The effect of rate preferences on capital gains realisations –Evidence from time series data

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Abstract

This paper reports upon the initial empirical results of a time series capital gains realisation response study. The principal motivation for the study is to address the largely unresolved tax policy question of how responsive capital gains realisations are to capital gains tax (CGT) rate changes. One of the applications of realisation response results is to estimate the revenue effects of CGT rate changes. The CGT rate change considered in this study is the effective halving of the CGT rate by way of the introduction of the 50 per cent CGT discount for individuals in Australia in the 1999-2000 fiscal year.

Prima facie, reducing CGT rates (by, for example, excluding 50 per cent of the gain from taxation) leads to a loss of tax revenue for the government. However, proponents of CGT rate cuts have argued that this 'first round effect' on government revenue is more than compensated for by second round or dynamic behavioural effects. Capital gains realisations, it is argued, are likely to increase because of the lower tax rates and as a result overall government revenue is likely to be enhanced. However, there is considerable debate about the level of responsiveness engendered by such rate cuts. To date, there has been an absence of empirical evidence outside of the United States to support or refute the arguments of either side.

This study uses aggregate time series taxpayer data from Taxation Statistics in Australia for the years 1988-89 to 2012-13, together with a regression analysis based upon a series of variables, to establish taxpayer responsiveness to the effective cut in the CGT rate in 1999-2000. The initial results of the study indicate that capital gain realisations are relatively unresponsive to changes in the tax rate, suggesting that assertions at the time of the introduction of the CGT discount that the policy change could enhance tax revenue collections may have been inaccurate and overstated. Indeed, there may have been a substantial revenue loss to the fisc rather than any form of revenue gain.

1. Introduction

The definition of capital gains and losses and their treatment for tax purposes are two of the most controversial policy issues that every income tax system faces (Avi-Yonah, Sartori and Marian, 2011). An equally controversial issue, which has received surprisingly little attention outside of the United States (US), is the responsiveness of capital gains asset realisations to changes in the rate of taxation. Whilst it is accepted that raising revenue may not be one of the main purposes of a capital gains tax (CGT), and that in any case revenues from CGT regimes tend to be somewhat volatile and unpredictable, all governments nonetheless need to be mindful of the revenue implications that can eventuate when CGT rates are changed, particularly in times of economic austerity (Evans, 2002).

This paper reports upon the initial empirical results of an Australian time series capital gains realisation response study, utilising data from the 1988-89 to 2012-13 fiscal years, designed to address the largely unresolved and highly controversial tax policy question of how responsive capital gains realisations are to CGT rate changes. Although it focuses on one major CGT rate change that took place in Australia in 1999 (effectively a halving of the marginal rates at which personal taxpayers are taxed by the exclusion from the tax base of 50 per cent of the capital gains realised by such taxpayers), its outcomes may have policy relevance for all jurisdictions which tax capital gains, and particularly those considering changes in the rates at which those gains are taxed, as well as for those jurisdictions that may be considering the introduction of a CGT regime.[1]

Prior to 1985 capital gains largely escaped taxation in Australia. In that year legislation was enacted which ensured that the net capital gains made from the disposition of assets, or from various capital receipts related to assets, were included in the taxable income base, and, for individuals, were charged to tax at their marginal income tax rates (which could be up to 47 per cent). In 1999 Australia moved away from this relatively 'pure' comprehensive income tax model and introduced a CGT 'discount', whereby 50 per cent of the capital gains realised by most individuals (and certain other entities) is excluded from the taxable income base, with the resultant net capital gains then taxable at marginal income tax rates.

It is the implications for asset realisations (and therefore government revenue) of this major rate change in 1999 that is the focus of the analysis in this paper.

Australia, like most other countries with CGT regimes, taxes capital gains on a realisation basis, as opposed to an accruals basis (which is recognised as theoretically the more pure but practically the more difficult basis of taxing capital gains). However, adoption of a realisation basis leads to a number of problems. For example, Holt and Sheldon (1962) identify a 'lock-in' effect associated with the realisation basis of CGT. Auerbach (1991) explains lock-in as an effect that causes investors to accept a lower pre-tax rate of return than they would for new investments; at the individual taxpayer level, the result of the lock-in effect can be inefficient

[1] In a 2014 review of CGT around the world, it was suggested that 167 different countries had a CGT regime in operation whilst 52 either had no CGT regime, or relevant information could not be established (Cooper and Evans, 2014, p. 11).

portfolio selection. Niemann and Sureth (2013) investigate whether capital gains taxation influences immediate and delayed investments asymmetrically, given the optimal abandonment decision. Their findings in relation to the lock-in effect of capital gains taxation suggest that tax legislators should not use capital gains taxation as a short-term tax policy instrument to influence investors' timing decisions.

The existence of the problem of lock-in, together with other realisation-related problems, such as the 'bunching' of capital gains in one year and the taxing of inflationary gains, have led to the inclusion of various preferences or concessions in the design of many CGT regimes. Such preferences include lower rates for taxing capital gains.

According to Feldstein, Slemrod and Yitzhaki (1980) a reduction in the CGT rate can lead to an increase in revenue collected by the government. Notwithstanding that lock-in is not a severe problem for investors who own a diverse portfolio of assets (Burman, 1999, p. 70) some commentators have suggested that a lowering of CGT rates may result in a proportion of accrued capital gains, subject to the lock-in effect, being 'unlocked'. To date there has been scant empirical evidence of a reduction in CGT rates causing an increase in CGT revenue. Instead, the prevailing view in the tax literature – as confirmed by Auerbach (1988), Zodrow (1993) and Burman (1999) – is that reductions in the CGT rate almost certainly lead to decreases in revenue collected. Furthermore, some studies have found that the effect of CGT rate changes on capital gains realisations is statistically insignificant in some specifications (Auerbach, 1988).

Surprisingly, there has been very little research completed outside of the US to date on the realisation response of capital gains. The principal motivation for this paper, therefore, is the relative lack of such analysis outside the US, and the paper seeks to address this shortcoming with an empirical study based upon Australian data that may have application elsewhere. There are now several years of Australian tax return data, for years following the introduction of the CGT discount, which may provide evidence on the realisations response. We use a regression analysis to determine whether the claims that a reduction in the CGT rate can lead to an increase in realisations, and, in turn, an increase in tax revenue collected, can be substantiated.

The remainder of the paper is organised as follows: Section 2 outlines the context and literature, providing further details about the Australian CGT and the 50 per cent discount, and discussing the extant literature relating to the impact of CGT rate changes on asset realisations and consequent revenue effects. Section 3 provides details of the current research design, including model specification. Section 4 reports the results of the time series regression analysis, and Section 5 provides results of alternative analyses designed to establish the robustness of the initial results. Finally, Section 6 contains conclusions, as well as identifying limitations that may be inherent in the study and its model design, and also opportunities for further research.

2. Context and Literature

2.1. The taxation of capital gains and the CGT discount in Australia

In Australia, the CGT is not a separate tax.[2] Net capital gains are subject to tax and these are aggregated with the taxpayer's other assessable income and charged to income tax. Capital losses can only be offset against capital gains, not against ordinary income. When taxpayers are unable to utilise their capital losses in a particular income year, the losses are carried forward to future income years in which the taxpayer has capital gains.

From September 1985 until the introduction of the 50 per cent CGT discount regime on 21 September 1999, an indexation system allowed for an inflation adjustment to the cost base of the CGT asset.[3] The capital gains of personal taxpayers were then taxed at the taxpayer's marginal income tax rate. Since 21 September 1999, the 50 per cent CGT discount has potentially applied to capital gains where the personal taxpayer has held the asset subject to the CGT event for at least 12 months.[4]

The 50 per cent CGT discount was introduced in September 1999 on the recommendation of the 'Ralph Review' (Australian Treasury, 1999). Under this tax policy change capital gains, which were previously taxed at the individual's marginal tax rates, were effectively subject to tax at only half those marginal rates. This was achieved by including only 50 per cent of the gain on assets held for 12 months or more in assessable income. *Taxation Statistics*[5] indicates that most capital gains realised by individuals — since the introduction of the CGT discount — are discount capital gains (Australian Taxation Office, 2014).[6]

The report prepared by the Ralph Review predicted — apparently in the absence of sound empirical evidence — that the long-run elasticity of capital gains would be at a magnitude that would more than compensate for the static revenue loss from the 50 per cent CGT discount in each of the years 2000-01 to 2004-05 (Australian Treasury, 1999, p. 732). The Ralph Review's revenue projections predicted an overall revenue gain and they assumed a long-run elasticity of -0.9; however, expert testimony heard by a Senate Committee in 1999 warned that the capital gains realisations response was likely to be less than this (Senate Finances and Public Administration References Committee, 1999, pp. 28-29).[7]

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[2] Australia has never taxed capital gains under a separate schedule.
[3] Cost base is an Australian term for what is referred to as 'basis' or 'cost' in some other tax jurisdictions.
[4] *Income Tax Assessment Act 1997* (Cth) Div 115. Where a capital gain is calculated using the discount method, indexation does not apply.
[5] An annual publication of the Australian Taxation Office.
[6] That is, gains eligible for the 50 per cent CGT discount. In the 2011-12 tax year (year ended 30 June 2012), approximately AUD7.7 billion in net taxable discount capital gains were realised by individuals, out of approximately AUD8.2 billion in total taxable net capital gains. (In 2011-12 one Australian dollar (AUD) was roughly equivalent to one US dollar (USD).) Hence for individual taxpayers, the discount capital gains realised in 2011-12 represent approximately 94 per cent of total capital gains: 'Individual tax: selected items, for income years 1978-79 – 2011-12' *Taxation Statistics 2011-12,* (Australian Taxation Office, 2014).
[7] Presented by Alan Auerbach and Jane Gravelle.

Although it may have been very difficult to predict with certainty the revenue effects arising as a result of the introduction of the 50 per cent CGT discount, it is surprising that policy makers enacted a CGT rate cut of such a large magnitude as the discount without sound empirical evidence to justify the policy shift. Given the uncertainty about the capital gains realisations response in Australia, it may have been more prudent to protect the fisc from the potential for several billion dollars of static losses from the introduction of the 50 per cent CGT discount.[8]

2.2. Literature review

2.2.1. The debate on CGT rate preferences

Generally, tax reform in Australia has been undertaken with regard to the traditional criteria of a good tax system, namely efficiency, horizontal and vertical equity, simplicity, and fiscal adequacy. Mirrlees et al. (2010) note that although it is usually not possible for each specific aspect of tax reform to meet all of these criteria, the tax system as a whole should ideally possess all these characteristics to some degree. It is considered that there is something of a trade-off between the individual traditional tax system criteria and the choice of which of these criteria a specific tax reform should focus on, which may reflect the priorities of the government of the day. The criteria of equity, efficiency and simplicity could be better achieved than they are in the current Australian regime (Evans, 2000; Cooper and Evans, 2014).

According to Kesselman (2005) taxing capital gains preferentially (by, for example, introducing a 50 per cent CGT discount as in Australia in 1999) may represent a compromise between creating incentives for saving and entrepreneurship against forgone tax revenue. However, a large preference for capital gains may have a slightly depressing effect on the economy and is likely to have no positive effect on saving or investment (Burman, 1999, p. 81). The literature disputes the claim that a CGT preference stimulates economic growth as a stand-alone argument. For example, the claim is disputed on the grounds that in order to be correct, the preference must increase domestic investment and its ability to achieve this is largely dependent on whether the preference is self-financing through increased realisations (Cunningham and Schenk, 1992-93). If the capital gains realisations response is overestimated, this will lead to a reduction in national saving through an increase in the budget deficit and, consequently, a slowing of economic growth (Gravelle, 1990). Concerns about the negative effects on saving and investment from taxing capital gains at ordinary income rates may be overstated (Burman, 2009). A better solution than capital gain preferences is an overall lowering of tax rates (Burman, 2009).

[8] The Review of Business Taxation estimated that the static revenue loss as a result of the introduction of the 50 per cent CGT discount would be AUD570 million in 2000-01, rising to AUD1.18 billion in 2004-05 (Australian Treasury, 1999). Since then the figure has steadily increased. For example, it is estimated that the CGT discount will cost more than AUD5.4 billion in 2014-15. See Australian Treasury, *Tax Expenditures Statement,* Canberra (2013), as updated by the Mid Year Economic and Fiscal Outlook, December 2014, http://www.budget.gov.au/2014-15/content/myefo/html/06_attachment_c.htm, accessed 4 January 2015.

A CGT preference is only justifiable if one is of the view that the tax system improperly discriminates against certain investment types or that encouragement in particular types of investments is desirable (Halperin, 1992-93). Preferential tax treatment should not be extended to all items that meet the definition of a capital gain, as this may include items for which there is no case for special treatment (Halperin, 1992-93).

An argument sometimes made in favour of a CGT rate preference is that it can operate as a proxy for an inflation adjustment to the cost base of an asset. However, a rate preference does not approximate the required inflation adjustment in most cases and therefore, due to its imprecision, it is not the best method for dealing with inflation. Furthermore, deductible interest expenses invariably include an inflation component and the deductible amount of interest expenses should arguably be reduced in the event that an inflation adjustment is made for the amount of capital gains subject to tax.[9] In the case of assets held for a long time, inflation is often not a problem since it becomes a smaller percentage of the nominal gain over time and it can be offset by the benefits of deferral accruing to the taxpayer (Halperin, 1992-93). A preferential CGT rate cannot be justified on the grounds of high inflation, given that, in such a scenario, where an asset is financed by debt there is a countervailing inflation gain accruing to the taxpayer (Brannon, 1986). A system of indexation of cost base, similar to that used in Australia before the introduction of the 50 per cent CGT discount, is a superior alternative to a CGT rate preference (Auerbach, 1989, p. 398). Furthermore, keeping the CGT rate the same as the tax rate on ordinary income reduces the incentive for arbitrary conversion of income to capital gains, whilst the indexation ensures that inflationary gains are not taxed (Auerbach, 1989).

An argument against preferential CGT rates relates to the benefits of deferral. Specifically, there are some asset types that pay out most or all of their return in the form of income, such as rent or dividends, whereas for other types of assets the income returns are low or nil and the return is instead accrued in the form of a capital gain (Burman, 1989). For the latter type of assets in particular, deferral reduces the effective tax rate, since the money that otherwise would have been used to pay tax continues to earn returns until tax is paid. Thus, the benefit of deferral compounds over the time that such an asset is held (Burman, 1989).

The Australian CGT discount is a generous tax preference and it would be incorrect to view it as simply a replacement for the adjustment to cost base for inflation that occurred under the indexation method. This is notwithstanding that many OECD countries offer some type of CGT rate preference (OECD, 2006). There has been an absence of a coherent tax policy reason outlined in association with the introduction of the CGT discount in Australia. Furthermore, there has been no compelling case made for why the CGT discount should be a permanent feature of the Australian tax system.

2.2.2. Methodology issues on econometric approach

One of the issues in reducing the rate of CGT is determining how responsive capital gains realisations are to rate reductions. Research into realisations response, primarily focused upon

[9] Notwithstanding that not all capital gains asset purchases are subject to interest payments.

the US, has generally used an econometric approach to estimate the elasticity of capital gains realisations.

The term elasticity refers to the responsiveness of the realisations of capital gains to a change in the CGT rate.[10] The realisations response of capital gains is very important on political, economic and fiscal grounds (Cunningham and Schenk, 1992-93). If capital gains realisations are found to be highly elastic in the long run—defined by Gravelle (2010) as a period of time in excess of one or two years—there may be some justification for taxing capital gains at rates preferential to those applying to ordinary income.[11] In theory, a high capital gains realisation response may allow a reduction of the CGT rate at no cost to the fisc. The capital gains realisation response is an important area of CGT policy because taxpayers have a large degree of discretion on whether and when to realise a capital gain.

The earliest empirical studies on realisation response used a cross section of tax return data for a single tax year to estimate the elasticity of capital gains realisations. Feldstein et al. (1980) found an elasticity of -3.75 in their 1980 cross-sectional study in the US. This estimate implies that capital gains are highly responsive to tax rate changes and that a small tax rate reduction would increase revenue. However, an elasticity of this magnitude is inconsistent with most of the remainder of the US research into the capital gains realisations response.

Moreover, several decades of subsequent research on the topic appears to indicate that the use of cross-sectional data may be inappropriate for these studies. Although cross-sectional data contain a high number of observations, it is difficult to determine, using this data, the extent to which realisations are due to a timing response rather than to the prevailing statutory tax rate.[12] Such a determination cannot be made in the absence of data for more than one year. It is notable that revenue-estimating agencies in the US have not relied on the larger elasticities produced by cross-sectional studies, which may be indicative of their unreliability (Gravelle, 2010).

The other data types that can be used in a realisation response study are time series and panel data. Compared to cross-sectional data, time series data are a better way of estimating the capital gains realisation response given that they span several consecutive tax years. The time series elasticity point estimates derived from research in the US have varied widely, although a large proportion of them fall between a range of -0.5 and -0.9. However, there are some studies where the elasticity has been more than one in absolute value including Darby, Gillingham and Greenlees (1988), which reported an elasticity of -1.07 and Jones (1989), which reported an elasticity of -1.18. These time series elasticities are considerably lower, in absolute value, than elasticities derived using cross-sectional data.

[10] Specifically, it measures the percentage change in the rate of capital gains asset realisations relative to the percentage change in the CGT rate.

[11] Such a justification would relate to the fiscal adequacy considerations of the CGT rate; it would not necessarily consider the other tax policy aspects.

[12] An example of a timing response is where a taxpayer chooses to realise capital gains in a year in which their income is unusually low. Data for the taxpayer's income in other years would be required to separate this timing response from the long run realisation response.

However, empirical studies using time series data suffer from a number of problems, including the limited number of observations and the possibility of aggregation bias. Because the number of observations in a time series studies is lower than for a panel study, time series tends to be more reliant on the non-tax variables included in the regression equation (Toder and Ozanne, 1988). Some of the variables that influence realisations can be difficult to capture and that this is likely to lead to overstated elasticity estimates in time series studies (Gravelle, 1990). Notwithstanding these shortcomings, the estimates reported in time series studies are credible given that they are, typically, less than 1.0 in absolute value. Gravelle (1991) suggests that long-run elasticities in excess of this are implausible when estimated levels of accrued gains are considered.

The aggregation bias problem, inherent in time series studies, arises from the need to choose a single tax rate for the entire taxpayer population. The need to choose a single tax rate can be problematic if taxpayers in different marginal tax rate brackets do not exhibit the same behavioural response to changes in tax rates. Gravelle (1991) finds that the aggregation bias problem is unlikely to be a significant one; in contrast, other research has noted that the aggregation biases in time series studies have been intractable and have caused some researchers to discount their findings (Burman and Randolph, 1994). Auten, Burman and Randolph (1989) note that the relationship between marginal tax rates and capital gains realisation is non-linear, meaning that the aggregate response to a change in tax rates will not be the sum of individual responses.

Notwithstanding these limitations, times series studies provide a better mechanism than the micro-data typical of cross-sectional analysis to estimate long-run capital gains realisation elasticities (Eichner and Sinai, 2000).

A third possible data type that can be used in a realisation response study is panel data. The main advantage of panel data is that it contains many more observations than an aggregate time series data set. One of the weaknesses of panel data, however, is that there is inevitably some attrition of the taxpayer population in the sample. There is also a non-stationarity problem caused by the ageing of the taxpayer population in the sample (Auerbach, Burman and Siegel, 2000). Moreover, Slemrod and Shobe (1990) identify an econometric problem with panel data that can arise when a regression equation is estimated for a population that has a large proportion of zero observations on the dependant variable. This finding suggests that where panel data are used, they should be stratified by income; since by including only a limited percentage of high-income taxpayers, there are likely to be less zero observations for capital gains realisations.

Dowd, McClelland and Muthitacharoen (2012) have conducted one of the most recent studies on the capital gains realisation response. The authors use panel data to estimate what they refer to as the ‘persistent elasticity’. This is a measure of a tax rate increase that has persisted over the previous year and is expected to persist in the next year. Dowd et al. (2012) find a ‘persistent’ elasticity of -0.792.

Gravelle (2010) reviewed the results of a number of capital gains elasticity studies from the US. A summary of the findings of studies conducted in the 1990s onwards finds that at a tax rate of 22 per cent, realisation elasticities range from 0.00 to -0.79 (Gravelle, 2010). A summary of the elasticity point estimates from selected studies from the 1980s indicates that these estimates range from -0.45 to -3.80; however, the time series estimates from the 1980s range from -0.27 to -0.89 (Gravelle, 2010).

Elasticity, to the extent that it can change according to tax rates, taxpayer income and the mix of assets being realised, is more akin to a convenient summary rather than a guide to all situations (Congress of the United States, 1988). The extant literature, principally from the US, also tends to suggest that measures of elasticity, identifying the responsiveness of realisations to CGT rate changes, are more likely to be in a range of zero to minus one, and that greater faith can be placed upon studies which utilise time series and panel data than studies using only cross-sectional data.

2.3. Hypothesis development

Despite the problems associated with econometric capital gains realisations response studies, these still appear to be the most accepted form for quantifying the realisation response of capital gains. Elasticity points estimates are also used to inform the associated question of the revenue effects associated with a change in the CGT rate.

This paper is, in part, motivated by the lack of any publicly available empirical study on the elasticity of the capital gains realisations response in Australia. Although the question of revenue effects may have been given some consideration by policy makers prior to the introduction of the 50 per cent CGT discount, some of the political commentary from that time indicates that the analysis undertaken was non-empirical and potentially an incorrect prediction of the revenue effects. It is recognised that when the 50 per cent CGT discount was introduced, there had been no rate change in previous tax years. At least one CGT rate change is probably required to effectively estimate the capital gains realisation response. Nevertheless, the tax policy question of the revenue effects of a CGT rate preference has received very little attention from policy makers since 1999. The broad implication is that if capital gains realisations are not very responsive to preferential rates, the government will have lost large amounts of CGT revenue unnecessarily. This point is highly relevant to the Australian context, and elsewhere. There have been nominal increases in capital gains realisations in some years since the 50 per cent discount was introduced. However, the Australian Government may have lost large amounts of CGT revenue to the extent that capital gains realisations are relatively unresponsive to CGT rates. An elasticity point estimate provides information on the extent to which realisations are dependant on CGT rate changes.

Although there has been debate about the magnitude of the capital gains realisations response, the more recent empirical evidence from the US (e.g. Eichner and Sinai, 2000) suggests that capital gains are not very responsive to changes in tax rates.

The aims of this paper are to measure the elasticity of capital gains for individual taxpayers in Australia and to examine the impact of the 50 per cent CGT discount in the tax years after 1999-2000. Our hypotheses are:

H1 – The realisation response (elasticity) of capital gains in the long run is less than one in absolute value.

H2 – The 50 per cent CGT discount has caused a decrease in CGT revenue over the long run.

In the event that H1 is proven and assuming the unitary elasticity rule applies, it would be reasonable to conclude that the 50 per cent CGT discount has lost revenue in the long run (H2). Under the unitary elasticity rule, where there is an elasticity of more than one in absolute value, a CGT rate cut will raise additional tax revenue. An elasticity of less than one in absolute value implies a revenue loss in the event of a CGT rate cut. A long run elasticity of less than one in absolute terms, at the current tax rate, results in lost revenue where a CGT rate reduction is enacted (Mariger, 1995).

3. Research Design

3.1. Data

We estimate the capital gains realisation response using regression analyses with aggregate time series data. The aggregate tax return data are from *Taxation Statistics 2012-2013* spanning the years 1988-89 to 2012-13 (Australian Taxation Office, 2015). These data form the basis for the calculation of the dependent variable, which is a measure of the capital gains realisations in each of the years, and one of the independent variables: the top marginal CGT rate. The data on the other independent variables in the main regression equation, such as the amount of shares and other equity held by households, the S&P/ASX200 index and the Gross Domestic Product (GDP) are taken from datasets published by the Australian Bureau of Statistics. Table 1 shows the dataset used in the analysis.

<Insert Table 1 here>[13]

[13] This table presents the dataset for the equations in this paper. In the years 1988-89 to 1998-99 'pre-discount' capital gains is net capital gains for individual taxpayers as reported in *Taxation Statistics* (2012-13). In the years 2000-01 to 2012-13 'pre-discount' capital gains is double the amount of net capital gains as reported in *Taxation Statistics* (2012-13). The pre-discount capital gains for all years have been converted from nominal to real amounts using the GDP deflator prepared by the Australian Bureau of Statistics. In the years 1989-90 to 1998-99 the average CGT rate is the amount of tax payable on capital gains divided by the net capital gains for individuals (both reported in *Taxation Statistics*). In the years 2000-01 to 2012-13 the average CGT rate is the amount of tax payable on capital gains divided by double the net capital gains for individuals (both reported in *Taxation Statistics*). In the years 1989-90 to 1998-99 the top marginal CGT rate is the highest marginal tax rate for individual taxpayers. In the years 2000-01 to 2012-13 the top marginal CGT rate is half the marginal tax rate for individual taxpayers. Shares and other equity held by households is the amount reported by the Australian Bureau of Statistics (catalogue number 5232.0 – Australian National Account: Finance and Wealth, December 2014b). The amounts have been adjusted from nominal to real amounts using the GDP deflator prepared by the Australian Bureau of Statistics. The S&P/ASX200 data is from the Australian Bureau of Statistics publication *Australian Economic Indicators* (catalogue number 1350.0). The source of the real GDP data is the amounts

One of the problems inherent in the data relates to the 1999-2000 tax year. Because the CGT discount commenced on 21 September 1999 and all capital gains realised before this date were not eligible for the discount, the most appropriate way to approximate the pre-CGT discount capital gains in this year is an issue that cannot be easily resolved. Specifically, the aggregate data do not report the amount of discount capital gains in that year. Given that we cannot assume that the proportion of discount capital gains corresponds with the proportion of months in the 1999-2000 year when the CGT discount was available, there appears to be no reasonable method of approximating discount capital gains in this year.

As a result of the problems associated with the 1999-2000 year, we omit this year from the time series. Excluding a year from a time series was an approach used by Eichner and Sinai (2000) in their study on capital gains realisation response. An alternative approach would have been to treat 1999-2000 as one of the post-CGT discount years, which would require the doubling of net capital gains, as reported in *Taxation Statistics* and halving the top marginal tax rate to estimate the real marginal CGT rate. However, we rejected this approach as it would have resulted in a calculation of a capital gains amount that was inconsistent with the post-CGT discount years.

3.2 Model specification

We focus on our main regression equation to estimate the long run capital gains realisation response for Australian individual taxpayers. The number of years in the time series data is consistent with the definition of the long run response in the literature (Gravelle, 2010). We estimate elasticity using Ordinary Least Squares (OLS).

The main regression equation is as follows:

$$\text{dLn(pre-discount capital gains)}_t = a_1 + a_2\,\text{dTop marginal CGT rate}_t$$

$$+ a_3\,\text{dLn(real value of household shares and other equity)}_t + a_4\,\text{dLn (S\&P/ASX200)}_t +$$

$$+ a_5\,\text{dLn(real GDP)} + u_t \qquad \text{(Equation 1)}$$

Our second equation contains a dummy variable for the post-CGT discount years (2001-02 to 2012-13) and it is written as follows:

$$\text{dLn(pre-discount capital gains)}_t = a_1 + a_2\,\text{Post-CGT Discount}_t + a_3\,\text{dtop marginal CGT rate}_t$$

$$+ a_4\,\text{dLn(real value of household shares and other equity)}_t + a_5\,\text{dLn (S\&P/ASX200)}_t$$

$$+ a_6\,\text{dLn(real GDP)} + v_t \qquad \text{(Equation 2)}$$

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reported by the Australian Bureau of Statistics in *Australian National Accounts: National Income, Expenditure and Product* (catalogue number 5206.0, December 2014a). This publication reports Gross Domestic Product using 'chain volume measures'. Broadly, under this approach index numbers are applied to the nominal GDP amounts in each year so that the effects of inflation are removed from the time series.

Our main equation specification is in semi-log form — all variables, except for the tax rate variable, are in log form. The functional form of the specification is guided by the fact that a previous time series study used the semi-log form to good effect (Toder and Ozanne, 1988). However, we do note that other studies prefer a log-log specification, for example Zodrow (1993) argues that a log-log specification avoids the problem of a tax rate coefficient that is biased towards zero.

Our choice of variables is guided by theory and existing literature on the factors that may be determinative to capital gains realisations. We have not, however, replicated any particular previous study. Examples of previous studies that have included a share market index as an explanatory variable are Minarik (1984) and Auerbach (1989); given that these were US studies, each used the New York Stock Exchange index. An independent variable for GDP has been a feature of many previous realisation response studies.

The dependent variable in our equations is the annual aggregate of all 'pre-discount' capital gains, converted from nominal to real terms using a GDP deflator prepared by Australian Bureau of Statistics (2014).[14] In the years prior to 1999-2000, this variable is net capital gains, as reported in *Taxation Statistics 2012-13*. In the years after 1999-2000, we assume this variable to be double the amount of net capital gains reported in *Taxation Statistics 2012-13*. The result of this assumption is that the dependent variable is slightly overstated in the post-CGT discount years[15] and it can, therefore, be considered an approximation of the amount of capital gains before the application of the CGT discount.

The independent variables in the main equation were sourced from various publications of the Australian Bureau of Statistics (Australian Bureau of Statistics, 2012) and (Australian Bureau of Statistics, 2014). The independent variables are: the top marginal CGT rate; the real value of household shares and other equity; the S&P/ASX200 index; and the GDP, included as a measure of economic conditions.

Tax rate

One of the issues in a time series realisation response study is the choice of an appropriate tax rate. A serious econometric problem is the fact that while the effective tax rate could be used as an exogenous variable, it is, in fact, an endogenous variable given that it is influenced by the amount of capital gains realisations (Gravelle, 2010). Using maximum statutory tax rates, predicted gains or instrumental variables are some ways of overcoming this problem (Gravelle, 2010). It is also noted that the endogeneity of the tax rate variable is less important in a time series study (Gravelle, 2010).

An important influence on the methodology for our study is the fact that CGT in Australia is not a separate tax. Where an individual taxpayer's capital gain qualifies for the 50 per cent

[14] For this GDP deflator, the year 2012-13 has a value of 100 and earlier years, with the exception of 2011-12, have a value of less than 100.

[15] The overstatement is because a small proportion (approximately 6 per cent) of net capital gains are not eligible for the 50 per cent CGT discount. For simplicity we assume that all net capital gains are eligible for the 50 per cent CGT discount.

discount, half of the gain is included in their assessable income and it is taxed at their prevailing marginal tax rate. Our study therefore assumes, for the post CGT discount years, a CGT rate that is half of the top marginal rate and consistent with this, we use a grossed-up amount of net capital gains reported in *Taxation Statistics* as a measure of capital gains realisations. Our study is concerned with an approximation of the real marginal tax rate on capital gains rather than the statutory rate of CGT. Net capital gains reported in *Taxation Statistics* for the post-CGT discount years do not reflect the amount of capital gains that the taxpayer has decided to realise, whereas the net capital gains in the pre-CGT discount years do approximate this amount. Our adjustment to the post-CGT discount years' net capital gains allows for a meaningful comparison of the pre- and post- CGT discount year realisations.

According to Australian Taxation Office (2015) the average tax rate on capital gains in 2012-13 was 31.7 per cent.[16] This calculation of a CGT rate of 31.7 per cent refers to tax payable on all net capital gains for individuals in 2012-13 as estimated by the Australian Taxation Office. Given that most (at least 94 per cent) of taxable capital gains are eligible for the CGT discount, the real average tax rate on capital gains would be closer to half of 31.7 per cent: that is, 15.8 per cent.

Household shares

An independent variable for the value of real household shares and other equity is included in the equation as a proxy for the level of accrued capital gains. Auten et al. (1989) identify that the more accrued gains a taxpayer has, the more gains are likely to be candidates for realisation. Some of the earlier studies on capital gains realisation responses, conducted in the US have been criticised for failing to control for accrued capital gains. Although it is arguable that a measure of total capital gains assets could have been used for this variable, shares represent one of the most liquid forms of capital gains assets. Clark (2014, p. 14) notes that, on average, individual taxpayers realise capital gains from shares every four years whereas the average holding period for real estate is approximately 10 years. Burman (1999, p. 60) identifies that the realisation response of assets with high non-tax transaction costs such as real estate is likely to be smaller than for assets with low transaction costs such as shares. An example of a previous study that used a similar variable as a proxy for accrued capital gains was the Toder and Ozanne (1988) study—prepared for the US Congressional Budget Office— that used the year-end total value of equities held by individuals.

The coefficient for the real household shares and other equity variable is expected to have a positive sign. This is because an increase in shares owned by households increases the level of accrued capital gains. This, in turn, results in more capital gains that can be realised.

[16] Capital gains are reported from the 1986-87 year onwards. Although our time series dataset commences in 1988-89, all out first differenced equations use data commencing in 1989-90 due to Australian Bureau of Statistics data on household shares and other equity commencing in 1988-89.

Share market

The S&P/ASX200 index independent variable is included in the equations as a measure of the performance of the Australian share market. In theory improvement in this indicator should correlate with increased capital gains realisations. It follows that the coefficient for this variable is also expected to have a positive sign. Indeed, Clark (2014) explains that the largest movements in capital gains realisations have been related to changes in the share market – in particular, there was a decline in the early 2000s, seemingly related to the dot-com crash and a decline related to the GFC following the peak of the ASX200 index in October 2007.

GDP

The GDP variable is included in the equations as a measure of the overall level of economic activity. It is expected that CGT realisations will increase as GDP increases. It follows that the coefficient for this variable is again expected to have a positive sign. Toder and Ozanne (1988) refer to the effects that a GDP variable captures. First, GDP is a comprehensive measure of total spending, which, in turn, captures the incentive to sell assets for consumption. Second, GDP, as a measure of aggregate economic activity can capture some of the influences on total wealth that are missing in the share market variable. Importantly, Toder and Ozanne (1988) note that the GDP variable together with a variable for the value of the share market better explains capital gains realisations than a measure of household wealth other than corporate shares. A similar finding was made in a recent study on realisation response in Sweden; here Jacob (2011, pp. 10-11) found that aggregate capital gains were strongly correlated with stock market returns whereas such a correlation was not present between aggregate capital gains and the house price index.

3.3 Data trends

Before outlining the results of the regression analysis, there are some notable trends in the data that are briefly discussed in this section. Firstly, and as noted in Table 1, the peak year for individual capital gains realisations was 2006-07. Since that year there has been a downward trend in realisations of capital gains for individual taxpayers. The decline was moderate in 2007-08 and very pronounced in 2008-09. Realisations, in nominal terms, in 2008-09 were less than half the level they had been in the previous year and at their lowest level since 2003-04. In the latest year of the time series, 2012-13, realisations are even lower than they were in 2008-09 and lower than in 2003-04. Given that the preferential CGT discount has been in operation for all the years referred to, this strongly suggests that tax rates may not be the only determinant of capital gains realisations. The timing of the decline in realisations may indicate that the global financial crisis (GFC) in the late 2000s had at least some effect on the propensity of taxpayers to realise capital gains.

Another noteworthy trend in the data (not specified in Table 1) is the large increase in capital losses carried forward to later income years. Specifically, these increased from $9.8 billion in 2007-08 to $18.5 billion in 2008-09. In 2012-13, the most recent year for which *Taxation Statistics* is available, capital losses carried forward to later income years were $26.3 billion

(Australian Taxation Office, 2015). In theory, there is an increased incentive for taxpayers with carried forward capital losses to realise capital gains. However, taxpayers who have an unusually low taxable income in a particular income year may prefer to defer the use of these losses to a year when their taxable income is higher. The measure of capital gains realisations used in our study takes into account the use of capital losses by taxpayers in that it is based on net capital gains; specifically, it is based on capital gains net of capital losses.

4. Estimation Results

Table 2 reports the results for an initial regression. As this regression is preliminary and non-preferred, Table 2 does not report elasticity point estimates.

<Insert Table 2 here>

The dependent variable in the regression equation is the 'pre-discounted' capital gains (in the years after the CGT discount was introduced this is assumed to be double the net capital gains reported in *Taxation Statistics*).

The adjusted R squared of 0.97 suggests that multicollinearity could be an issue in the preliminary specification. Broadly multicollinearity refers to a perfect linear relationship between the variables in the equation.

Furthermore, the results for the preliminary equation (in Table 2) indicate that the real GDP coefficient has the wrong sign. Theory and previous research indicates that the sign for this coefficient should be positive since as GDP increases, there is an increased likelihood of additional capital gains realisations.

Table 3a reports the calculations of pairwise correlation coefficients for Equation 1. The purpose is to determine the value of the sample correlation for each pair of independent variables.

<Insert Table 3a here>

As Table 3a indicates, the correlation coefficients for Equation 1 are high and this appears to confirm a multicollinearity problem.[17] Auerbach (1988) explains that independent variables such as capital gains realisations, GDP, and shares and other equities might not be stationary variables and may be trending together over time. We conducted Dickey-Fuller tests and these tests could not reject the null hypothesis that the variables in the equation have a unit root.

Given that the first differencing of the variables is known to eliminate the unit root, all variables in the dataset were first differenced. The pairwise correlation coefficients for the variables were recalculated and, as reported in Table 3b, these indicate that first differencing has appeared to address the multicollinearity problem.

[17] An alternative method of testing for multicollinearity is to calculate the variance inflation factor for every independent variable.

<Insert Table 3b here>

Table 4 reports the Equation 1 regression results, using the first differenced data. The Table 4 results are the results of our main equation. All the specifications in the remainder of the paper use first differenced variables (i.e. dPre-discount capital gains, dTop marginal CGT rate, dReal household shares, dReal GDP, and dASX200), which is consistent with the previous literature (e.g. Auerbach, 1998; Eichner and Sinai, 2000).

The inclusion of a first difference of log real GDP variable may improve the equation specification where GDP has a lagged effect on capital gains realisations. In the absence of this lagged effect, it would be expected that the coefficient for this variable would be statistically insignificant.

<Insert Table 4 here>

Table 4 reports the results for Equation 1 (a semi-log specification) at two different tax rates. Firstly, the elasticity is reported at a rate of 33.75 per cent, representing the midpoint between the real top real marginal CGT rate in the later years of the study of 22.5 per cent and the rate of 45 per cent, which would be the top marginal CGT rate if the CGT discount were repealed.[18] Secondly, the elasticity is reported at a rate of 20 per cent, being the mean of the average CGT rate for all years of the study.

The results in Table 4 indicate that at a 33.75 per cent tax rate, the elasticity point estimate is -0.81. This implies that any additional realisations induced by the CGT discount would be of an insufficient magnitude to compensate for the static revenue loss from the discount. At a 33.75 per cent tax rate elasticities of between -0.15 and -1.47 are included in a 95 per cent confidence interval. At a 20 per cent tax rate, the elasticity point estimate is -0.48; at the 20 per cent tax rate elasticities of between –0.09 and -0.87 are included in a 95 per cent confidence interval.

The results of the Equation 1, reported in Table 4 support H1 – that the capital gains realisation response is less than 1 in absolute value. The results appear to indicate a good model fit with significant F-statistics.

Table 5 reports the results for a modified Equation 1. In this equation, we use a log form tax rate variable. This alternative form confirms the robustness of the results in the previous specification. In a log-log equation the coefficient is equal to the elasticity point estimate. Given that the coefficient for the tax rate variable is -0.81 in Table 5 (the same as for the Table 4 equation), this implies that a 33.75 per cent tax rate is appropriate for estimating elasticity. The Table 5 results include elasticities of -0.14 and -1.47 in a 95 per cent confidence interval, which is almost identical to the range of elasticities included in a 95 per cent confidence interval for the previous equation.[19] Notably there are only minor differences in the coefficients and t-statistics, in comparison to the previous equation. The results in

[18] The 1999-2000 year is excluded from the calculation since we have excluded the tax return data for 1999-2000 from the regressions. The tax rates referred to throughout this paper do not include levies and surcharges such as the Medicare Levy.
[19] At a 33.75 per cent tax rate.

Table 5 may be considered to allay concerns about the semi-log specification in the main equation producing results that are biased towards zero given the similarity of the point estimates when the functional form is altered.

<Insert Table 5 here>

Table 6 reports the results for Equation 2; this specification includes a dummy variable for the post-CGT discount years. In this specification the CGT rate variable is in linear form. The results for the second equation indicate that the coefficient of the post-CGT discount dummy variable has a negative sign, is small in magnitude and is not statistically significant (coefficient = -0.07, t-statistic = -0.81). This implies that our second hypothesis is partially supported: specifically, that the 50 per cent CGT discount — introduced in 1999 — has resulted in a decrease in CGT revenue.

As for all previous specifications in this paper, the coefficient for the S&P/ASX200 is significant at the 1 per cent level.

<Insert Table 6 here>

5. Additional Analyses

5.1. Additional control variable for GDP price deflator

The next specification is based on our main equation (Equation 1), except for the addition of one additional independent variable — a GDP price deflator. A GDP price deflator variable can be used as a measure of real prices and it has been included in previous time series studies such as Eichner and Sinai (2000). This variable may be of increased importance when the tax return data in a regression are reported in nominal rather than real terms. Given that in our study, the variable for capital gains realisations has been converted to real terms using the GDP deflator, the need for a GDP deflator variable in the equation is not obvious; consequently, we do not control for the GDP price deflator in our main specification. Nevertheless, following Eichner and Sinai (2000), we include GDP price deflator as an additional control. Under this equation specification, and as shown in Table 7, the capital gains realisations elasticity is -0.84. The result for this specification includes, at a 33.75 per cent tax rate, elasticities of -0.17 to -1.51 in a 95 per cent confidence interval.

<Insert Table 7 here>

The results for the regression equation that includes additional control variables also support H1 – that the capital gains realisation response is less than 1 in absolute value. This equation specification also confirms that our main specification is robust to minor changes in specification.

5.2. Alternative sample period – 1994-95 to 2012-13

Table 8 shows the results for our main specification, with the years 1989-90 to 1993-94 excluded from the sample. Although reducing the number of years in the regression may provide an additional robustness test, the results should be interpreted with caution given the

limited number of observations. Excluding the first five tax years from the regression has the effect of increasing the elasticity point estimate (in absolute terms) to -0.98 at a 33.75 per cent tax rate and -0.64 at a 20 per cent CGT rate.

<Insert Table 8 here>

The results reported in Table 8 indicate that our main specification is robust to changes in the time period, with the coefficients for the top marginal CGT rate and the ASX200 significant at the 1 per cent level and the coefficient for log real GDP significant at the 5 per cent level. The adjusted R squared for this specification is 0.73 and, as for the main specification, the F-statistic is significant at the 1 per cent level.

In summary, we have used several alternatives specifications to confirm the robustness of the results of our main specification. Notably, in all specifications the elasticity of capital gains realisations is less than 1 in absolute value. This implies that the CGT rate cut enacted in September 1999, in the form of the CGT discount, has not been self-financing and is likely to have caused a loss of CGT revenue. Although this paper did not estimate the revenue maximising rate on capital gains, the results of the regressions imply that this rate is likely to be higher than the current top marginal rate on capital gains.[20]

6. Conclusion

In this paper we have examined the capital gains realisation response to the introduction of the 50 per cent CGT discount for individual taxpayers in Australia in 1999. Although the study uses Australian data, it will be of interest to tax researchers and policy makers in other jurisdictions as the capital gains realisation response has arguably not been widely researched outside of the US.

As for previous research on the capital gains realisation response, we have quantified a behavioural response to changes in CGT rates using the econometric technique of regression analysis. This has involved specifying a regression equation that includes a measure of capital gains realisations as the dependent variable as well as a number of independent variables. One of the independent variables is a measure of the CGT rate and the others are non-tax factors thought to influence realisations.

The result of our main equation is an elasticity point estimate of -0.81 at a 33.75 per cent CGT rate and -0.48 at a 20 per cent CGT rate. These elasticity point estimates imply that the capital gains realisation response is insufficient to compensate for the static revenue loss from the introduction of the CGT discount. Although our elasticity point estimates imply that there is the expected inverse relationship between tax rates and realisations (in all specifications), they are such that the CGT discount, of itself, appears to have almost certainly resulted in lost CGT revenue.

[20] Specifically, the real marginal rate given that the CGT discount is a 50 per cent inclusion of net capital gains in assessable income.

Where a CGT rate cut takes effect at a time where there is economic growth, there is a possibility that policy makers will attribute increases in CGT revenue to the rate cut rather than the economic growth. The results of this study indicate that economic growth may be more influential on capital gains realisations than CGT rate cuts. Furthermore, our results indicate that the ASX200 index is highly relevant to capital gains realisations. In all specifications, the coefficient for the ASX200 variable has a positive sign, is more than 1 and is statistically significant at the 1 per cent level. This particular variable is very robust to changes in specification and the coefficients imply that the ASX200 index is more determinative of the level of capital gains realisations than the CGT rate.

There are, of course, limitations to the study, primarily methodological in nature. For practical reasons, the study adopted a time series analysis and Zodrow (1993) identifies that this approach has the problem of being quite sensitive to the choice of sample period. Zodrow (1993) recommends caution in basing policy prescriptions on a single set of time series estimates given the problems associated with time series analysis. In analysing the issue of realisation response in the Australian context, however, there are some issues less relevant to Australia in comparison with the US. For example, we find that there is no need to include an independent variable for tax rate expectations in any of our specifications.[21]

The absence of relevant tax return data for 1999-2000 may also be considered a limitation of this study.

Notwithstanding these methodological limitations, we believe that the results are both credible and robust. Our estimates fall within the range of credible results for an aggregate time series study suggested by earlier and comparable research, and the various checks undertaken using alternative models confirm that the findings are robust.

This study is the first known attempt to estimate the realisation response of capital gains realisations for individual taxpayers in Australia, and it paves the way for further research. Future studies on capital gains realisation response could, for example, extend the time series to include more years of data, which are not yet available. In other jurisdictions, such as the US, where a CGT has been in place for longer, a time series dataset can span several decades.

Another possibility for future research is a panel data study. This is dependent on the development of a suitable panel data set in Australia.[22] Panel data would allow researchers to track the changes in taxable income for individual taxpayers over a number of years. With this information, one could control for realisations in years when a taxpayer's taxable income is unusually low.[23] It would also counter the problem of aggregation bias and provide

[21] This is because Australia has not had the US experience of several changes in the CGT rate over time. Another institutional difference between the two jurisdictions is that Australia has not had the experience of pre-announced changes in the CGT rate, as in the US. One of the consequences of this difference is that the transitory response to pre-announced CGT rate changes is less relevant to an Australian analysis of capital gains realisation response.

[22] Such a dataset is not currently available.

[23] The rationale for doing so is that such realisations are better explained as a timing response rather than a long run response to the prevailing CGT rate.

information on demographic variables that may influence realisations, such as the age of the taxpayer.

A second best alternative to a panel data study may be a time series study with an increased number of observations. Treating taxpayer income brackets as separate observations could increase the number of observations. The results of such a study may provide some insight into how realisation response varies according to taxpayer income. Of particular interest would be the realisation response of taxpayers in the highest income bracket as this demographic realises a high proportion of capital gains. A future study using this approach may also be useful in confirming whether we have correctly specified the equation in this paper.

As noted earlier, the annual Tax Expenditures Statement prepared by Treasury indicates that the 50 per cent CGT discount has had a cumulative static revenue cost of several billion dollars during the 15 years it has been in operation (Australian Treasury, 2013). Increasing the rate of CGT for individuals by removing part of the 50 per cent CGT discount was one of the recommendations of the Henry Review (2010);[24] and consideration of its entire removal is also a suggestion put forward in the more recent Murray report into the financial system (Murray, 2014).[25] The restriction or removal of the CGT discount is clearly a tax policy reform worthy of greater consideration. Reducing or removing the discount would improve vertical and horizontal equity and assist in the simplification of the Australian tax system[26]. It could also prove effective in the reduction of the budget deficit, given our finding of a moderate realisation response.

This latter aspect may prove to be a critical consideration in the review of the tax system currently being undertaken in Australia in 2015 (Australian Treasury, 2015). This paper will hopefully contribute to a more informed and evidence-based debate about the implications of changes to the CGT rate than appeared to be the case when the 50 per cent CGT discount was introduced in Australia in 1999. Furthermore, there is an opportunity for further research on the issue of capital gains realisation response in other tax jurisdictions that offer preferential CGT rates. The case for taxing capital gains at highly preferential tax rates appears to lack rigorous tax policy foundations. In light of this, there appears to be no compelling reason for governments to forgo CGT revenue unnecessarily.

[24] Recommendation 14 of the Henry Review (which has not been accepted by the Government) suggested that the CGT discount for capital gains should be reduced from 50 per cent to 40 per cent, effectively increasing the rate at which capital gains are taxed.

[25] The report notes that reducing CGT concessions would result in a more efficient allocation of funding in the economy.

[26] Taxing capital gains at the same rate as other income would reduce the complexity of the tax system.

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Table 1 - Capital gains realisations, tax rate and equity data

Year	'Pre-discount' capital gains (AUDmillions)	Average CGT rate	Top marginal CGT rate	Shares and other equity held by households (AUDbillions)	S&P/ASX200	Real GDP (AUDbillions)
1988-89	1.891	0.315	0.49	233.7	1,521	723,614
1989-90	1,764	0.252	0.48	205.4	1,501	749,152
1990-91	1,322	0.237	0.47	199.1	1,506	745,961
1991-92	1,625	0.266	0.47	197.3	1,645	748,974
1992-93	1,984	0.239	0.47	231.4	1,738	779,286
1993-94	4,236	0.247	0.47	266.7	1,989	810,806
1994-95	2,816	0.235	0.47	253.4	2,017	842,275
1995-96	3,827	0.240	0.47	256	2,242	875,522
1996-97	5,364	0.246	0.47	305.1	2,726	910,048
1997-98	8,316	0.248	0.47	335.4	2,668	950,371
1998-99	9,922	0.274	0.47	405.9	2,969	997,930
1999-2000	-	-	-	-	-	-
2000-01	18,357	0.170	0.235	494.3	3,490	1,056,562
2001-02	19,905	0.165	0.235	473.7	3,216	1,097,378
2002-03	20,437	0.167	0.235	416.8	3,027	1,131,169
2003-04	30,045	0.170	0.235	531.1	3,533	1,178,187
2004-05	34,852	0.169	0.235	768	4,278	1,216,083
2005-06	43,407	0.166	0.235	836.3	5,074	1,252,452
2006-07	64,748	0.159	0.225	817.5	6,275	1,299,546
2007-08	55,717	0.163	0.225	653.1	5,215	1,347,659
2008-09	24,149	0.157	0.225	491	3,955	1,370,998
2009-10	25,500	0.15	0.225	513.9	4,302	1,397,902
2010-11	25,491	0.156	0.225	512.1	4,608	1,430,354
2011-12	19,278	0.156	0.225	463.8	4,095	1,483,675
2012-13	19,748	0.158	0.225	559.3	4,803	1,520,944

Table 2 – Capital gains realisation response (1988-89 – 2012-13) – preliminary equation

	Expected sign	Coefficient	t-statistic
Constant		20.89**	2.65
Top marginal CGT rate	-	-2.31**	-2.38
Log real value of household shares and other equity	+	1.10***	3.20
Log S&P ASX200	+	1.61***	3.38
Log real GDP	+	-1.19*	-1.73
Adjusted R squared		0.9675	
F-statistic F (4, 19)		172.43***	
Durbin-Watson		1.1494	
Number of observations		24	

***Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 3a - Pairwise correlation coefficients

	Pre-discount capital gains	Top marginal CGT rate	Real household shares	Real GDP	ASX200
Pre-discount capital gains	1				
Top marginal CGT rate	-0.9018	1			
Real household shares	0.9736	-0.8815	1		
Real GDP	0.9113	-0.9090	-0.9052	1	
ASX200	0.9682	-0.8737	-0.9547	-0.9470	1

Table 3b - Pairwise correlation coefficients – first differenced data

	dPre-discount capital gains	dTop marginal CGT rate	dReal household shares	dReal GDP	dASX200
dPre-discount capital gains	1				
dTop marginal CGT rate	-0.2390	1			
dReal household shares	0.5755	0.1875	1		
dReal GDP	0.3599	0.2131	0.3074	1	
dASX200	0.7181	-0.0177	0.5570	0.1300	1

dPre-discount capital gains, dTop marginal CGT rate, dReal household shares, dReal GDP, and dASX200 are first differenced variables, respectively.

Table 4 – Capital gains realisations elasticity (1989-90 – 2012-13) with first differenced data (Equation 1)

	Expected sign	Coefficient	t-statistic
Constant		-0.24*	-2.04
dTop marginal CGT rate	-	-2.39**	-2.56
CG realisations elasticity (at 33.75%): -0.81 (at 20%): -0.48			
dLog real value of household shares and other equity	+	0.59	1.57
dLog S&P ASX200	+	1.45***	3.47
dLog real GDP	+	7.57**	2.11
Adjusted R squared		0.6487	
F-statistic F (4, 18)		11.15***	
Durbin-Watson		2.9718	
Number of observations		23	

***Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 5– Capital gains realisations elasticity (1989-90 – 2012-13) for a log-log specification

	Expected sign	Coefficient	t-statistic
Constant		-0.24*	-2.02
dTop marginal CGT rate	-	-0.81**	-2.56
CG realisations elasticity: -0.81			
dLog real value of household shares and other equity	+	0.59	1.57
dLog S&P ASX200	+	1.45***	3.45
dLog real GDP	+	7.50*	2.09
Adjusted R squared		0.6485	
F-statistic F (4, 18)		11.15***	
Durbin-Watson		2.9718	
Number of observations		23	

***Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 6 – CGT rate variable in linear form and a variable for a 'post-CGT discount' dummy (1989-90 – 2012-13) (Equation 2)

	Coefficient	t-statistic
Constant	-0.19	-1.43
Post-CGT discount	-0.07	-0.81
dTop marginal CGT rate	-0.85**	-2.64
dLog real value of household shares and other equity	0.60	1.58
dLog S&P/ASX200	1.40***	3.27
dLog real GDP	4.27*	2.00
Adjusted R squared	0.64	
F-statistic F(6,16)	8.88***	
Durbin-Watson	3.13	
Number of observations	23	

The dependent variable is the log transformation of 'pre-discounted' capital gains. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 7 - Capital gains realisations elasticity (1989-90 – 2012-13) – as per Equation 1 with an additional variable for GDP price deflator

	Coefficient	t-statistic
Constant	-0.19	-1.49
dTop marginal CGT rate	-2.48**	-2.64
CG realisations elasticity: (at 33.75%) -0.84 (at 20%) -0.50		
dLog real value of household shares and other equity	0.48	1.21
dLog S&P/ASX200	1.44***	3.41
dLog real GDP	7.04*	1.93
dLog GDP deflator	-0.06	-0.93
Adjusted R squared	0.65	
F-statistic F (5,17)	9.03***	
Durbin-Watson	3.11	
Number of observations	23	

The dependent variable is the log transformation of 'pre-discounted' capital gains. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 8 - Capital gains realisations elasticity (1994-95 – 2012-13), as per main equation

	Coefficient	t-statistic
Constant	-0.47**	-2.61
dTop marginal CGT rate	-2.92***	-3.37
CG realisations elasticity (at 33.75%) -0.98 (at 20%) -0.58		
dLog real value of household shares and other equity	0.57	1.64
dLog S&P/ASX200	1.24***	3.28
dLog real GDP	13.80**	2.57
Adjusted R squared	0.73	
F-statistic F (4,13)	12.29***	
Durbin-Watson	2.14	
Number of observations	18	

The dependent variable is the log transformation of 'pre-discounted' capital gains. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.