DATA CHOICE IN CAPITAL GAINS REALISATION RESPONSE STUDIES - A REVIEW

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ABSTRACT

This paper reviews the literature, from the United States, on capital gains realisation response studies. The studies reviewed use the econometric technique of regression analysis to estimate the responsiveness of capital gains realisations to tax rates and this is reported as an elasticity point estimate. The literature review reveals that the use of cross-sectional tax return data for only one tax year is the least preferred of three data types considered. In concluding, the paper considers the implications of the reviewed literature for a forthcoming Australian study on capital gains realisation response.

I INTRODUCTION

The focus of this paper is the choice of three types of data for use in capital gains realisation response studies.[1] The paper refers to literature about studies completed to date, mostly undertaken in the United States of America (USA). Capital gains realisation response studies are concerned with how responsive realisations of capital gains are to a change in the tax rate applying to these gains. In the research to date, elasticity[2] has been the most common means of quantifying the realisations response. Typically, an elasticity point estimate measures the capital gains realisation response. Elasticity in the context of capital gains describes the percentage change in realisations divided by

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[1] Also referred to as elasticity studies
[2] The percentage change in one variable resulting from a one per cent change in another variable

the percentage change in the tax rate.[3] Elasticity is not necessarily constant at all levels of taxable income; generally, there would be a higher elasticity at higher tax rates.[4]

Typically, empirical studies of the capital gains realisation response use the statistical technique of regression analysis. This technique uses a regression equation where the equation estimates the mean value of a dependant variable in terms of the known values of the independent variables. In the capital gains realisation response studies completed to date, the dependent variable is usually a measure of capital gains realisations and the independent variables are measures of the marginal tax rate that applies to capital gains, as well as a number of other non-tax factors that are seen as influencing capital gains realisations.[5]

The three types of data approaches considered in this paper are cross-section, aggregate time series and panel data. A review of the literature indicates that while early research on capital gains realisation response used a cross-section approach, the problems inherent in this method are such that later research has tended not to use this method. The literature identifies a trend in the relative estimates of realisation responses given by two types of studies: generally, the estimates of elasticity are relatively small in time series studies whilst cross-section estimates are relatively large.[6] A United States Congressional revenue estimate prepared by the Joint Committee on Taxation (JCT) in 1990 argued that estimates of realisation elasticity from time series data better described how taxpayers responded to a permanent change in the tax rate.[7]

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[3] Jane G. Gravelle, *The Economic Effects of Taxing Capital Income*, 1st ed., (1994), 144.
[4] Ibid.
[5] George Zodrow, "Economic Analyses of Capital Gains Taxation: Realizations, Revenues, Efficiency and Equity" (1992-93) *Tax Law Review* 419-527, pp. 431-432.
[6] Leonard E. Burman, *The Labyrinth of Capital Gains Tax Policy: A Guide for the Perplexed*, (Washington, DC 1999), p. 62.
[7] Gerald Auten and Joseph Cordes, "Policy Watch: Cutting Capital Gains Taxes" (1991) 5 *The Journal of Economic Perspectives*, 185.

The United States Treasury, however, has argued that time series studies may underestimate realisations elasticity.[8]

The methodology used in econometric studies to estimate realisations response appears to have developed over time. The limitations of the studies per se include that some of the econometric analysis of capital gains realisation behaviour has weak theoretical economic foundations;[9] for example, there are few predictions provided in the theoretical literature about how and why capital gains are realised.[10] Furthermore, the type of data that is adequate for answering policy makers' questions can be difficult to determine.[11] In addition, there are various econometric problems that have been a limitation of some studies.[12]

The literature also reveals that capital gains realisations response studies have tended to produce a wide range of elasticity point estimates due to the model specification being sensitive to minor changes where these can lead to significant differences in results.

II REVIEW OF REALISATION RESPONSE STUDIES

This section considers the major elasticity studies that have taken place, primarily in the USA, over the last 40 years. The following section of the paper considers individually the three distinct groupings of type of study—cross-section, time series and panel data—undertaken in this period.

A *Cross-section Capital Gains Realisation Response Studies*

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[8] Ibid,186.
[9] Gerald Auten, Leonard Burman and William Randolph, "Estimation and Interpretation of Capital Gains Realization Behaviour: Evidence from Panel Data" (1989) 42 National Tax Journal 353-374.
[10] Zodrow, above, n 5, 433.
[11] G. Auten et al, above, n9.
[12] Ibid.

A cross-section capital gains elasticity study is limited to tax return data for a sample of taxpayers for a single year. The earliest econometric capital gains realisation response studies were based on cross-section analysis, with the first being the 1978 paper by Martin Feldstein and Shlomo Yitzhaki[13] followed by the 1980 paper by Martin Feldstein, Joel Slemrod and Shlomo Yitzhaki.[14] The other cross-sectional study reviewed in this paper is Minarik (1981).[15]

One of the advantages of cross section analysis is that the marginal tax rate variable can be calculated for specific individual taxpayers, which means that the tax rate is more accurate than for the time series approach.[16] In this sense, the cross-section method might provide a more accurate gauge of the revenue consequences at the individual taxpayer level, with these results aggregated to obtain the overall revenue response.[17] This is in contrast to the time series method where the marginal tax rate chosen is effectively an estimate derived from aggregate taxpayer data. Another advantage of a cross section study is in the number of observations available. Whereas time series studies by their nature have a small number of observations, cross section studies typically have a very large number of observations, given that individual tax returns are their main source of data.[18] Panel data studies have an even higher number of observations than cross section studies given that they use individual taxpayer data for several consecutive years.

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[13] Martin Feldstein and Shlomo Yitzhaki, "The Effects of the Capital Gains Tax on the Selling and Switching of Common Stock" *Journal of Public Economics* (1978) 17-36.

[14] Martin Feldstein, Joel Slemrod and Shlomo Yitzhaki, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains" (1980) 94 The Quarterly Journal of Economics 777-791.

[15] Joseph J. Minarik, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains: Comment" (1984) 99 The Quarterly Journal of Economics 93-110.

[16] Zodrow, above, n 5, 454.

[17] Ibid.

[18] Ibid.

Despite the apparent advantages, there are also several disadvantages associated with a cross-section approach. Cross-section studies have been unable to account for the dynamics of the capital gain realisations response.[19] Other more specific criticisms of cross section studies include firstly, that they fail to distinguish between transitory and permanent effects; secondly, that they include effects specific to individual taxpayers which are not considered as a separate effect and thirdly that they fail to include a measure of accrued unrealised capital gains.[20] Furthermore, there is a fourth problem of the need to separate the income and price effects as well as a fifth problem of a lack of information about the components of the model specification and a sixth problem of 'heterogeneity bias.' It is noted that some critics of cross-sectional studies have suggested that the problems inherent in these studies are such that the results do not adequately estimate the realisations response.[21]

The inability of cross section studies to separate temporary and permanent effects is due to there being only one tax rate per taxpayer. That is, because the studies only include taxpayer data for one year, the researcher cannot determine whether the marginal tax rate faced by the individual is unusually high or low for the year in question. Given the absence of this data, the only way to estimate the relationship of the tax rate to the taxpayer's tax rate in other years is to compare it with the tax rates of otherwise similar taxpayers in the same sample and year.[22] The results of cross-section studies can thus show a negative relationship between CGT rates and realisations even in instances where there is no permanent effect. Specifically, part of the realisation response captured in the results of cross-section studies may be due to timing effects

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[19] Auten et al, above, n9.

[20] Gravelle, above, n3, 147.

[21] Ibid

[22] Alan J. Auerbach and James Poterba, "Capital Gains Taxation in the United States: Realizations, Revenue, and Rhetoric" (1988) 1988 Brookings Papers on Economic Activity 595-637, p. 614.

pertaining to a taxpayer facing an atypically low marginal tax rate in that year rather than a measure of the, more important, long-run or permanent effect. On this basis alone, the cross section methodology is inferior compared to the alternative methodologies, both of which use more than one year of data.

Cross-section data studies may overstate the elasticity of capital gains realisations to the extent that they include transitory, individual-specific effects as part of the elasticity point estimate. The unreliability of cross-sectional studies is such that revenue-estimating agencies in the USA have chosen not to rely on the results of those cross section elasticity studies that reported very high elasticity estimates. The elasticity point estimates[23] in realisation response studies using cross-section data are likely to include a transitory response[24] given that a personal taxpayer's income can fluctuate over time. Taxpayers, especially those with high permanent incomes, have an incentive to realise capital gains in years when their marginal tax rate is unusually low. Cross-section data cannot determine the difference between a taxpayer's income in the year of the study and their 'permanent' income. Several years of data on the taxpayer's income is required in order to estimate permanent income.

The literature identifies a further problem associated with cross-section studies being the lack of accurate data on the explanatory (independent) variables in the equation. That is, where data from a source other than individual tax returns is used, it is often imputed from an aggregate source, which can lead to measurement errors, resulting in biased estimates of the coefficients in the regression equation.[25]

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[23] This term refers to the result of an elasticity study, the higher the number (in absolute terms) the higher the elasticity.
[24] Generally, the transitory response is considered by revenue estimators to be a distinct effect which should not be considered as part of the long-run revenue effects of a capital gains tax rate change.
[25] Zodrow, above, n 5, 458.

Furthermore, cross section studies suffer from the problem of 'heterogeneity bias' which describes the absence of a variable in the estimating equation to control for the investment preferences of individual taxpayer. The problem, more specifically, is that observed changes in the tax rate variable are not independent (or exogenous), but are rather dependent on (determined endogenously by) differences in individual behaviour reflecting differences in taxpayer investment preferences that are not captured by the explanatory variables in the equation.[26] The endogeneity of the explanatory variable is more problematic in cross-section studies, where much of the variation is due to circumstances of the individual taxpayer; this is in contrast with time series studies where the problem is not as apparent because the major source of variation is due to CGT rate changes.[27] The literature notes that because, in a cross-sectional study, the individual's tax rate is endogenous to their behaviour this endogeneity can result in a spurious correlation between tax rates and realisations.[28] One way of explaining this problem is that differences in taxpayers' investment preferences can simultaneously affect a taxpayer's tax rate and the amount of their capital gains realisations; thus the independent variable—the tax rate—is dependent on taxpayer behaviour.[29]

The remainder of this section considers the main capital gains realisations response studies that use a cross sectional data approach.

Feldstein and Yitzhaki (1978) is a US cross section elasticity study, focussed on the realisation response of corporate stock (shares), a specific type of capital gains asset. The analysis differentiates between two types of realisations – 'switch' sales, where the

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[26] Ibid, 456.

[27] Jane Gravelle, Capital Gains Tax Options: Behavioral Responses and Revenues, *CRS Report for Congress*, (Washington D.C. 2010), 13.

[28] William Bogart and William Gentry, "Capital Gains Taxes and Realizations: Evidence from Interstate Comparisons" (1995) The Review of Economics and Statistics, 77(2) 267-282.

[29] Jane Gravelle, "Can a Capital Gains Tax Cut Pay for Itself?" (1990) *Tax Notes*, 214.

proceeds are reinvested and net sales, where the proceeds are not reinvested.[30] The

cross-section data used in the study is from 1963 and high-income taxpayers were

deliberately oversampled.[31] The study finds that switch sellers are highly responsive to

the capital gains tax rate. The paper also includes simulations of alternative CGT

policies;[32] one of the findings here is that if capital gains were taxed at ordinary income

rates, rather than at the prevailing preferential rates in the year of the sample, there

would be a dramatic decrease in the volume of realisations.[33] In their conclusion, the

authors refer to the importance of considering the importance of incentive and

efficiency effects as well as equity criteria in a redesign of the CGT law.[34] The paper

appears to be making the case for taxation of capital gains at preferential rates as a way

of improving economic efficiency and incentives for investment.

In another US cross section elasticity study, with corporate stock as the capital gains

asset considered, Feldstein, Slemrod and Yitzhaki (1980), used taxpayer data used from

1973. The researchers imputed taxpayer wealth, given that the tax return data used

contained no information about the portfolio value of individual taxpayers.[35] The main

analysis of the study was limited to those taxpayers who had dividends of at least

US$3,000 in the sample year of 1973; based on a dividend yield of 3 per cent per annum

in that year, it was considered that these taxpayers owned shares and that their

portfolios were of at least $US100 000 in value.[36] Selecting the sample according to this

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[30] Feldstein and Yitzhaki, above, n 13, 18.
[31] Ibid, 21.
[32] Specifically, CGT rate changes or policies which are equivalent to a rate change.
[33] Ibid, 33.
[34] Ibid, 33-34.
[35] Feldstein et al, above, n 14.
[36] However, when Feldstein et al fitted regression equations for the entire population, they found that there was no tax rate effect.

criterion of a minimum amount of dividends appears problematic and the literature notes that there are many types of investments paying little or no dividends.[37]

One of the problems that researchers examining the capital gains realisation response face is deciding on an appropriate CGT rate; this may be a 'first dollar' or 'last dollar' CGT rate or some other type. In a CGT realisations response study, the first dollar CGT rate is the rate that applies to the first dollar of capital gains that the taxpayer realises. The advantage of the first dollar CGT rate is that it is exogenous (independent) to the taxpayer's decision on the amount of capital gain to realise.[38] In this sense, it can be seen as a measure of the decision to realise capital gains rather than the amount of capital gains to realise. The last dollar CGT rate is the rate applying had the taxpayer increased their actual realised capital gains by one dollar. Feldstein et al consider that it is more appropriate to use a last dollar CGT rate rather than a first dollar CGT rate. This is partly because, in the case of very wealthy taxpayers, there is the potential for substantial differentiation between the first dollar CGT rate and the tax rate at which marginal decisions concerning capital gains realisations are made.[39]

The Feldstein et al study found the realisations elasticity to be -3.75. This is in the upper range of reported elasticities relative to most other studies.[40] Notably, several commentators have disagreed with the high elasticity found in the study claiming that it is inconsistent with observation. The elasticity in Feldstein et al implies that if the CGT rate was cut by 10 per cent, realisations would increase by 37.5 per cent.

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[37] Eric Cook and John O'Hare, "Issues Relating to the Taxation of Capital Gains" (1987) 40(3) National Tax Journal 473-488, p.475.

[38] Feldstein et al, above, n14.

[39] Ibid.

[40] An example of an even higher elasticity is 5.84 as reported in: Joel Slemrod and William Shobe, The Tax Elasticity of Capital Gains Realizations: Evidence from a Panel of Taxpayers, *NBER Working Paper Series*, vol. Working Paper No. 3237, (Cambridge, MA 1990).

Because Feldstein et al uses cross-sectional data, the effect of a rate cut may be overstated to the extent that the elasticity point estimate includes a measurement of realisations that occur due to temporary differences in tax rates for individual taxpayers between different years, rather than permanent differences that are attributable to the change in the CGT rate itself. Since data for one year were used in the study, there is no way of ascertaining to what extent the elasticity point estimate was a measure of timing behaviour by individual taxpayers. In their discussion of the results, Feldstein et al recognised and referred to the potential for overstatement of the sensitivity of realisations, to a temporarily low tax rate. The literature also warns that cross-sectional studies may reveal more about timing strategies rather than the response to statutory changes in tax rates that are expected to be permanent or long-lasting.[41] Perhaps the main criticism of cross section studies is that the timing effects are incorrectly measured and reported as part of the elasticity point estimate. Ideally though, such an estimate should only pertain to the permanent effect.

According to Feldstein et al, older taxpayers are more likely to engage in net selling rather than switch selling.[42] Part of the rationale for this conclusion is that retirees are likely to have lower incomes and are therefore more likely to want to use rather than reinvest the proceeds of their net sales of shares.[43] Feldstein et al also note that the data used in the study did not allow them to distinguish between switch selling and net selling.[44]

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[41] Leonard E. Burman, *The Labyrinth of Capital Gains Tax Policy: A Guide for the Perplexed*, (Washington, DC 1999), 62.
[42] Feldstein, above, n 14, 782.
[43] Ibid, 783.
[44] Ibid, 782.

Two of the other variables identified in the study that are likely to have an effect on the taxpayer's decision to sell shares are the value of the taxpayer's share portfolio and their level of income. According to Feldstein et al, the probability of a taxpayer selling some of their share portfolio increases with portfolio size.[45] The authors note that the effect of the taxpayer's age on the realising of capital gains[46], although difficult to interpret, is not statistically significant when tax rate, income and portfolio size are taken into account.[47]

One of the limitations of the Feldstein et al study, identified by the authors, is the effect of the change in rules for assets transferred in the event of a taxpayer's death. Specifically, in 1973, the year of the study, the US tax law allowed for a full revaluation of these assets. In subsequent years, there was an amendment to the tax law to allow for only a step-up in basis[48] on the transferred asset. Feldstein et al acknowledge that the result of this change in tax law was a reduced advantage in holding rather than selling a CGT asset in the years subsequent to their study and that, consequently, investor behaviour may be less sensitive to tax rates as a result.[49] This would suggest that caution should be taken in how the elasticity point estimate in the study may apply to tax years after 1973, as it would appear that the elasticity might be lower in those later years because of the tax law change.

The literature identifies a number of shortcomings of the Feldstein et al study. These include its focus on high-income taxpayers and the finding of a very large realisation response, which does not reconcile with, what other researchers consider to be, the true

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[45] Ibid.
[46] As distinct from the selling of shares which may be at a loss.
[47] Feldstein, above, n 14, 786.
[48] This is effectively a tax law provision which allows for an adjustment of the cost base to market value.
[49] Feldstein et al, above, n 14.

realisation response at that time. The literature notes that a small increase in the CGT rate had not caused a large reduction in realisations, almost to the point of cessation, as the -3.75 realisation in the Feldstein et al study elasticity implies.[50] Feldstein et al note that although their regression analysis should ideally include an explanatory variable for accrued capital gains available for realisation, it does not as the information was not available.[51] Given the literature's recognition of the importance of this variable, however, it may have been better to use an imputed amount rather than exclude this variable.

A subsequent study by Minarik, from 1981,[52] although described as a comment on Feldstein et al, presents an alternative functional form using the same data as Feldstein et al, and a weighted rather than unweighted least squares regression technique. Minarik views the sensitivity of capital gains realisations to marginal tax rates as a vitally important subject.[53] After recapping the Feldstein et al methodology and findings, Minarik uses a series of steps to present and apply what he considers to be a superior methodology and in doing so he arrives at a significantly lower elasticity estimate. According to Minarik, the high elasticity found by Feldstein et al was due largely to an econometric error related to the weighting of the observations and a significantly lower elasticity could be found using similar data and a different weighting method.[54] Minarik argues that it is not appropriate for Feldstein et al to have used ordinary least squares to fit their equations, given that their sample is not stratified according to the independent variable in the regression.[55] Minarik notes that the combination of

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[50] Gravelle, above, n 3, 145.
[51] Feldstein et al, above, n 14, 788.
[52] Minarik, above, n 15.
[53] Ibid.
[54] Ibid.
[55] Ibid, 96.

Feldstein et al using unweighted ordinary least squares and their sampling technique resulted in an oversampling of individuals who realised large capital gains.[56] According to Minarik, because their sample is stratified according to the dependent variable, the use of weighted least squares is appropriate.[57]

Furthermore, Minarik does not agree with the use of unweighted summary statistics by Feldstein et al in calculating the elasticity, especially since Feldstein et al used their coefficients to simulate the revenue effects of a change in the CGT rate using a weighted data file.[58]

Minarik is critical of Feldstein et al using a positive age dummy variable and argues that the negative age dummy variable used in his own study is more appropriate. According to Minarik, the fact that capital gains escape tax at death is a more powerful effect than the need for access to cash, through capital gains realisations, amongst taxpayers aged 65 and over who hold at least $US100,000 or corporate shares.[59] That is, overall, taxpayers in this age group are less likely to realise capital gains than taxpayers in younger age groups. Minarik also notes that Feldstein et al do not include statistics on the goodness of fit of the main equation reported.[60]

It is noted that based on the elasticity point estimate of the Feldstein et al study, an increase in the CGT rate of 0.6 per cent from 20.6 to 21.2 per cent would cause the average shareholder with at least $US1.5million of shares to completely stop realising capital gains on those shares.[61] Furthermore, a 0.6 per cent rate cut from 20.6 to 20 per

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[56] Ibid.
[57] Ibid.
[58] Ibid, 95.
[59] Ibid.
[60] Minarik, above, n 15,94.
[61] Ibid, 95.

cent, the same taxpayer would double their realisations.[62] According to Minarik, both these scenarios are highly unlikely.

According to Minarik, the use of a last dollar tax rate by Feldstein et al is not appropriate given that it is relevant to the taxpayer's decision to realise additional gains[63] rather than a reflection of the gains that they actually realised.[64] That is, capital gains realisation response is concerned with the decision to realise capital gains per se and the decision on the amount of capital gains to realise is a separate question. It is Minarik's view that the use of an average tax rate for predicted gains would have been more appropriate. The literature notes that although Minarik's comment on the rate used in Feldstein et al highlights the difficulty of having to use a single tax rate in an elasticity study to represent an entire tax schedule, there is no theoretical justification for any one type of such a tax rate.[65]

Minarik is one of several researchers disputing the Feldstein et al finding on capital gains realisations being highly responsive to changes in tax rates.[66]After applying all of his suggested changes to the Feldstein et al equation, Minarik finds an elasticity of realisations of long term capital gains of -0.6; this implies a level of realisations response that is too low to cause an increase in CGT revenue overall. Minarik's study can be considered to have improved on the methodology used in Feldstein et al largely due to two reasons. Firstly, Minarik's sample was weighted to reflect the taxpayer population and secondly, because the equation included more of the non-tax variables thought to influence realisations than in Feldstein et al. Notwithstanding these

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[62] Ibid, 96.
[63] Over and above the amount actually realised.
[64] J.Minarik, above, n 15, 109.
[65] Auerbach and Poterba, above, n 22.
[66] See eg Auten and Cordes, above, n7, 184.

improvements, Minarik's study is still unable to differentiate between permanent and timing effects given that it used a cross section approach.

In a reply to Minarik's comment on their previous paper, Feldstein et al sought to justify the appropriateness of their higher elasticity estimate on the basis that higher-income taxpayers are more responsive to tax rate changes and the elasticity point estimate for this group is thus appropriate for evaluating tax rate changes that largely affect high-income taxpayers.[67]

B *Time Series Capital Gains Realisation Response Studies*

A realisation response study using a time series approach relates total capital gains realisations, on a year- by-year basis, over several years to the CGT rate in each particular year. Time series studies generally do not use individual tax return data, relying instead on aggregate tax return data.

In the US, time series studies have tended to produce elasticity point estimates that are lower than those for studies that use cross section data. The range of results from time series studies typically range from those estimates that are not statistically significant, to an elasticity of approximately 1, in absolute value.

One of the advantages of time series studies is that, unlike cross-section studies, they are based on responses to actual tax rate changes.[68] According to some of the literature, time series studies provide a better mechanism to identify behavioural responses resulting from tax changes than for micro-data.[69]

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[67] Feldstein et al, above, n14, 116.
[68] Alan J. Auerbach, "Capital gains taxation and tax reform." (1989) 42 National Tax Journal 391-401, p.392.
[69] Matthew Eichner and Todd Sinai, "Capital Gain Tax Realizations and Tax Rates: Evidence from Time Series", *National Tax Journal,* 53:3, September 2000, 665.

On the other hand, criticisms of aggregate time series studies include concerns about the limited number of observations and problems with the imperfect aggregation of tax rates.[70]

The literature notes that in the US, time series studies have guided the policy process[71] and this may be due to the lower elasticity estimates that they tend to produce. That is, from a policy perspective, in a deficit budget environment, it may be more prudent to underestimate revenue gains, resulting from a behavioural response, rather than to overestimate such revenue gains.

Policy makers should be cautious of basing tax policy prescriptions on any time series estimate from an individual study.[72] Although this does not suggest an average of elasticity point estimates, derived from several time series studies, can be a useful way of informing tax policy. This is because given the diversity of approaches used in each study an average is not meaningful. Furthermore, time series studies are highly sensitive to minor changes in specification and sample period.[73] The literature warns that because of this, revenue estimators must necessarily supplement any conflicting statistical from such studies with their own judgment as to how markets are likely to work.[74] Time series studies are also sensitive to the sample period and in some studies where data for an additional year was included there was a significant change to the elasticity point estimate.[75]

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[70] Gravelle, above, n 3, 147.
[71] Eichner and Sinai, above, n 69, 664.
[72] Zodrow, above, n 5, 452.
[73] Ibid, 453.
[74] Congress of the United States, Congressional Budget Office, *How Capital Gains Tax Rates Affect Revenues: The Historical Evidence,* 1988, 3.
[75] See eg Auerbach and Poterba, above, n 22.

Furthermore, because time series studies include a smaller number of observations than the studies using micro data,[76] there is a high dependency on factors other than tax rates that are hypothesised to influence realisations of capital gains.[77] The small number of observations in time series studies limits the number of variables that can be included in the equation which, in turn, leads to an incomplete representation of the dynamics of adjustment.[78] There is a view in the literature that, in many cases, where important variables are omitted from a time series study, the resulting tax rate variable will be too large and will thus overestimate the realisations response.[79]

Another problem that the literature identifies with time series studies is that of heterogeneity bias arising from the fact that aggregate data will not allow for the marginal CGT rate to vary according to the situation of individual taxpayers.[80] For example, taxpayers with net capital losses face a marginal CGT rate of zero, therefore the extent to which taxpayers, in aggregate, face a net capital loss position should be an influence on the marginal CGT rate chosen in a time series study.

According to some of the literature, time series studies cannot be relied on to produce a definitive elasticity estimate since the elasticity can be large or small according to how the estimating equation specification.[81] However, this view may apply whatever the data type used in a study. The United States Joint Committee on Taxation has previously stated that elasticity estimates derived from time series studies are the most

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[76] Usually individual tax returns
[77] Congress of the United States, above, n 74.
[78] Gravelle, above, n 27, 214.
[79] Ibid.
[80] Auerbach and Poterba, above, n 22, 613.
[81] Jonathan Jones, "An Analysis of Aggregate Time Series Capital Gains Equations" (1989) OTA Paper 65, Office of Tax Analysis, Washington D.C., 1.

appropriate for revenue estimating.[82] An alternate view in the literature is that because of the statistical uncertainty of time series estimates, it would be more prudent to use estimates from panel or cross section studies in combination with those from time series studies.[83]

The first of the time series papers considered here is Auerbach and Poterba (1988), it consists of a main paper by Auerbach and a separate comment and discussion section by Poterba (for simplicity, the paper is hereafter referred to as Auerbach and Poterba). The paper includes a brief commentary of the time series evidence available at that time. Auerbach and Poterba refer to the problem of how to model the effects of tax rates on realisations in order to permit a realistic characterisation of taxpayer behaviour.[84] They also note the 'nonstationary' nature of both capital gains realisations and the variables used to explain realisations;[85] it follows that, the estimating equation used must take into account the fact that these vary systematically with time. An important finding of the Auerbach and Poterba study is that when they correct time series equations for non-stationarity and correctly account for expectations of changes in tax rate, there is, essentially, no measurable response of capital gains realisations to changes in CGT rates.[86]

Although tax considerations are a strong influence on taxpayers' decisions on when to realise capital gains, it is the timing effect that is the most noticeable and there is a lack of convincing evidence of a strong permanent effect.[87]

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[82] Joint Committee on Taxation,"Explanation of Methodology Used to Estimate Proposals Affecting the Taxation of Income from Capital Gains", (Washington D.C. 1990) U.S. Government Printing Office.
[83] Jones, above, n 81, 20.
[84] Auerbach and Poterba, above, n 22, 603.
[85] Ibid, 603-604.
[86] Ibid.
[87] Ibid, 597.

Auerbach and Poterba demonstrate that, in time series studies, the responsiveness of capital gains realisations to tax rates decreases when expected tax rate changes are incorporated into the specification.[88] More specifically, when tax rate changes are controlled for, it is considered impossible to reject the hypothesis that in the long-run the tax rate has no effect on realisations.[89] Furthermore, the data in time series studies prefer equations based on the change in tax rates only, rather than on the level of tax rates, suggesting that time series studies may not be robust to minor specification changes.[90]

Eichner and Sinai is a 2000 aggregate time series study using aggregate tax return data from 1986 to 1997. The authors are of the view that time series studies are the best way to estimate long-run realisation elasticity[91] and they also note that time series studies have guided the policy process over the decade preceding their paper.[92] They refer to the sequence of previous tax changes as an influence on the level of accrued capital gains that taxpayers can realise.[93] Specifically, where previous tax changes encouraged realisations of capital gains, the stock of capital gains remaining in later years diminishes and fewer asset portfolios are in need of rebalancing.[94] Eichner and Sinai find a long-run realisation elasticity of between -0.8 and -1.3 and they note that this estimate is higher than many previous time series studies.[95] However, they also note that their estimate is sensitive to the inclusion of 1986, a year in which there was an extraordinarily high level of capital gains realisations due to the pre-announced increase to the CGT rate. Eichner and Sinai find that, by including a dummy variable for

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[88] Ibid, 632.
[89] Ibid, 632-633.
[90] Ibid, 633.
[91] Eichner and Sinai, above, n 69, 665.
[92] Ibid, 664.
[93] Ibid.
[94] Ibid, 674.
[95] Ibid, 664.

1986—effectively excluding that year from the regression—the elasticity point estimate is reduced to -0.45.[96]

The Eichner and Sinai study also examines the specific question of the revenue effects of the Taxpayer Relief Act of 1997 (TRA97), under which the top CGT rate was reduced from 28 to 20 per cent and the 15 per cent rate was reduced to 10 per cent. The study uses a range of elasticity estimates to examine revenue effects of the 1997 CGT rate reductions. Eichner and Sinai find that although there was an increase in realisations in 1997 compared to 1986, there was also a significant decrease in the average tax rate weighted by predicted 1996 realizations—from 23.4 per cent to 16.5 per cent.[97]The authors consider the offsetting effects of TRA97 leading to additional capital gains realisations and the decrease in revenue collected as a result of the CGT rate change and they conclude that the net revenue loss for 1997 was $US2.8 billion per year, approximately 5 per cent of 1996 CGT revenue.[98] Eichner and Sinai note the unusual realisation dynamics of the years around TRA86 resulting from the preannouncement of the higher CGT rates to take effect in 1987. Specifically, even though $165.5 billion of capital gains realisations in 1985 was a record at that time, taxpayers realised $317 billon of capital gains in 1986 in order to take advantage of the lower rate relative to the increased CGT rate to take effect in the following year.[99] According to the authors, there is evidence of some of these realisations in 1986 being a result of timing behaviour, which, of itself, confounds the measurement of estimated long-run elasticity. That is, the aggregate data gives the appearance of low-tax rate periods being associated with higher realisations and high-tax rate periods being associated with lower realisations,

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[96] Ibid.
[97] Ibid, 676.
[98] Ibid.
[99] Ibid, 668.

whereas the true situation is representative of a re-shuffling of the timing of capital gains realisations with no effect on the aggregate amount realised over the years concerned.[100]

Eichner and Sinai refer specifically to the issue of 'path dependence' which describes the dampening effect of previous CGT rate reductions on the future unlocking effects in subsequent years of additional rate reductions. It follows that if path dependence is not considered in an elasticity equation in a period in which there are several CGT rate cuts, the elasticity point estimate will be overstated for the later years of the study. By way of example, Eichner and Sinai explain that a CGT rate reduction in the US shortly after TRA86 may not generate the same realisation response as a comparable rate reduction in 1997 given the relative amounts of capital gains that taxpayers realised in the years preceding 1986 and 1997 respectively.[101]

Eichner and Sinai identify another factor, which in their view, caused a lowering of the sensitivity of capital gains realisations to the CGT rate over the period of their study, namely, the increase in the share of household equity held in managed funds.[102] It is their view that this is suggestive of mutual fund managers realising more gains than would individual taxpayers, which may lead to the conclusion that they are not as tax efficient as individual investors.[103] However, elsewhere in the literature, it is noted that mutual stock funds have higher turnover rates because of their professional management and lower brokerage fees. [104] Eichner and Sinai note that extending their sample causes the elasticity estimate to fall and that this is consistent with mutual funds

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[100] Ibid.
[101] Ibid, 665.
[102] Ibid, 664.
[103] Ibid.
[104] Gravelle, above, n 29, 215.

comprising only a small proportion (5.8 per cent) of equities between 1954 and 1985 and a larger proportion (22.8 per cent) of equities after 1985.[105]

In their conclusion, Eichner and Sinai note the sensitivity of their results to how 1986 is modelled and they identify a need for future research, which uses micro data, rather than time series data, in a structural framework.[106]

<p align="center">C Panel Data Capital Gains Realisation Response Studies</p>

Panel data studies use tax return data for a number of consecutive years. In these studies, the same taxpayers are tracked over the years of the study. That is, panel data studies do not use a different sample of taxpayers in each of the years of the study.

The literature considers panel data studies to constitute something of an improvement on cross-section studies insofar as they attempt address the problem of cross-section studies reporting of a transitory effect[107] rather than the effect of when the CGT rate is lowered permanently.[108] It is noted in the literature, however, that some of the earlier panel data studies that attempted to separate permanent and transitory effects were not completely successful in achieving this as the panels used were too short.[109] Some of the individual panel data studies are discussed below.

Auten and Clotfelter is a seven year panel data study (1967 to 1973) which used a random sample of individual taxpayers. In the introduction to their paper, Auten and Clotfelter refer to the Feldstein et al elasticity study, noting that the cross-section

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[105] Eichner and Sinai, above, n 69, 673.
[106] Eichner and Sinai, above, n 69, 678.
[107] Specific to the individual taxpayer's income being relatively lower in a particular year.
[108] Gravelle, above, n 29, 213.
[109] Ibid.

equation used in Feldstein et al did not distinguish between permanent and transitory effects, in part because cross section studies lack information on the variation in individual tax rates over time.[110] That is, although Feldstein et al recognise the problem of separating the two effects, the fact that they did not have information on the variation in individual tax rates over time prevented them from doing so. Auten and Clotfelter is notable in the sense that it is one the first studies to separately measure the permanent and temporary responses to changes in the tax rate. The permanent elasticity was found to be between -0.37 and -0.55.[111]

Auten and Clotfelter described the purpose of their paper as distinguishing between transitory and permanent tax effects using their panel data set.[112] The authors note that it is important to include both permanent and transitory components of income as explanatory variables in their equation as movements in transitory income can cause movements in marginal tax rates.[113] The Auten and Clotfelter study uses capital gains from all sources as its dependent variable; part of the rationale for using capital gains from all sources is that the data set did not contain information on the type of capital gains asset.[114] The explanatory variables in the study are permanent and transitory income, current capital income, age, retirement, marital status and the carryover of long-term capital losses.[115] The panel of tax returns used in the study included information on the exact age of taxpayers.

As part of their study, Auten and Clotfelter examined the extent to which marginal tax rates varied over time, given the importance of transitory effects and the timing of

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[110] Gerald E. Auten and Charles T. Clotfelter, "Permanent Versus Transitory Tax Effects and the Realization of Capital Gains" (1982) 97 The Quarterly Journal of Economics 613-632, 614.
[111] Ibid.
[112] Ibid.
[113] Ibid, 620.
[114] Ibid.
[115] Ibid.

realisations by taxpayers when their tax rate is temporarily low. Auten and Clotfelter use a basic income measure as a value in their study, a predicted Adjusted Gross Income (AGI), that is intended to be independent of the capital gains for an individual taxpayer.[116] The predicted Adjusted Gross Income is AGI minus capital gains plus the average capital gains of the taxpayer's income class. This predicted AGI is then used to calculate a measure of permanent income: the logarithm of the average value of the predicted AGI for the current and previous two years.[117] The Auten and Clotfelter study includes dummy variables for individual years for exogenous factors affecting capital gains realisations such as the change in share prices.[118] The 'Tobit'[119] method of estimation is used which is considered the most appropriate method given the discretionary nature of capital gains realisations.[120]

The Auten and Clotfelter study calculates the individual taxpayer's marginal tax rate as the total of their 'normal' marginal rate and a transitory component; the normal marginal rate is a simple three year average of the individual's tax rate and the transitory component is the difference between the taxpayer's tax rate in the year of income and their normal tax rate.[121]

One of the findings of the Auten and Clotfelter study is that the elasticity of capital gains realisations for all asset types is not as large as the elasticity of capital gains realisations from company shares, estimated in previous studies such as Feldstein et al.[122] The Auten and Clotfelter study also estimated a number of additional equations in order to

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[116] Ibid.
[117] Ibid.
[118] Ibid.
[119] Tobit describes a maximum likelihood method of estimation. Earlier studies such as Feldstein at al which used ordinary least squares (OLS) as an alternative method of estimation have been criticised as containing an econometric error, which is, in part, a comment on the use of OLS.
[120] Cook and O'Hare, above, n 37, 476.
[121] Auten and Clotfelter, above, n 110, 620.
[122] Ibid, 628.

examine the variation in responsiveness to marginal tax rates for different taxpayer groups. One of the findings here was that the transitory and permanent tax rate effects were larger for taxpayers under 65 than for the total sample.[123] The sample was also divided into two classes of taxpayer income – taxpayers with income[124] less than $US 25,000 and those with income more than $US 25,000. One of the findings here was that the transitory tax rate effect was slightly higher for the high-income group whereas the permanent tax rate effect was only significant for the low income group.[125] This result is considered somewhat unexpected and Auten and Clotfelter explain that it may reflect that there are few high income taxpayers included in their panel, which may in turn make the results for these taxpayers less reliable and more sensitive to extreme values.[126]

In their conclusions, Auten and Clotfelter identified some of the difficulties involved in undertaking empirical research on tax-induced behaviour. Firstly, there is the problem of attempting to calculate a correct marginal tax rate. In the United States context, such a calculation requires assumptions to be made about the order in which a taxpayer realises their short-term and long-term gains as well as the use of loss carryovers.[127] Auten and Clotfelter note that taxpayers may not be able to estimate the tax consequences of a particular transaction given the complexity of the capital gains tax law.[128] This point may have implications for this type of research generally to the extent that it is correct.

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[123] Ibid.
[124] Adjusted gross income less capital gains
[125] Auten and Clotfelter, above, n 110, 629.
[126] Ibid.
[127] Ibid.
[128] Ibid.

Auten and Clotfelter found that capital gains taxes cause a significant effect on the timing of realisations as reflected by the transitory effect that they estimated; they also concluded that it is likely there is a permanent lock-in effect of capital gains taxes, but that the coefficient is not always significant.[129] Auten and Clotfelter conclude that the absolute level of realisations increase with permanent income, but that the increase is not proportionate.[130] Auten and Clotfelter estimate short run elasticities for a range of specifications as well as a long run elasticity of -0.5.

One of the limitations of the Auten and Clotfelter study was that because it uses a three year average of federal tax rates, there is a correlation with the transitory component of the tax rate meaning that the permanent and transitory rates cannot be separately estimated since the three year average constitutes a combination of the two.[131] According to Auten and Clotfelter it is important to determine how much marginal tax rates vary over time given the importance of transitory effects.[132] Auten and Clotfelter find, in conclusion, that although CGT rate reductions may produce increases in realisations of long-term capital gains, their study does not provide strong support for the hypothesis that such rate reductions lead to increased revenue for the Treasury.[133]

Auten, Burman and Randolph (1989) is a five year panel data study. Auten et al refer to a number of advantages of panel data over cross-section data. One such example is that panel data allows the dynamics of the individual response to CGT rate changes to be estimated due to the availability of lagged data.[134] Another advantage of panel data is

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[129] Ibid, 627.
[130] Ibid, 621.
[131] Leonard E. Burman and William C. Randolph, "Measuring Permanent Responses to Capital-Gains Tax Changes in Panel Data" (1994) 84 *The American Economic Review*, 794-809.
[132] Auten and Clotfelter, above, n 110, 619.
[133] Auten and Clotfelter, above, n 110, 630.
[134] Auten et al, above, n 9.

that it provides information about permanent income of taxpayers and that it allows for corrections for individual-specific fixed effects.[135]

Auten et al consider taxpayer wealth to be an important component of a model that measures elasticity and they note that such information is not available from tax returns. The authors used the results of the '1981-82 US Treasury Estate-Income Tax Match Study' to impute the total wealth of the taxpayers in their sample since there was no direct information on taxpayer wealth available in the tax return data they used.[136] Auten et al include a number of demographic variables in their equation in an attempt to control for variances in trading strategies as a result of taxpayer preferences. They note that for wealthier taxpayers there is a decision of whether or not to realise capital gains which is distinct from the decision on the amount of capital gains to realise and that failure to model this distinction may have led to biased estimation results in some previous micro-data studies.[137]

Auten et al note that previous studies that used a fixed marginal tax rate may have overstated the response of taxpayers to changes in CGT rates. Furthermore, the authors note that focussing on individual capital gains realisation behaviour may ignore some important determinants of the aggregate revenue effects of CGT rate changes.[138]

Part of the purpose of the Auten et al study was to gain an understanding of why capital gains realisations equations from previous studies have yielded a wide range of varying results as well as the relevance of panel data to answering this question.[139] The results of the Auten et al study suggest that one of the main reasons for the past variance in

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[135] Ibid.
[136] Ibid.
[137] Ibid.
[138] Ibid.
[139] Ibid.

elasticities could be the simultaneity between marginal tax rates and capital gains

realisations and the failure of previous studies to correctly deal with bias in sample

selection.[140] Auten et al use a simulation method to examine the effect of changes in the

individual income tax on aggregate capital gains and tax revenue.[141] Jonathan Jones

confirmed the problem of simultaneity between realisations and tax rates in a 1989

study.[142]

Auten et al identify that using a lagged tax rate detected a short-term capital gains

realisation response that was significantly greater than the long-run response.[143] Auten

et al argue that data from a long panel are essential to completely unravelling the

components of capital gains realisation responses that are due to tax policy from the

component that is due to individual-specific factors.[144] They also note that the five year

panel used in their study is probably not long enough and that one of the problems this

poses is that it cannot identify the differential between capital gains tax rates and other

income.[145]

Auten et al also identify deficiencies associated with panel data per se that a longer

panel would not remedy, one such example is that focussing on individual capital gains

realisation behaviour may ignore some important determinants of the aggregate

revenue effects of capital gains tax changes.[146] This is notwithstanding another point

made by Auten et al that panel data has the advantage of a lack of aggregation bias.

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[140] Ibid.
[141] Ibid.
[142] Jones, above, n 81.
[143] Auten et al, above, n 9.
[144] Ibid.
[145] Ibid.
[146] Ibid.

In their discussion of the estimation results, Auten et al note that older taxpayers are more likely to realise capital gains than younger taxpayers, but that older taxpayers realise lower levels of capital gains.[147] They also note that taxpayers with higher permanent income are more likely to realise higher amounts of capital gains.[148] As part of their study, Auten et al use a simulation model they developed to examine the effects of changing the inclusion rate on long term capital gains could be examined. Their findings here were that where there was a small change in the inclusion rate, long-run elasticity was -1.63 and short-run elasticity was -1.98.[149] In the case of increasing the inclusion rate to 60 per cent, long-run elasticity was -1.67.[150]

In their conclusion Auten et al argue that there should be more research undertaken on the effects of CGT policies on growth and rates of return in financial markets and that predictions about revenue consequences of CGT are tenuous in the absence of an understanding of the effects of CGT on Gross National Product, interest rates, dividend payouts and asset values.[151]

Slemrod and Shobe (1990) is a six year panel data study . In their discussion of heterogeneity bias, the authors note that capital gains realisations behaviour is influenced by factors that are not observable by the econometrician and that unobservable explanatory variables can lead to inconsistent estimates of parameters.[152] Notwithstanding this, Slemrod and Shobe assert that where the unobserved influences are specific to the individual taxpayer, it may be possible to minimise or avoid

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[147] Ibid.
[148] Ibid, 363.
[149] Ibid, 366.
[150] Ibid.
[151] Ibid, 371.
[152] Joel Slemrod and William Shobe, The Tax Elasticity of Capital Gains Realizations: Evidence from a Panel of Taxpayers, *NBER Working Paper Series*, vol. Working Paper No. 3237, (Cambridge, MA 1990),9-10.

heterogeneity bias in panel data studies.[153] Slemrod and Shobe attempt to achieve this

by using a fixed-effects model to control for differences in permanent tax rates and

other unobservable fixed effects that may have an effect on parameter estimates.[154]

The panel used in Slemrod and Shobe was non-stratified and randomly selected. The

number of individual taxpayers who are present in all six years of the initial sample was

6,152. SS, however, limit their study to a 5 percent subsample of tax returns consisting

of 307 taxpayers. The 5 percent were selected based on their having the highest values

of real positive income, excluding capital gains, when averaged over the six year study

period.[155] The subsample of 307 taxpayers in Slemrod and Shobe realised 52 percent of

total net capital gains.[156]

The panel data is analysed in Slemrod and Shobe using a slightly modified version of the

model estimated in Feldstein et al (1980). The dependent variable in the study is the

long-term gains or losses divided by the sum of dividends and interest receipts.[157]

Although it is a panel data study, Slemrod and Shobe do not attempt to separately

identify the transitory and permanent responses. The study uses ordinary least squares

as the method of estimation for all four of their specifications.[158]

Slemrod and Shobe conclude that there is consistent support for an inverse response of

capital gains realisations to changes in their rate of taxation.[159] Although the elasticities

in Slemrod and Shobe are high, greater than -1 and greater than -5 in some cases, the

authors qualify their findings by reference to a standard error quantum whereby even

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[153] Ibid.

[154] Burman and Randolph, above, n 131, 800.

[155] Slemrod and Shobe, above, n 152, 13.

[156] Ibid.

[157] Ibid, 16.

[158] The specifications are: 1981-4 full sample and high income only and 1979-84 full sample and high income only.

[159] Slemrod and Shobe, above, n 152, 24.

in the case of an elasticity that is in excess of -1, the coefficient may not be statistically different from zero.[160] Some commentary since the Slemrod and Shobe study, refers to the fact that it appears it has captured transitory effects as one of its limitations as well as the fact that it uses the Feldstein et al (1980) methodology.[161] Slemrod and Shobe refer to some limitations, such as the fact that their study is restricted to higher income taxpayers and that elasticity studies generally are very sensitive to many dimensions of specifications.[162] It is also acknowledged by Slemrod and Shobe that their results may capture some transitory effects.

Burman and Randolph (1994) is a panel data study in which the equation models the long-run relationship between capital gains realisations and rates as well as two transitory or timing effects. One of these transitory effects considers the tax cost of realising a capital gain in the current year, compared to waiting to do so in a later year. The second transitory effect relates to the influence of prior year CGT rates on realisations. The rationale for the inclusion of this effect may be that past CGT rates can be an influence the stock of unrealised capital gains.

The Burman and Randolph study separated the transitory and permanent responses by using the variation in state tax rates to estimate the permanent elasticity; Burman and Randolph considered state tax rates to be an easily measurable exogenous source of variation.[163] The study found a very large transitory elasticity of -6.42 and a very small permanent elasticity of -0.18.[164] Although the transitory elasticity is a large in comparison with most other estimates that had been completed at the time of the study,

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[160] Ibid
[161] Gravelle, above, n 27, 14.
[162] Slemrod and Shobe, above, n 152, 24.
[163] Burman and Randolph, above, n 131.
[164] Ibid, 805.

it is consistent with the volume of the increase in realisations that occurred as a result of the Tax Reform Act of 1986.[165] Burman and Randolph note that given the relatively large standard error, the hypothesis that permanent changes in CGT rates have no long-term effect on capital gains realisations cannot be rejected.[166]

The data used in the Burman and Randolph study was taken from a panel of approximately 11,000 individual income tax returns for the years 1979-1983.[167] Generally, a panel study of five years is considered to be a short panel. The sample of taxpayers was stratified according to income and although unweighted data was used in the study, testing was conducted to ascertain whether endogenous stratification biased the estimates.[168]

Burman and Randolph's elasticity estimates imply that the permanent elasticity is significantly less than the transitory response.[169] Burman and Randolph use a lagged tax rate as a proxy for the unobservable size of accrued gains; Burman and Randolph note, by way of example, that if the previous year's CGT rate was unusually high, then accrued gains in the current year should be higher than usual as a proportion of realisations would have been postponed.[170] The sample includes the year 1981 in which the Economic Recovery Tax Act reduced the tax rates on ordinary income and capital gains.[171] Burman and Randolph identify an advantage and disadvantage of including this year. The advantage is that significant variation in tax rates is introduced into the

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[165] Ibid.
[166] Ibid.
[167] Ibid, 801.
[168] Ibid.
[169] Ibid, 795.
[170] Ibid, 797.
[171] Ibid.

study, whilst the disadvantage is that some of the response to the CGT rate reduction may have been transitory.[172]

Observations on individual taxpayers were included in the study whenever the current and lagged data were considered valid and this process yielded 42,406 included observations.[173] The dependent variable in the study was net long-term capital gains before the carryover of prior-year losses.[174] The tax rate measure used in the study was determined with reference to the taxpayer's income and deductions and the applicable tax law for the year concerned.[175] Burman and Randolph calculated the marginal tax rate on capital gains transactions using defined realisation transactions rather than a single dollar of capital gains. The capital gain on each defined transaction was the maximum of $1,000 or the square root of imputed wealth.[176] Burman and Randolph imputed permanent income by using the panel sample to regress the logarithm of a five year average of real positive income on taxpayer characteristics.[177]

Burman and Randolph note that previous micro-data studies lacked appropriate instruments for the permanent tax rate and that the estimates of tax effects in those studies could only be considered consistent if transitory and permanent responses were the same.[178] Burman and Randolph find that capital gains realisations are significantly positively related to permanent income, but negatively related to transitory income, which suggests a consumption motive for realisations.[179] It is also concluded that wealthier taxpayers are much more likely to realise capital gains and that this

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[172] Ibid.
[173] Ibid, 801.
[174] Ibid.
[175] Ibid.
[176] Ibid, 802.
[177] Ibid.
[178] Ibid, 798.
[179] Ibid, 806.

demographic realises larger capital gains than average.[180] The study found that the composition of capital gains assets was also an influence on whether taxpayers were more likely to realise gains; that is, where shares comprised a larger share of the overall asset portfolio, the taxpayer was more likely to realise capital gains.[181] Burman and Randolph estimated an elasticity of -0.18 at an 18 per cent CGT rate.

Burman and Randolph concluded that there is a large and statistically significant difference between the transitory and permanent responses to CGT rate changes.[182] Burman and Randolph used a first-dollar tax rate to estimate the transitory effect. BR also concluded that the lagged tax rate coefficient in their study is insignificantly small and that this implies that lagged taxed rates do not affect capital gains realisation decisions, provided current and permanent tax rates are held constant.[183]

Burman and Randolph identified a number of limitations of their study. Firstly, the effects of CGT on the cost and allocation of capital are ignored.[184] Secondly a reduced form model is used, as per other elasticity studies and this has the limitation of the estimated parameters being subject to change over time since they are a function of the macroeconomic environment and the tax law.[185] Secondary commentary on Burman and Randolph notes that there may be imprecision in the study caused by using the same set of explanatory variables in modelling the decision to realise capital gains as well as the amount of capital gains to be realised.[186]

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[180] Ibid.
[181] Ibid.
[182] Ibid.
[183] Ibid., 803.
[184] Ibid.
[185] Ibid.
[186] Tim Dowd, Robert McClelland and Athiphat Muthitacharoen, "New Evidence on the Tax Elasticity of Capital Gains", Joint Working Paper of the Staff of the Joint Committee on Taxation and the Congressional Budget Office, June 2012.

Auerbach and Siegel (2000) is a panel data study that uses the same empirical model as Burman and Randolph (1994), applying it to a different panel of taxpayers over the years 1985 to 1994, a different time period. For their main equation, Auerbach and Siegel find a long-run elasticity of -0.34 and a transitory elasticity of -4.91;[187] however their study does not report the marginal tax rate used in determining the elasticities. Auerbach and Siegel refer to the an improved precision of their elasticity estimate compared to some earlier studies (such as Burman and Randolph) due to the large sample size and the improved spread of state tax rates over the sample period.[188] Auerbach and Siegel note that they are able to reject an elasticity of zero with a high confidence level, but that they can also exclude much above -0.5.[189]

Auerbach and Siegel also run an alternative specification under which the elasticity estimate increases from -0.34 to -1.75. This is considered to be a high elasticity estimate and its magnitude is similar to some of the panel and cross section studies of the 1980s. The higher elasticity may have been caused in part by the inclusion of a current first dollar tax rate, which is likely to add a transitory element to the measurement of the permanent tax rate.[190]

III CONCLUSIONS ON THE REVIEW OF CAPITAL GAINS REALISATION RESPONSE STUDIES AND IMPLICATIONS FOR FUTURE AUSTRALIAN RESEARCH

The review of the literature has revealed that, despite the known problems associated with econometric capital gains realisations response studies, these still appear to be the most accepted form for examining the elasticity of capital gains. The main related

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[187] Alan Auerbach and Jonathan M. Siegel, "Capital-Gains Realizations of the Rich and Sophisticated" (2000) 90 *The American Economic Review 276*-282, 279.
[188] Ibid.
[189] Ibid.
[190] Gravelle, above, n 27, 16.

question that such studies can be useful for is that of the revenue effects associated with a change in the CGT rate.

The literature review has also revealed the lack of any publicly available empirical study on the elasticity of capital gains in Australia. Surprisingly, the tax policy question of the revenue effects of the 50 per cent CGT discount has received very little attention from policy makers in Australia. It would appear that policy makers deferred to an optimistic view of the revenue effects of an effective reduction in the CGT rate at the time that the 50 per cent CGT discount was being considered. Although revenue effects are not the only consideration in CGT policy, policy makers did refer to these effects and there was a view expressed by some Members of Parliament, at the time that the 50 per cent CGT discount would cause an increase in capital gains realisations and, consequently, in revenue collected.

If capital gains realisations are not very responsive to a reduction in the CGT rate, the government will forgo large amounts of CGT revenue unnecessarily. This point is highly relevant to the Australian context, notwithstanding the fact that the literature is critical of the policy for a number of tax policy reasons other than revenue considerations.

Although capital gains realisation response studies from the US have produced elasticity point estimates that vary widely, it appears that time series studies have tended to produce lower estimates of elasticity overall as well as estimates that are less variable and might therefore be considered more reliable. Some of the literature considers that time series studies are the best method of estimating long-run elasticity, despite the

known problem of aggregation bias.[191] The Congressional Budget Office considered the specific issue of aggregation bias in a 1988 study, which included separate estimates for the top one per cent and bottom 99 per cent of the population; the CBO found the effect of aggregation to be statistically insignificant.[192] Although aggregation bias is not a characteristic of studies that use micro-data, these types of studies have their own shortcomings and this is particularly the case with cross section studies. That is, where the data used does not allow the identification of, separate, timing effects they may result in an overstated elasticity estimate.

It is evident from the review of the literature that the elasticity point estimate is sensitive to the specifications of the equation. Some of the elasticity studies reviewed included a sensitivity analysis as a way of testing the robustness of the results. The literature on capital gains realisations response studies also refers to the problem of choosing an appropriate tax rate to use in time series studies. The choice can be seen as something of a compromise given that, although a single tax rate must be decided on for the purpose of these studies, in practice, realisations decisions are made by many personal taxpayers who collectively face a wide range of tax rates on their capital gains realisations. Furthermore, the literature explains that elasticity will not necessarily be constant at all marginal tax rates.

Based on the literature review in this paper, it is considered that cross section data is not preferred. Although the literature review indicates that there are several advantages of panel data, a panel of Australian individual tax return data is not readily

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[191] Eichner and Sinai, above, n 69, 665.
[192] Gravelle, above, n 29, 214.

available to tax researchers and this effectively precludes the use of this data approach.

It follows that time series may be the best data type for any future research on the

capital gains realisations response in Australia.