discrimination across domestic and foreign capital owners), a positive tax on all capital income will be desirable if the country faces

a downward sloping demand curve for its exports. Specifically, Burgess shows that the optimal tax on capital income balances the desired reduction in externally funded capital and thus exports (and the associated improvement in the nation's terms of trade) against the tax-induced distortion of domestic savings choices. The theoretical optimal capital income tax varies between zero (when the domestic savings elasticity is perfectly elastic) and the inverse of the demand elasticity (if domestic savings elasticity is zero), and ranges from 0.07 to 0.67 in his simulations.

Once again, one must be careful in extending these results to the capital gains tax, as they generally refer to source-based taxes that apply to both domestic and foreign capital. They are thus irrelevant for the capital gains tax in Canada since it does not apply to foreign capital owners. In most other cases, as noted above, taxes on capital gains assessed at the individual level will at most increase the fraction of the domestic capital stock that is financed domestically, without affecting the size of the total national capital stock. However, Burgess shows that if the demand for a country's exports is less than perfectly elastic, increases in domestic savings reduce future export requirements, improve the terms of trade, reduce the demand for externally funded capital and thus translate into increases in the domestic capital stock. Indeed, in his simulations, between 17 per cent and somewhat more than 100 per cent of an increase in domestic saving is translated into increases in the domestic capital stock. Thus, tax changes that potentially affect domestic savings, such as cuts in capital gains taxes, may have significant effects on savings and investment even in a small economy – provided that it has at least some market power in the international market for its exports.

This discussion suggests that determining the optimal tax rate on capital gains is no easy task, especially in an economy that is 'partially' open. It is thus rather difficult to determine whether any particular change in capital gains taxes increases or decreases the efficiency of resource allocation in the economy.

Most analyses of the effects of capital gains taxes on saving, investment and growth in the US adopt a closed economy approach in which tax cuts increase saving; moreover, the models are typically constructed in such a way that, given the assumed initial conditions, such an increase in saving is welfare-enhancing. Three approaches have been utilized in this context. One calculates the effects of the capital gains tax on the cost of capital to businesses – the minimum rate of return that must be earned on an investment to yield a fixed net return after depreciation to an individual saver, taking into account all taxes and deductions at both the firm and individual levels. This method requires that the calculated effect on the cost of capital of a cut in the individual-level taxation of capital gains be translated into an increased level of investment; most such analyses are partial equilibrium in the sense that they assume that any increase in the net return required to induce the implied increase in saving is small enough to be ignored. The second approach calculates the change in the after-tax return to saving implied by a capital gains tax change and then translates this into a change in saving and in investment – on the assumptions that these changes are equal and any reduction in the return to saving can be ignored. The third approach adopts a general equilibrium perspective, as it assumes that an increase in saving occurs only if net after-tax returns to saving increase, and increases in investment are characterized by decreasing returns.

Note, however, that all of these approaches do not take open economy considerations into account. For example, the cost of capital approach ignores the fact that individual level tax cuts have no effects on the level of investment in a small open economy, and the 'effects on saving' approach ignores the fact that increased saving generally does not translate into in-

creased domestic investment in the small open economy model. In addition, the general equilibrium adjustments noted above are inappropriate in an open economy context, as national saving and/or investment levels do not affect international returns to saving and investment.

In any case, the results obtained in these closed economy models are sufficiently small that it seems highly unlikely that similar changes in a partially open economy context – in which saving incentives have relatively little effect on the cost of capital and changes in saving do not translate automatically into changes in investment – would result in significant changes in saving, investment and economic growth. These studies are complicated by various issues, including disagreement about (1) how to translate the statutory capital gains tax rate into an effective annual accrual tax rate, taking into account the benefits of deferral and the tax exemption of gains transferred at death in the US, (2) whether to adopt the 'new' or the 'traditional' view of the effects of dividend taxation,[40] and (3) the degree of responsiveness of saving (investment) to changes in the after-tax rate of return (cost of capital).

Most of the recent studies in the US were prompted by the Council of Economic Advisors (1990) – hereafter CEA – analysis which estimated that the 30 per cent capital gains exclusion proposed by the Bush administration would result in a long-run increase in GNP of 0.6 per cent. This estimate has been criticized for exaggerating the effect of the tax cut; critics have argued that the effect on the cost of capital was overstated and that adoption of the new view of dividend taxation was inappropriate (Auerbach, 1990; Gravelle, 1990; Hoerner, 1990). The Congressional Budget Office (1990a) – hereafter CBO – reviewed six studies that appeared after the CEA analysis (including a saving-based analysis and a macroeconomic model-based analysis conducted by CBO) of the effects of the proposal; other studies include Cashell and Gravelle (1992) and Sinai (1990a; 1990b), who examined the effects of a reduction in the maximum capital gains tax rate to 15 per cent. Six of these nine studies – Auerbach (1990), Gravelle (1990), Kotlikoff (1990), Cashell and Gravelle (1992), and the two by CBO – predicted little or no effect on growth; any resulting revenue increases were not nearly large enough to offset the proposal's revenue loss as predicted by the Joint Committee on Taxation (1990), and the Kotlikoff model predicted a long-run decline in GNP of 1.4 per cent. The seventh study (Robbins and Robbins, 1990) estimates reductions in the cost of capital that are roughly similar to the other six studies (and between 25 and 44% of the effect estimated by CEA), but then assumes that the induced increase in GNP is over five times greater than that estimated by CEA. The CBO (1990a:19) report reasonably 'judges this implied level of response to be implausible'. The final analyses, which reflects simulations of a large-scale macroeconomic model by Sinai, is difficult to interpret. In testimony before the Joint Economic Committee, Sinai (1990a) considers the imposition of a cut in the top capital gains tax rate to 15 per cent after the enactment of a deficit reduction package and obtains results broadly similar to the group of six studies noted above. However, in a separate report, Sinai (1990b) considers the same capital gains tax reform without the deficit reduction package and gets results broadly similar to those of Robbins and Robbins (1990). As noted by CBO (1990a:26), this sensitivity to initial conditions 'leaves the overall implications of his simulations uncertain'.

On balance, these analyses suggest that, as long as the revenue effects of a capital gains tax cut are negative and in the neighbourhood of those predicted by the Joint Committee on Taxation, it is rather unlikely that they would result in significant increases in saving, investment and economic growth even in a closed economy model. Moreover, the discussion above stresses that the effects on domestic investment of saving incentives such as capital

gains tax cuts will be muted – or entirely eliminated – in an open economy context.[41] Accordingly, it seems very likely that capital gains tax cuts in Canada would have very limited effects on saving, investment and economic growth. One caveat should, however, be noted. Specifically, since the exemption for capital gains transferred at death in Canada is less generous than that in the US, the effective annual capital gains tax rate is higher in Canada; since saving may be more responsive to tax changes at relatively high rates, the effects of a capital gains tax cut may be more pronounced in Canada than in the US.[42,43]

In addition, the critical role of the revenue assumption should again be noted – if the capital gains tax cut increases long-run revenues, then the accompanying reduction in other tax rates or the deficit will have a positive effect on growth that will supplement rather than offset any positive effect attributable to the capital gains tax cut; in this case, a greater positive effect on economic growth would be obtained. Finally, it should be noted that preferential treatment of capital gains might result in a reallocation of investment and of research and development expenditures from mature, well-established firms to start-up enterprises with a relatively large potential to generate future capital gains. Such a reallocation of investment could result in increased economic growth if it led to a more rapid rate of technological progress.

Other Analyses of the Efficiency Implications of Capital Gains Taxation

A number of studies have focused on various distortions of individual and firm decision-making induced by capital gains taxes; total wealth is typically assumed to be fixed in these analyses. Most of these have examined the often-cited 'lock-in effect' of the capital gains tax – the distortion attributable to the fact that investors with accumulated gains may not realize them in order to avoid the capital gains tax. Such investors would thus hold an inefficient portfolio; for example, they may avoid portfolio reallocations that they believe would earn higher returns or that would achieve a desirable degree of diversification.[44] A wide variety of other distortions has been examined as well.

The most comprehensive models in this area are due to Hendershott, Toder and Won (1991; 1992) – hereafter HTW.[45] Their model includes (1) 147 types of risk-averse individuals (categorized by amount of capital and labour income and marital status) who make welfare-maximizing portfolio choices over five financial assets and housing, (2) a corporate sector and a non-corporate sector in which firms make capital allocation decisions based on cost of capital calculations (which include individual level taxes such as the capital gains tax and thus assume a closed economy), choose an optimal debt-equity ratio as a function of interest costs that increase with the extent of leverage, and choose an optimal dividend payout rate by weighing the tax cost of dividends against their informational or other benefits,[46] and (3) federal, state and local governments. In addition to the efficiency gains attributable to a reduction in lock-in effect induced by a capital gains tax cut, the HTW (1992) model considers simultaneously (1) the reduction in efficiency attributable to the increase in other taxes on capital income used to balance the government budget, (2) the loss suffered by investors as a result of the reduction in the benefits of dividends (e.g., information or limits on managerial discretion) due to the lower payout rate attributable to the rate reduction and reduced revenues as dividends are converted to capital gains, (3) the increased cost of a less efficient allocation of risk-bearing,[47] and (4) the increased cost of a less efficient allocation of capital (due to over-investment in assets that produce capital gains rather than current income).

HTW simulate the effects of a reduction in the maximum capital gains tax rate in the US to 15 per cent in their model for realizations elasticities that vary from -0.62 to -1.4 (evaluated at a 25% tax rate). All of these effects roughly cancel out for a reali-

zations elasticity of -0.62, but HTW report net efficiency gains of $1.8 ($4.2) billion in 1985 dollars for a realizations elasticity of -0.87 (-1.4). These gains are quite small in absolute terms,[48] but are not insignificant when compared to the revenue losses due to the tax cut (before the budget-balancing increase in the tax rate on other capital), which are $3.8 billion for the intermediate realizations elasticity and $1.2 billion in the 'high responsiveness' case. These results indicate the sensitivity of estimates of the efficiency effects of capital gains tax cuts to the assumed realizations elasticity. However, they do suggest that the efficiency costs of capital gains taxes, in comparison to the revenues gained, may be relatively high if the realizations elasticity is sufficiently large.

Although the HTW model considers the allocation of risk-bearing, it does not examine the effects of the capital gains tax on the level of risk-taking.[49] In a recent provocative paper, Haliassos and Lyon (1993) – hereafter, HL – construct a model in which individuals allocate wealth across a safe and a risky asset, maximizing expected utility over a three-period life cycle; their analysis considers two types of individuals (high and low income) subject to a progressive two-rate tax structure, and models explicitly the behaviour of a representative firm and the government, including a government budget constraint. HL compare a capital gains tax regime (which includes taxation of interest and dividend income) with a lump sum tax regime.

Their most striking result is that the efficiency losses due to the lock-in effect under the capital gains regime are outweighed by efficiency gains due to increased risk-taking by risk-averse investors. That is, the capital gains tax reduces the risk associated with any level of investment in the risky asset and thus induces an increase in risk-taking to a more optimal level than that which would occur under the lump sum tax.[50] In the HL model, risk-averse investors value highly the ability to realize losses and thus reduce tax liability, subject to loss limitations. (Note that this effect would be even more pronounced in Canada, since losses can be deducted only against gains, while losses can offset up to $3,000 in ordinary income in the US.) In addition, the efficiency gains for high-income investors are particularly large since they are assumed to be relatively less risk averse and thus to own a disproportionate share of the risky asset.[51]

Although these results are based on a stylized model with fairly restrictive assumptions, they certainly suggest that considerations of risk may have efficiency implications for capital gains taxation that dominate the more commonly cited lock-in effect; at a minimum, such considerations should be factored into any estimates of the efficiency costs of the capital gains tax. However, it should be noted that these results depend on the assumption that the shifting of risk from private individuals to the government imposes no costs on the government. Although such an assumption is common in the literature and can be justified to the extent that the government can spread risk better than the private sector, several observers have argued that it is unreasonable to assume that the government can absorb risk costlessly. For example, Gordon (1985:5–6) concludes that 'risk in government tax revenues is as costly to bear as privately traded risks' since governments and ultimately private individuals must bear the risks of 'random tax rates on other income, random government expenditures, or random government deficits'.[52] If one agrees with this position, the efficiency gains obtained under the capital gains tax regime in the HL model due to increased risk-taking on the part of private investors would evaporate, and the primary efficiency effect of a reduction in the capital gains tax rate would again be a reduction in the lock-in effect. In addition, HL do not capture the extent to which the taxation of purely inflationary gains increases the effective tax rate applied to capital gains while simultaneously lowering the effective rate at which losses are

taken. Finally, there is fairly little analysis of tax effects on individuals subject to loss limitations (since aggregate average losses over an extended period of time are fairly small); more disaggregated analysis over shorter periods of time could reveal more important negative effects on risk-taking by individuals subject to the capital loss limitation. For these reasons, the provocative results obtained by Haliassos and Lyon must be viewed as tentative.

A related issue is that the capital gains tax may have deleterious effects on risk-taking by entrepreneurs forming small-scale new ventures that will generate significant capital gains if they are successful, as well as on the supply of venture capital to such emerging enterprises. The discussion above raises the possibility that the effect of capital gains taxes on risk-taking may in fact be positive – subject to the important qualifications that the government must share equally in both the risk and the return of the investment and must be able to bear risk costlessly. However, as stressed in that analysis, the role of loss limitations is crucial since they introduce a potentially important asymmetry in the treatment of gains and losses.[53] This point may be especially important to the entrepreneur whose investment in a new venture represents a significant fraction, if not all, of his or her wealth and who thus faces potential (undiversified) net losses that would greatly exceed current loss limitations. In addition, the effect of capital gains taxes on such investment in the context of an open economy may be much more pronounced than on investment generally, since the international capital market may not be readily available to small entrepreneurs and venture capitalists; that is, this case corresponds more closely to that of the closed economy in which the appropriate measure of the cost of capital reflects both firm-level and individual-level taxation.

Several points have been emphasized in the literature on this issue. First, the U.S. Department of the Treasury (1985) has observed that a capital gains preference is a very poorly targeted and thus expensive means of attempting to encourage venture capital or entrepreneurial investment. Second, the U.S. Treasury and Poterba (1989) have noted that a very large fraction of the funds that are supplied by organized venture capitalists in the US come from entities that are not sensitive to individual capital gains taxation, such as pension funds, endowments and foundations, foreign investors, and corporations (including insurance companies);[54] thus, any important effect of capital gains tax cuts on such investment is likely to appear only at the earliest stages of an enterprise, before organized venture capitalists are a viable source of funds (Freear and Wetzel, forthcoming). Third, by increasing the attractiveness of retained earnings, capital gains tax cuts may reduce dividend payouts – as documented by Poterba (1987) – and thus reduce the supply of funds available to new enterprises.

A final efficiency rationale that is sometimes offered in support of cuts in capital gains taxes in the US is that they would reduce the distortions of the corporate income tax, including the double taxation of corporate equity due to the lack of integration of business and individual level taxes and the tax advantage of debt over equity finance (under the traditional view of dividend taxation). It is clear that such concerns are at best addressed only indirectly by changes in capital gains taxation, and that such changes should be confined to gains accrued on corporate stock. In addition, these concerns are of limited relevance in Canada in light of the integration provided by the existing dividend tax credit and the 25 per cent capital gains exclusion. Moreover, Boadway and Bruce (1992) argue that cuts in individual taxes on capital income – they consider dividend tax credits – are an ineffective means of achieving integration in an open economy. Specifically, since (as noted above) investment decisions depend only on firm level taxes, cuts in individual taxes on capital income do not eliminate investment distortions; instead,

they simply eliminate individual level taxation, which presumably is not the goal of an integration reform. Accordingly, it seems unlikely that capital gains tax cuts in Canada would lead to any significant efficiency gains due to a reduction in distortions associated with the corporate income tax.

IV Distributional Issues

Opponents of cuts in capital gains taxes often argue that they are undesirable because they confer disproportionately large benefits to the wealthy. Indeed, some argue that even if a capital gains tax cut were to be a Pareto-improving reform in the US (in the sense of increasing the welfare of all income classes), it would be undesirable because it would only exacerbate recent economic and tax changes that have increased the degree of after-tax income inequality (Aaron, 1990; Schmalbeck, 1990). In marked contrast, some proponents of capital gains tax cuts argue that such reductions are desirable from a policy standpoint because it is in fact the middle class who would be the primary beneficiaries.[55]

Economists have largely ignored this debate on the grounds that such contentions reflect primarily individual value judgments regarding the desirability of alternative distributions of income; instead, as suggested by the material reviewed in the paper thus far, they have instead focused on the implications of capital gains taxation on realizations, revenues and economic efficiency. Nevertheless, distributional arguments such as those outlined above play an important role in political discussions of reforms of the tax treatment of capital gains. Moreover, apart from subjective judgments regarding income distribution, it is possible to use economic data to determine objectively the distribution of capital gains income, as well as the distribution of the benefits and costs of various changes in the tax treatment of capital gains. In particular, several recent economic analyses have examined various arguments which imply that distributional concerns regarding capital gains tax cuts are misplaced because capital gains are in fact a middle class phenomenon.[56] This section considers a number of these arguments; it also includes a discussion of the relationship between distributional studies and the excess burdens of capital gains taxes.

Before proceeding, three points should be noted. First, the analyses discussed below consider only realized taxable capital gains; if largely untaxed capital gains on owner-occupied housing and on assets held in pension and retirement accounts were included, the concentration of capital gains among high-income households would presumably be reduced. Second, it is clear that a very large number of households – rather than just the rich – realize at least some capital gains;[57] the following discussion assumes that distributional concerns focus on the dollar magnitude of capital gains rather than the total number of taxpayers who realize a gain (no matter how small). Third, the current concentration of assets that produce capital gains among high-income households to some extent reflects current and past tax incentives; that is, such a concentration should be expected since the tax preference for capital gains has historically been greatest for high-income individuals.

The 'Snapshot' Issue

Many analyses of the equity implications of capital gains taxes simply examine the distribution of capital gains across income classes for a single year, using adjusted gross income (AGI) – including realized capital gains – as the classifier. Such studies inevitably find that capital gains income is highly concentrated among the highest income classes. For example, Feenberg and Summers (1990) show that a single-year analysis of 1986 US data indicates that taxpayers in the top 0.5 percentile of the AGI distribution (those with AGI in excess of $203,000 in 1989 dollars) receive 54 per cent of all capital gains, compared to 8 per cent of all income; the top 2 per cent of taxpayers (roughly those with

AGI in excess of $106,000) receive 68 per cent of all gains, compared to 15 per cent of all income. In contrast, the bottom 50 per cent of taxpayers (those with AGI less than $20,800) received 9 per cent of all capital gains but 15 per cent of all income.[58]

However, such a single-year 'snapshot' picture of the income/gains distribution may be seriously distorted because the high income groups contain individuals with large one-time gains (such as those related to the sale of a family business or a home) or, more generally, individuals with a temporarily high level of capital gains. Since such 'unusual' gains are included in the AGI classifier, income is overstated relative to a more appropriate measure of permanent income; that is, a middle-income household realizing a large gain is misclassified as 'rich'. As a result, the concentration of gains is overstated as well.

Several studies have examined the numerical significance of this problem by using individual panel data to calculate multi-year estimates of average gains and average AGI, classified according to average AGI; this approach attempts to capture the 'permanent' levels of income and gains.[59] For example, in an examination of panel data over 1979–84, Feenberg and Summers (1990) show that a single-year analysis indicates that the top 0.5 per cent of the annual AGI distribution receives 42.2 per cent of all gains, while the 0.5 per cent of taxpayers classified by average AGI receives 36.1 per cent of all (average) gains; for the top 2 per cent, the analogous figures are 56.5 and 49.4 per cent. Similar results are reported by Slemrod (1992), who uses panel data over 1979–85; for example, he finds that the top 1 per cent of taxpayers receive 51.8 per cent of capital gains when a single-year expanded measure of income is used, and that this figure drops to 43.7 per cent when a multi-year average approach is followed. Finally, Haliassos and Lyon (1993) examine a five-year panel data set on 11,452 taxpayers for 1985–89. Their data set differs from those used in the studies noted above in that it over-samples high-income individuals (based on 1985 income) and thus provides considerable detail on the taxpayers who are most likely to realize capital gains.[60] They show that on average over the five-year period a single-year 'snapshot' study indicates that taxpayers in the top 1 per cent income class received 66 per cent of all capital gains; their results thus suggest a higher degree of concentration than any of the studies described above. This fraction drops only modestly when the income classifier is changed to five-year average income, as the top percentile receives 58 per cent of gains reported over the five-year period. Similarly, the 'snapshot' estimate indicates that the top decile received 87 per cent of gains, while this figure drops to 82 per cent when five-year averages are used.[61]

Thus, all of these studies suggest that evaluating the distribution of gains on a multi-year basis does not change the basic conclusion that gains are on average highly concentrated. That is, while the use of a multi-year income classifier reduces the concentration of capital gains relative to an annual income classifier – with the share of those earning $200,000 or more falling by roughly 20 per cent in the case of the Auten and Cordes study – the income from realized capital gains remains quite concentrated even under the multi-year approach.

Nevertheless, it is undoubtedly true that the occurrence of a one-time gain inflates measured income for some individuals. For example, HL report that more than 40 per cent of those who realized gains in their sample had such gains in only one of the five years of the sample; unfortunately, they provide no information on the size of these one-time gains, other than to note that in the aggregate they comprised only 8 per cent of all net gains reported.[62] At the same time, however, only 2.5 per cent of taxpayers reported positive net gains in each of the five years, but they accounted for 42 per cent of all net gains.[63]

Other Measurement Issues

Several other issues related to the distribu-

tion of capital gains have been examined in this literature. Feenberg and Summers note that an alternative solution to the 'snapshot' problem is to use AGI less capital gains as the income classifier (Ross, 1989). However, they argue that this method is even more flawed than the single-year snapshot approach (which uses AGI including gains) since by ignoring all gains it seriously understates the income of the wealthy, especially at the very highest income levels. Returning to their 1986 single-year data set, Feenberg and Summers show – not surprisingly – that the use of such a classifier reduces the share of capital gains received by the top 0.5 per cent of the population to 24 per cent, and increases the share of the bottom 50 per cent to 41 per cent of all gains.

In addition, some opponents of capital gains tax cuts have argued that use of an AGI classifier may understate the concentration of capital gains – at least prior to 1986 in the US – because AGI is reduced by tax shelter losses. Feenberg and Summers test this contention by using an income classifier equal to positive income items less capital gains realizations (for purposes of comparison to the results with the AGI less capital gains classifier). This adjustment proves to be an important one, as it increases the share of the top 0.5 per cent of taxpayers from 24 to 41 per cent of all gains, and reduces the share of the bottom 50 per cent from 41 per cent to 10 per cent. (Note, however, that the use of positive income as a classifier – which simply neglects entirely all deductions for losses but includes all subsequent income – overstates the economic income of those investing in tax shelters.) Feenberg and Summers also support their contention that tax shelter losses play an important role in determining the true distribution of capital gains income by noting that capital gains and loss items are highly correlated and that fully 25 per cent of all capital gains were reported by individuals whose incomes were negative in the absence of reported gains. Indeed, they conclude that single-year/AGI-based measures of the distribution of capital gains are reasonably accurate, as the tendency to overstate the concentration of gains due to the inclusion of temporary gains in the AGI classifier is roughly offset by the tendency to understate the concentration of gains due to the disproportionate use of tax shelters by those realizing gains.

Another approach that is sometimes used to suggest that most capital gains accrue to the middle class is to use wage and salary income as a classifier (Walker, Bloomfield and Thorning, 1989). Such an approach is also clearly misleading in that it is likely to understate the economic well-being of taxpayers who are retirees or the owners of small businesses (who elect to draw small salaries) and thus have low annual labour income but significant levels of consumption and lifetime income. Feenberg and Summers investigate this issue by using wage and salary income as a classifier, while excluding such taxpayers from the sample by restricting it to taxpayers for whom wages and salaries represent at least 90 per cent of non-capital gains positive income. They show that capital gains are highly concentrated even for this group, as the top 0.5 (2) per cent receives 37 (56) per cent of all gains.

A Note on Distributional Analyses, Excess Burdens and the Realizations Elasticity

Finally, note that the above discussion has focused exclusively on the distribution of capital gains. However, the discussion of the efficiency costs of capital gains taxes in the previous section indicates that the distribution of such costs should be included in any distributional analysis of the effects of capital gains taxes; moreover, such efficiency costs will tend to be large if the elasticity of realizations with respect to the capital gains tax rate is large. Fairly little research has been conducted on this issue, although the models constructed by Hendershott, Toder and Won (1991; 1992) and by Haliassos and Lyon (1993) discussed above are promising examples. For example, Hendershott, Toder and Won (1992)

report that a cut in the maximum capital gains tax rate to 15 per cent in their simulation model increases the welfare level of all income groups if the realizations response is sufficiently high.[64]

In addition, the possibility that a capital gains tax cut might cause realizations to increase by enough that revenues would increase (or remain roughly constant) has some interesting distributional implications. Specifically, under such circumstances, it is quite possible that the taxes paid by the highest income groups would increase while those of all other income groups would fall or remain constant. For example, Auten and Cordes (1991) simulate the effects of a 30 per cent exclusion under the assumption that realizations increase by enough to hold revenue constant. They show that capital gains taxes paid by taxpayers with average adjusted gross income in excess of $200,000 increase by more than 16 per cent, while capital gains taxes paid by all other income groups decline by amounts varying from 5 to 30 per cent. Note, however, that the higher taxes paid by the wealthy do not indicate that their welfare has somehow declined as a result of the capital gains tax cut. Rather, since a tax cut clearly increases the welfare of the wealthy if they simply hold their level of realizations constant and pay the lower taxes associated with the lower capital gains tax rate, any increase in realizations occurs only if it further increases their welfare (Hoerner, 1992). Thus, under this scenario (with a relatively large realizations elasticity) the capital gains tax cut represents a 'Pareto-improving' reform, increasing or leaving constant the welfare levels of all individuals. Such a reform would generally be viewed as highly desirable, although (as noted above) this opinion is not unanimous. In any case, given the considerable uncertainty surrounding the degree of responsiveness of realizations to tax rate changes (explored at length above), it must be noted that it is far from clear whether the Pareto-improving scenario is indeed a realistic one.

V Conclusion

This review has focused on three economic aspects of the taxation of capital gains – the effects on realizations and revenues, on efficiency, and on the distribution of income. It suggests that considerable light has been shed on these issues over the years, and that recent contributions have been particularly useful in addressing and to some extent resolving issues raised by critiques of previous studies. Nevertheless, many directions for future research remain.

In particular, the debate concerning the responsiveness of capital gains realizations and revenues to tax rates is far from settled; moreover, there appears to be an increased realization that all of the empirical results in this area are quite tenuous, and that one should be exceedingly careful in attempting to draw policy implications from this literature. Future research in this area will presumably focus on (1) determining the robustness of recent findings regarding the relative importance of temporary and permanent tax changes and the lack of importance of individual-specific effects, (2) better identifying the dynamics of the realizations response, including both the role of expectations of future tax rates and the identification of short- and long-run responses to tax changes, (3) resolving a variety of econometric issues and improving the data used to estimate econometric models, and (4) incorporating the implications of theoretical models of realizations behaviour, including the tax avoidance literature, into empirical analyses of the relationship between capital gains realizations and revenues.

Research on the efficiency effects of capital gains taxation is still in its early stages, although some recent results have been quite provocative. Future efforts might focus on further investigation of the many different efficiency effects attributable to capital gains taxation and their various interactions; in particular, the sensitivity of existing results to alternative model speci-

fications – especially regarding the degree of openness of the economy and the role of the government in absorbing risk – and to alternative functional forms and parameter values should be explored.

Finally, recent research on the distributional effects of capital gains taxes has made a compelling case that capital gains in the US accrue primarily to the wealthy; in terms of dollars of taxable gains, capital gains are not a 'middle-class' phenomenon by any reasonable definition of the middle class. Nevertheless, further research on the distribution of the total capital gains tax burden (including both revenue costs and excess burden or efficiency costs) of both the existing system and proposed reforms would provide an essential input into discussions of the economic effects of capital gains taxes and the desirability of various reforms. In addition, a much clearer picture of the equity effects of capital gains taxes and proposed reforms could be obtained if data on gains on owner-occupied housing and on assets held in pension and retirement accounts could be included in analyses of the distributional effects of the taxation of capital gains.

Notes

* This paper draws heavily on an earlier, more detailed examination of these issues that appeared in Tax Law Review (Zodrow, 1993). My research on this issue has benefited greatly from extended discussions with Jerry Auten and from the comments of Alan Auerbach, David Bradford, Len Burman, Jane Gravelle, Daniel Halperin, Peter Mieszkowski, Jack Mintz, Bill Randolph, Eric Toder and the participants at the Symposium on the Lifetime Capital Gains Exemption, sponsored by the Institute for Policy Analysis, University of Toronto and the Canadian Department of Finance, January 27–28, 1994, in Toronto, and at the Tax Law Review Colloquium on Capital Gains, NYU School of Law, May 24, 1993, in New York. I would also like to thank two anonymous referees for their comments and Guillermo Rabiela for research assistance. Any remaining errors are my own.

1 See Richardson and Moore (1994) for a history of the taxation of capital gains in Canada, and Couzin (1994) for a discussion of capital gains tax policy alternatives.

2 Caution should of course be exercised in applying the results of empirical studies in the US to the Canadian tax context because – among other reasons – the treatment of assets generating capital gains (as well as other assets) differs across the two countries. See Arnold and Edgar (1994) for a comparative analysis of the treatment of capital gains across countries.

3 See Auerbach (1991) who proposes an innovative method of 'retrospective' capital gains taxation that would achieve the same effects as the 'ideal' income tax treatment – taxation of gains on an accrual basis – in a system that taxes gains only upon realization.

4 See Zodrow and McLure (1991) for a description of the treatment of capital gains under alternative forms of consumption-based taxation.

5 For a comprehensive examination of this issue, see Congressional Budget Office (1990b). Note that the absence of inflation indexing of capital gains in most countries provides a rationale for preferential treatment of such gains.

6 Auerbach (1989) discusses a number of such goals and alternative tax instruments that might be used to achieve them.

7 There are three distinct strands to this literature. The first is the 'tax avoidance' literature, which suggests that, if capital markets are perfect and transactions costs can be ignored, tax-minimizing individuals should pay little if any capital gains tax, and indeed – in the absence of loss limitations and other provisions designed to limit such avoidance – should be able to shelter all labour income from tax; see Constantinides (1983; 1984) and Stiglitz (1983). The second might be termed the 'limits to realizations responsiveness' literature due to Gravelle (1991) and Auerbach (1989), which draws out the implication of the fact that the long-run responsiveness of realizations to a capital gains tax cut is limited by the stock of accrued gains; these authors conclude that empirical estimates which suggest large long-run increases in realizations (especially those large enough to result in an increase in revenues) are theoretically implausible. Finally, some researchers have constructed theoretical models of the capital gains realization decision, including explicit analyses of the complicated dynamics of changes in realizations behaviour in response to tax changes. For example, Kiefer (1990) constructs a model in which there are 40 cohorts of investors who trade shares in order to rebalance their portfolios in an attempt to maximize lifetime wealth; investors sell stocks when the benefit of increased returns on an alternative asset exceed the cost imposed by the capital gains tax. His results suggest a complex time path of the realizations response to a capital gains tax cut, consisting

of three distinct phases: (1) a first-year jump in realizations when assets with large accrued gains are sold because they are subject to the largest reduction in trading costs; (2) an intermediate phase, lasting two to five years, during which realizations decline because the average gain, and thus the average reduction in trading costs, decline; and (3) a long phase, which lasts until about 20 years after enactment of the rate cut, during which realizations gradually increase as the market becomes dominated by investors who have been relatively active traders since the time of the tax cut, own shares with a low level of accrued gains on average, and thus tend to trade more both because their tax cost is relatively low and because the benefit of tax exemption at death is worth less than would be the case if average gains were higher. The increase in realizations induced by the tax cut is not sufficiently large to result in an increase in revenues in all but one of Kiefer's simulations. See also Burman and Randolph (1992), Auerbach (1992), and Haliassos and Lyon (1993), which is discussed below.

8 An elasticity is defined as the responsiveness of one variable to another, expressed in percentage terms. For example, a realizations elasticity of -0.5 with respect to the capital gains tax rate implies that a 1% increase in the rate will induce a reduction of 0.5% in the level of realizations.

9 Such a review is provided in Zodrow (1993); Auerbach (1988), Congressional Budget Office (1988) and Auten and Cordes (1991) also provide reviews of this literature.

10 These papers all analyse US data; for a discussion of the revenue implications of the taxation of capital gains in Canada, see Mintz and Wilson (1994).

11 'Time-series' studies use regression analysis to explain annual data on aggregate capital gains realizations as a function of some measure of the marginal tax rate on capital gains, after controlling for the effects of other explanatory variables also believed to affect realizations. In contrast, a 'cross-section' study examines a single year of data obtained from individual taxpayer returns and perhaps supplemented with data from other sources. A 'panel' study examines the behaviour of a fixed sample of individual taxpayers over several years; that is, the data consist of several consecutive cross-sections for the same group of taxpayers. By comparison, a 'pooled time-series cross-section' analysis also combines several years of cross-sectional data; however, no attempt is made to track the behaviour of individual taxpayers over time.

12 Indeed, one implication of the tax avoidance models noted above is that gains should seldom if ever be realized.

13 Mintz and Wilson (1994) examine this issue in the context of the lifetime capital gains exemption in Canada.

14 Most capital gains studies use a 'semi-log' regression equation in which the logarithm of realizations is related to the actual capital gains tax rate; in this formulation, the realizations elasticity increases with the level of the tax rate. In most cases, the discussion below follows Auten, Burman and Randolph (1989, Table 1, p. 355) in reporting elasticities at the weighted average capital gains tax rate in the US in 1987 of 25.4% as estimated by the Congressional Budget Office (1988). A few studies use a 'log-log' regression equation in which the tax rate is also specified in logarithmic form; in this formulation, the realizations elasticity is independent of the level of realizations.

15 For further details on time series studies, see Zodrow (1993), as well as Auerbach (1988), Auten, Burman and Randolph (1989), Congressional Budget Office (1988), and Gravelle (1990).

16 Gillingham and Greenlees argue that use of an 'instrumental variable' estimating technique is preferable to the use of the alternative 'ordinary least squares' approach; in contrast to U.S. Department of Treasury (1985) and CBO (1988), they find this change has significant effects on the regression coefficients. In addition, they use an instrumental variable based on the maximum statutory tax rate rather than the CBO weighted marginal tax rate variable; they argue that this is desirable because it eliminates endogeneity of the tax rate variable, although CBO (1988:102) stresses that this occurs only 'at the cost of suppressing relevant data on changes in tax rates faced by taxpayers below the highest income group'.

17 For example, Gravelle (1990), Auerbach (1988), and CBO (1988) provide examples in which heterogeneity bias leads to systematic overestimates of the effects of capital gains tax cuts on realizations.

18 The results presented by Feldstein, Slemrod and Yitzhaki also indicated that realizations behaviour differed considerably across taxpayers, as the realizations of their lower-income group (those with less than $3,000 in annual dividends) were not particularly sensitive to tax rates.

19 Auerbach (1988) suggests that the primary reason for such a difference is that the sample for the latter estimate – following Feldstein, Slemrod and Yitzhaki – includes individuals with net long-term losses; he argues that such an approach is likely to overstate significantly the revenue effects of capital gains tax cuts.

20 CBO (1988:106) shows that estimates of equations similar to Lindsey's except for the use of aggregate time-series data (not segregated by AGI class) result in much smaller tax rate coefficients. Accordingly, CBO argues that 'Lindsey's results reflect primarily the effects of differences in tax rates and realizations among groups of taxpayers instead of the effects of changes in tax rates over time'. See

also Slemrod (1989).

21 This result could be viewed as somewhat surprising, given the arguments presented by Gravelle (1990), Auerbach (1988), and CBO (1988), noted above, which suggest that ignoring individual-specific effects should result in a bias in the opposite direction.

22 In addition, their sample size is small by cross-section standards, it does not include many of the high income taxpayers that would be expected to have the biggest realizations responses and for whom individual-specific effects might be most important, and they are unable to successfully incorporate an expected future tax rate variable in their analysis.

23 Note that this 'simulation elasticity,' which reflects the reduction in realizations response as individuals move into higher tax brackets as they increase realizations, is considerably lower than the point estimate of the realizations elasticity implied by the regression equations in the ABR study (which is nearly -5); this point is also stressed by Gillingham, Greenlees and Zieschang (1990).

24 Broadly similar results are obtained in a pooled time-series cross-section analog to the ABR panel study performed by Gillingham et al. (1990).

25 The other variables in the equation defining the instrumental variable are the actual tax rate in the previous year and the other exogenous variables in the system; see Burman and Randolph (1994). It should be noted that their instrumental variable for the permanent tax rate is based on only tax rate information for the current and the previous years, and thus is subject to the criticism that data over a longer time span would yield a more accurate indicator of the permanent capital gains tax rate.

26 The other variables in the equation defining the instrumental variable are the maximum combined federal and state capital gains tax rate, the actual tax rate in the previous year and the other exogenous variables in the system; see Burman and Randolph (1994).

27 However, Burman and Randolph (1994) argue that the difference between the permanent and temporary elasticities is actually understated if this is the case.

28 At the same time, it should be noted that some of the differences in realizations estimates are easily reconciled. For example, some variation is explained by (1) differences in the dependent variable (e.g., corporate stock or all assets), (2) differences in the level of the tax rate at which the elasticity is reported, and (3) differences in the way in which the elasticity is calculated (as a point estimate or as the outcome of a simulation of a tax rate change of a given magnitude).

29 Additional opportunities for arbitrage are available if the tax system offers a rate preference for long-term over short-term gains; this issue does not arise under the Canadian tax system.

30 In general, the efficiency impact of any change in the taxation of capital income will depend on the treatment of existing assets. For a general discussion of the use of such 'grandfather rules' in reforms of capital income taxation, see Zodrow (1992).

31 See Boadway, Bruce and Mintz (1984) for an exposition of this argument. The empirical results presented by McKenzie and Thompson (1994) provide some support for the proposition that the lifetime capital gains exemption in Canada has some effect on asset prices (and thus would be expected to affect the level of investment).

32 For an excellent exposition of these arguments and other issues raised by the taxation of capital income in an open economy, see Slemrod (1988).

33 Note that a separate issue is whether capital gains taxation is desirable even if income taxation of capital income is deemed to be desirable. To the extent that changes in asset prices reflect retained earnings or changes in the present value of future earnings that have been or will be subject to income taxation under the corporate income tax, the capital gains tax results in double taxation of corporate earnings; see Gravelle and Lindsey (1988). Indeed, in the standard marginal effective tax rate approach to modelling the net effects of capital income taxation, the capital gains tax is treated as a double tax; see King and Fullerton (1984). This in turn raises a host of design issues as to how capital gains relief should be provided if the corporate and individual taxes are to be integrated; see U.S. Department of Treasury (1992).

34 See Sandmo (1974) and Auerbach (1979). For a general discussion of the conditions under which consumption taxation is efficient, see Zodrow (forthcoming). Davies and St-Hilaire (1987) and Diewert (1988) discuss the efficiency arguments for a consumption tax reform in Canada.

35 See Atkinson and Sandmo (1980) and King (1980).

36 For example, see Chamley (1985; 1986), Judd (1985) and the survey article by Stiglitz (1987).

37 Note, however, that the case for general consumption taxation becomes stronger when one considers the fact that most income taxes provide some assets – e.g., retirement saving, owner-occupied housing – with very generous treatment that is consistent with taxation on the basis of consumption rather than income. Full income taxation of some assets thus implies a large tax differential (and presumably correspondingly large efficiency losses) across fully taxed and untaxed assets. For example, see Feldstein (1985).

38 See Bernheim (1991) and the articles in Bernheim and Shoven (1991) for discussions of these issues.

39 In addition, Gordon and Varian show that large countries will wish to restrict domestic ownership

of foreign assets and to restrict net capital flows.

40 The former approach is associated with larger capital gains effects on saving investment, since the capital gains component of capital income taxation is much larger under the 'new' view which assumes that dividend taxes are irrelevant to investment decisions. For a discussion of theoretical and empirical analyses of these alternative views of dividend taxation, see Zodrow (1991).

41 This does not, however, imply that the effects of changes in saving behaviour on individual welfare will necessarily be less important in an open economy than in one that is assumed to be closed.

42 On the other hand, the somewhat more generous treatment of retirement savings in Canada than in the US suggests that a higher proportion of capital gains in Canada may be earned on assets that are in tax sheltered retirement savings accounts. For such assets, the tax treatment of capital gains is irrelevant, and capital gains tax changes would have a correspondingly smaller effect on saving in Canada than in the US.

43 Note that the studies of capital gains taxation described above model the effects of the exemption of gains transferred at death only indirectly (as a reduction in the effective annual accrual income tax rate applied to such gains). They are thus directly relevant to an analysis of the effects of the lifetime capital gains exemption only to the extent that such an assumption is appropriate – e.g., within the context of a model with fully informed and rational individuals maximizing utility over their life cycles. For an explicit analysis of the revenue effects of the lifetime capital gains exemption in Canada, see Mintz and Wilson (1994).

44 Note that the efficiency cost of the lock-in effect is thus not attributable to a misallocation of investment across firms, since the size of firms is independent of the identity of their investors; see Auerbach (1989).

45 See also Hendershott and Won (1991), Kovenock and Rothschild (1987) – who conclude that the efficiency losses attributable to reduced portfolio management due to the lock-in effect vary greatly depending on parameter values – and Auerbach (1992) – who constructs a more general model of the lock-in effect than that of Kovenock and Rothschild and concludes that its efficiency costs are fairly small.

46 The model thus assumes the validity of the 'traditional' view of the effects of dividend taxation.

47 This cost arises because investment in risky business capital increases relative to investment in less risky household capital, and because risk-bearing is allocated less efficiently among households as high bracket investors are induced by the capital gains tax preference to hold too large a share of risky assets and thus bear too great a share of the risk associated with uncertain returns to the capital stock. The HTW model is constructed to focus on the allocation of risk-bearing rather than the total amount of risk-taking. In particular, HTW do not assume that the government can assume risk costlessly; this issue is discussed further below.

48 These results are generally consistent with those presented by U.S. Department of Treasury (1985). This report includes a simulation of the effects of the 1978 capital gains tax cut in the US within the context of a general equilibrium model that includes 19 production sectors, and finds that inter-industry effects on capital allocation are fairly small.

49 Jog (1994) discusses the effects of the Canadian lifetime capital gains exemption on individual risk-taking.

50 In the simplest models of risk-taking – characterized by proportional accrual taxation, full loss offset, a zero return on the safe asset, and costless assumption of risk by the government – taxation increases risk-taking because government risk-sharing reduces the riskiness of the investment (measured, for example, by the variance of the expected return); the seminal article in this literature is Domar and Musgrave (1944). This is also true in the HL model, although the effect of taxation on risk-taking is theoretically ambiguous in such more complex models that are characterized by progressive rate structures, taxation on realization, loss limitations, and positive returns on the safe asset.

51 In the HL model, replacing the capital gains tax with a lump sum tax results in an increase in excess burden of 6% of revenues for the high income group and 3.1% of revenues for the low income group.

52 The analyses of Mintz (1981), Bulow and Summers (1984), and Galper, Lucke and Toder (1988) also assume that the government cannot absorb risk costlessly.

53 Note that the absence of inflation indexing and the existence of a progressive rate structure also imply overtaxation of capital gains, while the benefits of deferral and the exemption of gains transferred at death have the opposite effect.

54 Poterba (1989:378) estimates this fraction to be more than 80%. In addition, Poterba that a significant fraction of start-up enterprises rely heavily on debt.

55 See Walker, Bloomfield and Thorning (1989).

56 These papers all analyse US data; for an analysis of the distributional implications of the lifetime capital gains exemption in Canada, see Davies (1994).

57 For example, Auten and Cordes (1991) note that roughly 14 million households in the US report at least some capital gains in any single year, and

that roughly one-quarter of all taxpayers realize at least some gain during a typical five-year period.

58 Similarly, capital gains are more concentrated than other forms of capital income. The U.S. Department of the Treasury (1985) reports that in 1982 taxpayers with AGI between $100–200,000 received roughly 12% of dividends and capital gains but only 5.5% of taxable interest income; taxpayers in the $200–500,000 AGI range received 13.4% of capital gains but only 10.2% of dividends and 3% of taxable interest income, and taxpayers with AGI in excess of $500,000 received 27.3% of all capital gains, but only 11.6% of dividends and 2.4% of taxable interest income.

59 The studies discussed below examine panel data that cover periods of four to seven years; for general discussions of the desirability of taking a long-term perspective of tax burdens, see Davies, St-Hilaire and Whalley (1984) and Fullerton and Rogers (1993).

60 Haliassos and Lyon also use a relatively broad measure of income, including excluded gains and dividends (in 1985 and 1986) and various adjustments such as contributions to IRAs and Keogh saving plans and alimony paid. Note, however, that the use of data from the rather atypical year 1986 may distort their results.

61 Auten and Cordes (1991) report that households with annual income of $200,000 or more realize 56.6% of all gains, while households with a seven-year average income of $200,000 or more account for only 45.0% of all gains. However, as noted by Davies (1994), their results are not directly comparable to the studies cited above since they use a fixed income threshold expressed in dollar terms; as a result, the fraction of taxpayers in the top income group is smaller in their seven-year sample than in the case of their single-year analysis, which has the effect of reducing the share of capital gains reported in the income group.

62 Similar results are reported by Slemrod, Kalambokidis and Shobe (1989). In addition, the Joint Committee on Taxation (1990) reports that taxpayers with only a single realization in any given year typically receive about one-fifth of all gains realized in that year.

63 HL also investigate the age distribution of gains, showing that taxpayers age 60 and older accounted for 16.7% of all returns in 1985 but 39.4% of all gains over the five-year period; however, more than half of this population realized no gains during the five-year period.

64 This occurs for their 'high responsiveness' case, in which the realizations elasticity is -1.4.

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