Company tax scenario

Report prepared for the Department of the Treasury
by Chris Murphy, Director, Independent Economics and Visiting Fellow, ANU.

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Address:

Independent Economics
PO Box 4129
KINGSTON ACT 2604
AUSTRALIA

Phone: +61 4 1128 4929

Email: office@independenteconomics.com.au

Web-site: www.independenteconomics.com.au

Entity: Econtech Pty Ltd (ACN 056 645 197) trading as Independent Economics

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Introduction

The Department of the Treasury ("The Treasury") requested Independent Economics (IE) to model the economy-wide impacts of reducing the company tax rate from 30 to 25 per cent ("Company Tax Scenario") under four alternative funding assumptions. All other fiscal policy settings are assumed to be unchanged from the 2015-16 MYEFO. This report models the Company Tax Scenario, and presents its long-run, simulated effects on economic activity and living standards, and well as its final incidence for different types of income earners.

This report also explains the nature of the economic model that has been used and its key assumptions and elasticities that influence the modelling results. While the modelling provides estimates of long-run impacts, this report also provides separate information on the likely timeframe over which those impacts would develop. All estimates are reported on a 2015-16 financial year basis.

Company Tax Scenario

In the Company Tax Scenario, the company tax rate is reduced from 30 to 25 per cent, at a direct annual cost to government budgets of around $8.2 billion. This takes into account a loss of company tax revenue of $11.3 billion, partly offset by a gain in personal income tax and superannuation income tax of $3.1 billion as the cut in company tax automatically reduces the value of franking credits.

Reducing company tax stimulates three favourable behavioural responses. These responses at the same time lift national income and indirectly benefit government budgets.

- Reducing company tax has a positive effect on investment incentives. Stronger investment leads to a more capital intensive economy and higher **productivity**. This productivity gain lifts incomes, which in turn boosts most tax collections.
- Reducing company tax also improves the international competitiveness of Australia's effective average rate of corporate tax, lifting us to a middle ranking of a broad group of 46 countries. This reduces the extent of **profit shifting** to other jurisdictions, adding to Australian company tax collections.
- Since post-tax rates of return on capital are largely determined globally rather than nationally, the incidence of a nation's company tax is generally passed on from capital to labour. Cutting company tax therefore leads to higher real wages, which has a positive effect on work incentives. Like higher productivity, higher **employment** lifts incomes, which boosts tax collections.

In the long run, these productivity, profit-shifting and employment effects of the company tax cut provide an indirect gain of $4.5 billion to budgets at all three levels of government. This self-funds part of the direct cost of the company tax cut. After allowing for this self-funding, another policy measure is required to fund the remaining cost of $3.7 billion. Four alternative assumptions are modelled:

- "**lump sum**" funding i.e. budget savings measures that are economically neutral: they do not influence economic behaviour and have a cost to households equal to the benefit to the budget;
- an increase in personal income tax through **bracket creep**;
- an increase in personal income tax through an **income levy;** and
- a reduction in spending through **government efficiency** savings.

The Economic Modelling Approach

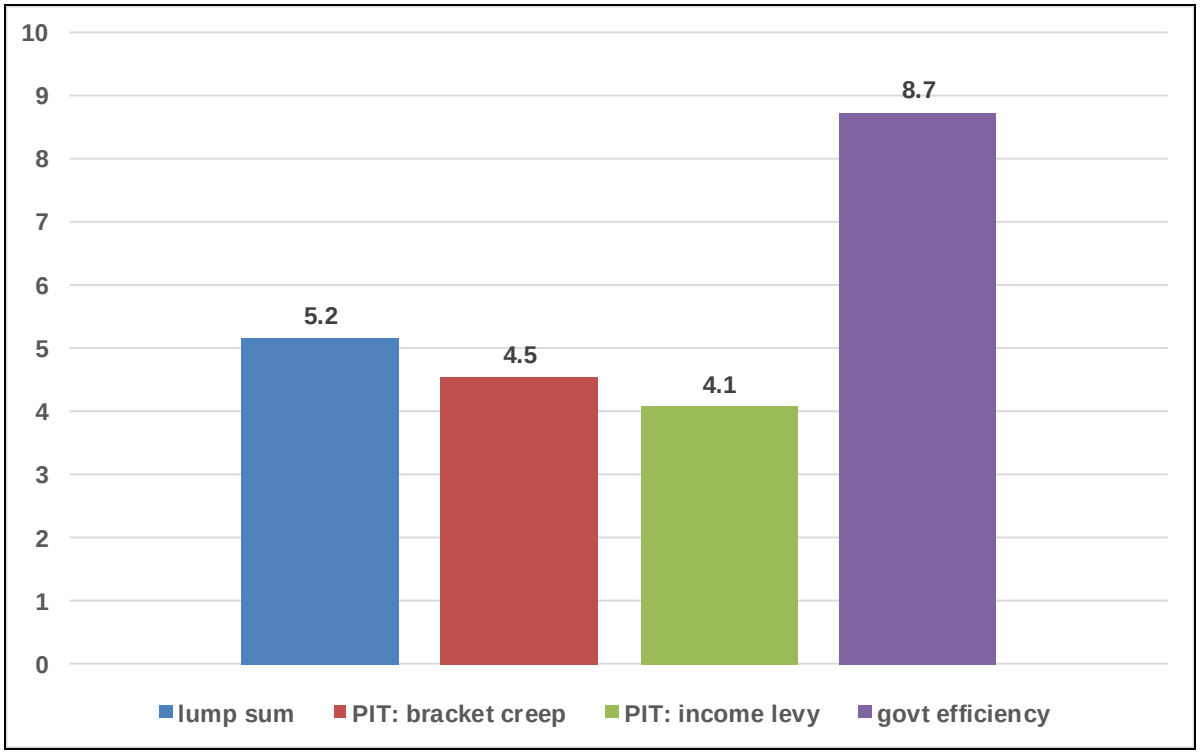
The economy-wide effects of this Company Tax Scenario were modelled using the CGETAX model. CGETAX represents an advance on earlier Computable General Equilibrium (CGE) modelling of tax inefficiencies, led by the author of this report and in collaboration with The Treasury, for the Henry Tax Review and the Business Tax Working Group. It incorporates:

- tax disincentives to work (through a compensated elasticity of the labour supply with respect to the marginal, post-tax real wage of 0.4);
- tax disincentives to investment (with elasticities of substitution between capital and labour of 0.7 to 0.9);
- tax disincentives to save (through an elasticity of intertemporal substitution of 0.25);
- profit shifting (with a semi-elasticity of the company tax base with respect to the company tax rate of -0.73);
- 278 industries;
- oligopoly power in industries with persistently above-normal rates of return on capital;
- the latest detailed snapshot of the economy from the ABS input-output tables for 2012-13; and
- the 2015-16 MYEFO (Australian Government, 2015).

Scenario Results

The modelling results show that the favourable economic responses to the company tax cut noted above – higher **productivity**, less **profit shifting** and higher **employment** – boost annual living standards by $5.2 billion under the economically-neutral assumption of "lump sum" funding.

Chart A: Effects of Company Tax Scenario on living standards ($billion, 2015-16 annual terms)



Source: CGETAX simulations

This large boost in annual living standards of $5.2 billion from cutting the company tax rate to 25 per cent is on a **net** basis. Consumers receive a **gross** benefit of $8.9 billion from the company tax cut but, as noted above, this comes at a net cost to government budgets of $3.7 billion. If this is funded from consumers in an economically-neutral or lump-sum way, they are left with the net benefit of $5.2 billion shown in Chart A.

The ratio of the net benefit ($5.2 billion) to the net budget cost ($3.7 billion) from reducing company tax is therefore 139 per cent. This ratio, known as the marginal excess burden (MEB), is much higher than for other broad-based taxes, leading to the large benefit to living standards from relying less on company tax in the overall tax mix. By comparison, MEBs are 18 to 41 per cent for personal income tax, depending on the nature of the change to the rate scale, 10 to 18 per cent for GST and 24 to 37 per cent for payroll tax, depending in both cases on whether the base or rate is varied.

A related statistic is the self-funding percentage for reducing company tax of 55 per cent. This is calculated as the indirect gain to the budget ($4.5 billion) as a percentage of the direct budget cost ($8.2 billion). This self-funding percentage is in line with recent UK Treasury modelling that found a self-funding percentage of 45 to 60 per cent for a cut in the UK corporation tax rate from 28 to 20 per cent (UK Treasury & Revenue and Customs, 2013).

Chart A shows how the final net benefit to consumers varies from $5.2 billion if the funding is not economically-neutral or lump sum. A **government efficiency** saving by definition provides consumers with the same government services at a lower cost, adding a further benefit of $3.5 billion. This takes the final gain in living standards to $8.7 billion.

The work and saving disincentive effects from raising personal income tax reduces the net benefit to consumers to between $4.1 billion and $4.5 billion, depending on the nature of the change to the personal income tax scale. The lower estimate refers to **income levy** funding while the higher estimate refers to **bracket creep** funding.

The long-run impacts on GDP are shown in Chart B. The company tax cut is estimated to permanently add 0.9 per cent to GDP in the long run under economically-neutral funding.

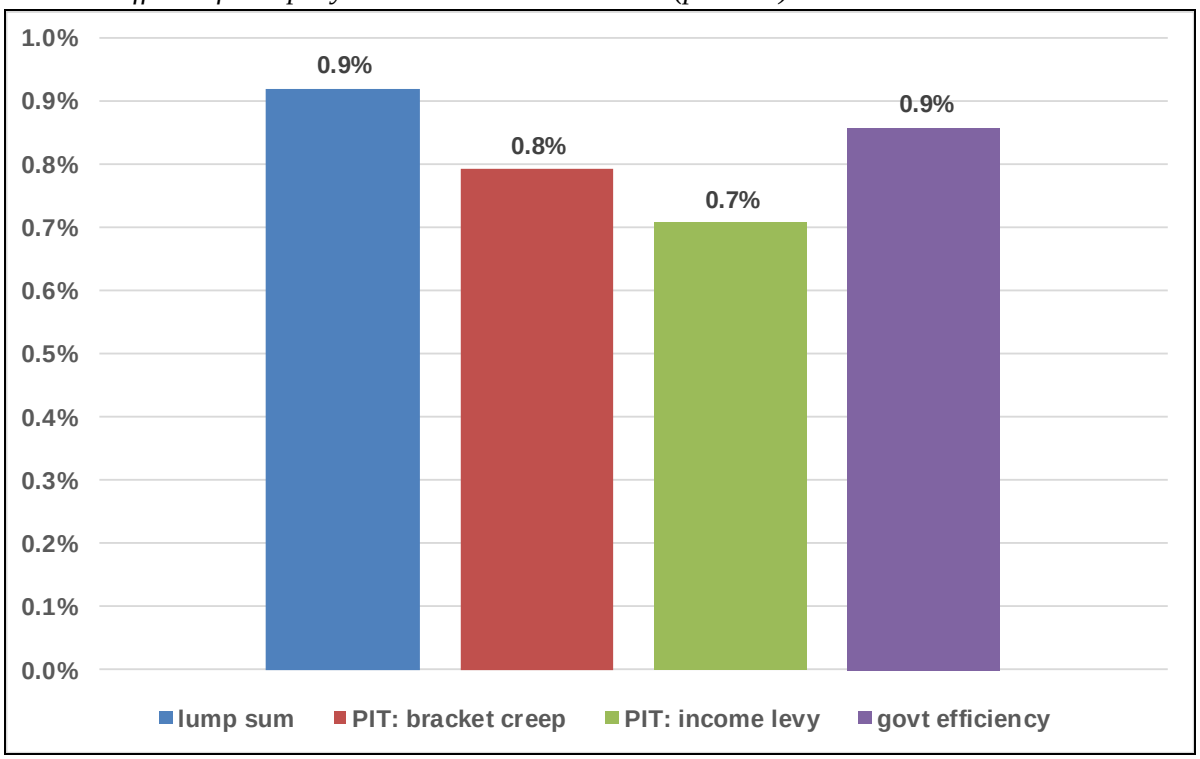
This is driven primarily by a **productivity** boost of 0.7 per cent from a higher capital stock. The capital stock is pushed higher by a permanent gain in the rate of business investment of 2.7 per cent. This is broadly comparable with UK Treasury (UK Treasury & Revenue and Customs, 2013) modelling of a gain in investment of 2.5 to 4.5 per cent from a larger corporate tax rate cut from 28 to 20 per cent. The remaining 0.2 percentage points of the gain in GDP is due to higher **employment**; higher real wages stimulate labour supply.

Although the company tax cut also reduces **profit shifting** out of Australia, this does not affect GDP. However, living standards are more appropriately measured by National Income and consumer welfare, both of which capture the benefits of a reduction in profit shifting.

Chart B shows how the gain to real GDP varies from 0.9 per cent if the funding is not economically-neutral. As noted earlier, a **government efficiency** saving raises living standards by providing consumers with the same government services at a lower cost. However, this gain in living standards is not captured by GDP because it measures government services based on their cost, reflecting the difficulty of measuring their value to consumers. Thus, the gain in GDP is still about 0.9 per cent.

The work disincentive effects from raising personal income tax broadly offset the employment gain from cutting company tax. For **bracket creep** funding this reduces the final GDP gain to 0.8 per cent, while for **income levy** funding it reduces it to 0.7 per cent.

Chart B: Effects of Company Tax Scenario on real GDP (per cent)



Source: CGETAX simulations
Note: In the chart and text, percentage impacts are rounded to the nearest one-tenth of a per cent.

The gain in GDP from cutting company tax of 0.7 to 0.9 per cent is equivalent to $11.6 billion to $15.1 billion in 2015/16 terms. Chart C shows how this gain is shared among different income groups based on GDP by income. That is, it shows the incidence of the Company Tax Scenario. A distinction can be made between the gains in GDP that relate to the cost to the economy of the expansion in the stock of business capital, and the gain in national income. These two types of gains are considered in turn.

Around $9 billion of the gain in GDP is required to fund the expansion in the stock of business capital. With a larger stock of business capital, there is additional depreciation expenses of around $6 billion. The additional capital is funded by additional foreign investment, which receives the post-tax rate of return prevailing on world capital markets. This adds $3 billion to net income to abroad, after the effects of a reduction in profit shifting are also taken into account.

Removing these elements from GDP leaves real National Income (NI) (measured at market prices), which is a better indicator of living standards. The gain in NI varies between $3.3 billion and $5.7 billion, depending on the funding assumption. This is broadly comparable to the more precise measure of the gain in living standards of $4.1 billion to $5.2 billion shown in Chart A for the first three funding measures. Thus, the breakdown into three components of the gain in NI shown in Chart C gives an indication of how the overall gain in living standards is shared across income groups.

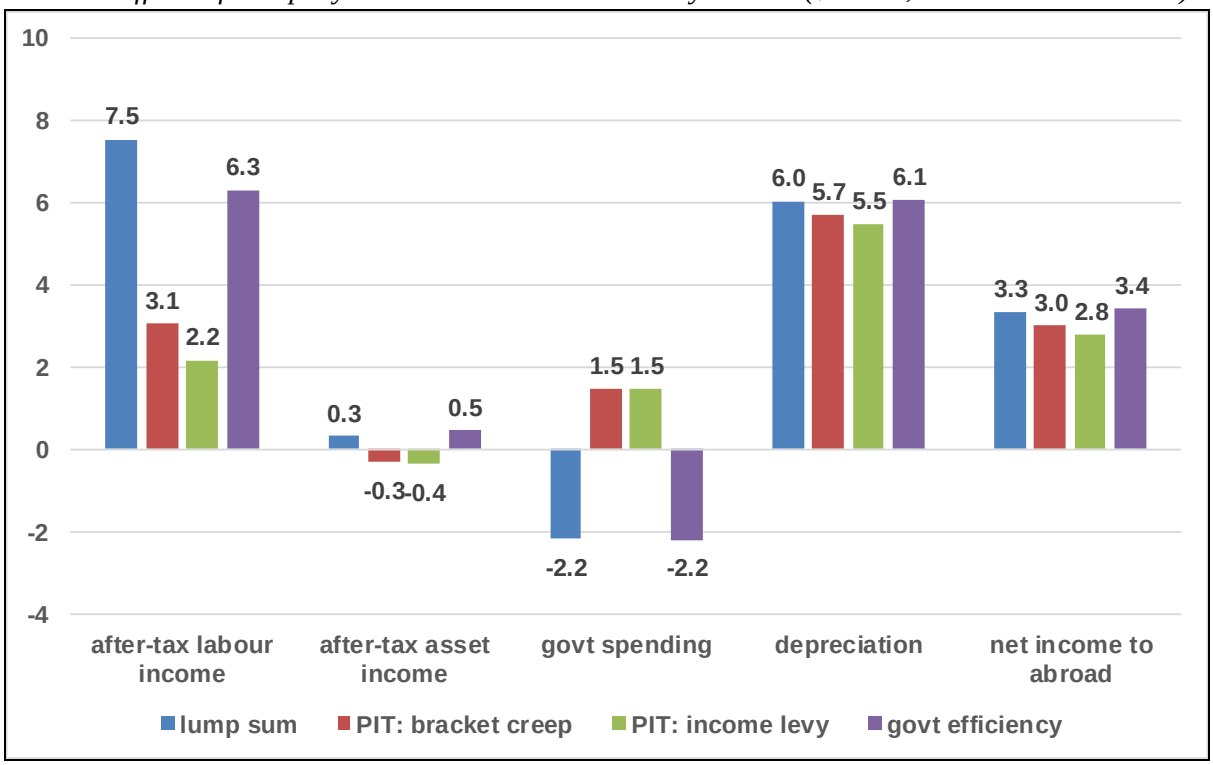
Labour income earners receive the majority or all of the benefit to NI under all four funding assumptions. This is because under each funding assumption, the productivity gain from the company tax cut drives a permanent gain in pre-tax real wages of 1.0 per cent.

When the company income tax cut is funded by lower government spending, the gain in real wages translates to a gain in real annual after-tax labour incomes of $6.3 billion to $7.5 billion. In the other two scenarios, part of this gain is clawed back in higher personal income tax, leaving a gain in real after-tax labour incomes of $2.2 billion to $3.1 billion.

There are three main effects on asset income earners. On the one hand, a gain in asset values raises real pre-tax asset incomes. This is only partly offset by the reduction in the value of franking credits under a lower company tax rate. Hence, there is a small gain in real post-tax asset income under the two funding assumptions involving lower government spending. Under the two funding assumptions in which personal income tax is increased, these tax increases leave real post-tax asset incomes marginally lower. Overall, the effect on real post-tax asset incomes is broadly neutral across the four funding assumptions at between -$0.4 billion and +$0.5 billion.

The final component of the gain in National Income is real government spending. It is lower under the two funding assumptions involving government spending restraint. However, it is higher when personal income tax funding is used. This is because higher real wages add to the costs of government services and to transfer payments (which in CGETAX are assumed to be adjusted in line with wages).

Chart C: Effects of Company Tax Scenario on real GDP by Income ($billion, 2015-16 annual terms)



Source: CGETAX simulations

The analysis presented here is long run in nature. However, other studies indicate the likely timing of these gains. The UK Treasury (UK Treasury & Revenue and Customs, 2013) modelling of a phased cut in the UK corporate tax rate from 20 to 28 per cent using a dynamic CGE model found that more than one-half of the long-run gains had accrued by the time the corporate tax cut was fully phased in.

1 Introduction

The Department of the Treasury ("The Treasury") asked Independent Economics (IE) to model the economy-wide impacts of reducing the company tax rate from 30 to 25 per cent ("Company Tax Scenario") under four alternative funding assumptions. This request was made under a consultancy contract in which Independent Economics is providing economy-wide modelling services for the tax review process.

This report models the Company Tax Scenario, and reports on its long-run effects on economic activity and living standards, and well as its incidence for different types of income earners.

This report also explains the nature of the economic model that has been used and its key assumptions and elasticities that influence the modelling results. While the modelling provides estimates of long-run impacts, this report also provides separate information on the likely timeframe over which those impacts would develop. All estimates are reported on a 2015-16 financial year basis.

Computable General Equilibrium (CGE) models have been used to analyse the economic efficiency of tax policy since the seminal work for the USA by Ballard, Shoven and Whalley (1985). Since that time, the author of this report, Chris Murphy, has led three CGE projects to model the efficiency of various aspects of the Australian tax system.

- MM900 modelling (KPMG Econtech, 2010) was commissioned by the Australia's Future Tax System Review ("Henry Tax Review") and focussed mainly on work disincentives and the inefficiencies from narrowly-based taxes.
- IE CGE modelling (Australian Government, 2012) was commissioned by the Business Tax Working Group (BTWG) and concentrated on modelling of investment disincentive effects and profit shifting.
- As part of the tax review process, Treasury commissioned IE to introduce saving disincentive effects to the IE CGE model, which is now known as CGETAX. Independent Economics also agreed to update CGETAX for the latest detailed snapshot of the economy from the ABS, namely the input-output tables for 2012-13.

In other development work on CGETAX, the behavioural effects of most taxes, including narrowly-based taxes, have been modelled, the number of industries has been developed from 120 to 278, and oligopoly power has been taken into account.

The Treasury contributed important ideas to the development of the first two models, the second of which, the original IE CGE model, it has continued to develop and use (Cao et al., 2015).

This report is organised as follows:

- **Section 2** describes the Company Tax Scenario in more detail, including the cut to company tax, the four funding assumptions, and how each is introduced into CGETAX.
- **Section 3** sets out the modelling approach by describing the important features of CGETAX for the Company Tax Scenario.

- **Section 4** quantities the economic inefficiencies or excess burden from company tax. It compares this with the excess burdens from other taxes.
- **Section 5** presents the results for the Company Tax Scenario. The results include the effects on consumer living standards, GDP, investment and the Government budget, as well as its incidence on labour and asset incomes.
- **Appendix A** shows how, in CGETAX, the company tax rate affects the cost of capital.

While all care, skill and consideration has been used in the preparation of this report, the findings refer to the terms of reference of The Treasury and are designed to be used only for the specific purpose set out below. If you believe that your terms of reference are different from those set out below, or you wish to use this report or information contained within it for another purpose, please contact us.

The specific purpose of this report is to provide an analysis of the economy-wide effects of the Company Tax Scenario specified above.

The findings in this report are subject to unavoidable statistical variation. While all care has been taken to ensure that the statistical variation is kept to a minimum, care should be taken whenever using this information. This report only takes into account information available to Independent Economics up to the date of this report and so its findings may be affected by new information. The information in this report does not represent advice, whether express or inferred, as to the performance of any investment. Should you require clarification of any material, please contact us.

2 Company Tax Scenario

The Company Tax Scenario involves reducing the company tax rate from 30 to 25 per cent under four alternative funding assumptions. This section explains the setup of the scenario in greater detail.

2.1 Policy changes

The modelling uses 2015/16 as its reference or baseline year. However, the modelling approach requires a fiscally sustainable baseline, whereas under the Mid-Year Economic and Fiscal Outlook or MYEFO (Australian Government, 2015) fiscal sustainability is project to be achieved later in 2021/22. To resolve this potential inconsistency, the fiscal settings for 2015/16 have been adjusted to incorporate the budget repair projected to 2021/22, including the equivalent of six years of bracket creep supported by expenditure restraint. That is, future budget repair has been brought forward to be superimposed on the 2015/16 baseline and make it fiscally sustainable.

Specifically, in 2015/16 MYEFO, personal income tax (plus fringe benefits tax) is estimated to raise $198 billion. Bringing forward the implied lift in average tax rates from six years of bracket creep to 2021/22 boosts this to $216 billion, based on simulations using the IE Personal Income Tax Model (ITM).

In 2015/16, MYEFO projects that company income tax will raise $68 billion (on an accrual basis). In the Company Tax Scenario, the company tax rate is reduced from 30 to 25 per cent. This directly reduces company tax revenue by one-sixth of its baseline amount of $68 billion i.e. by $11.3 billion

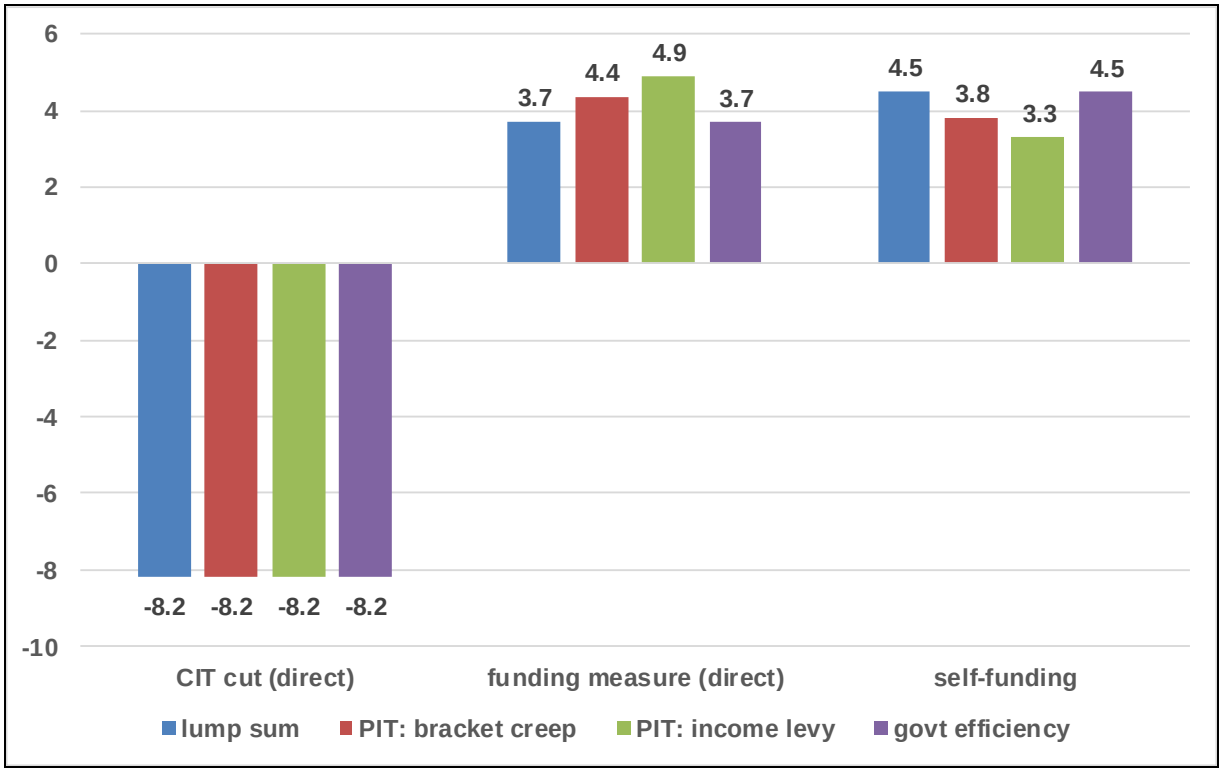
At the same time, the lower company tax rate reduces the value of franking credits. This results in a direct gain in personal income tax and superannuation income tax collections estimated at $3.1 billion. This is consistent with ATO historical income tax statistics data that shows that franking credits claimed have represented around 30 per cent of company tax collections. For example, the latest data, which is for 2013-14, shows franking credits claims of $21.6 billion (Australian Taxation Office (2015)), which compares to company tax on an accrual basis of $69 billion. The estimate of the direct impact on personal income tax and superannuation income tax collections also takes into account that franking credits are taxable.

The net direct cost to the government budget of the company tax cut is therefore estimated at $8.2 billion. This is the difference between the direct loss to company tax collections of $11.3 billion and the direct gain to personal income tax and superannuation income tax collections of $3.1 billion, as shown in Chart 2.1.

As explained further in sections 4 and 5, reducing company tax also has favourable effects on the economy, which lead to indirect gains to the budget, sometimes known as a fiscal dividend. It strengthens investment incentives, which lead to higher productivity, boosting tax collections. It reduces the incentive to shift profits to lower taxed jurisdictions, adding to company tax collections. Finally, it leads to higher real wages, which boosts collections from personal income tax.

In the long run, these productivity, profit-shifting and employment effects provide an indirect boost of $4.5 billion to budgets at all three levels of government. That is, they self-fund 55 per cent of the direct cost of the company tax cut of $8.2 billion. The self-funding percentage of 55 per cent is in line with recent UK Treasury modelling. It found a self-funding percentage of 45 to 60 per cent for a cut in the UK corporation tax rate from 28 to 20 per cent (UK Treasury & Revenue and Customs, 2013).

Chart 2.1: Long-term Effects of Company Tax Scenario on government budgets ($bn, 2015/16)



Source: CGETAX model simulations

After allowing for self-funding, another policy measure is required to fund the remaining, annual cost of the company tax cut of $3.7 billion. Four alternative assumptions are modelled:

- "**lump sum**" funding i.e. budget savings measures that are economically neutral: they do not influence economic behaviour and have a cost to households equal to the benefit to the budget;
- an increase in personal income tax through **bracket creep**;
- an increase in personal income tax through an **income levy**; and
- a reduction in spending through **government efficiency** savings.

As will be seen in detail later when considering detailed budget impacts, the first and the last funding methods have little effect on economic behaviour, preserving the $4.5 billion in self-funding of the company income tax cut. Consequently, either of these measures only needs to raise $3.7 billion to achieve a neutral budget outcome in the long run.

The middle two measures increase personal income tax, partly offsetting the gains in real wages from cutting company tax. This neutralises the gain in labour supply and employment from cutting company tax. This in turn reduces the self-funding or indirect budget gain from the company tax cut from $4.5 billion to between $3.3 billion and $3.8 billion. After taking this into account, bracket creep would need to directly raise $4.4 billion and the income levy $4.9 billion to achieve a neutral budget outcome in the long run, as seen in Chart 2.1.

Hence, the funding measure needs to directly raise between $3.7 billion and $4.9 billion annually, depending on which one is assumed, to achieve a neutral budget impact in the long run. Nevertheless, this is well below the direct value of the company tax cut of $8.2 billion. The net self-funding (or fiscal

dividend or indirect budget impact) from the Company Tax Scenario is therefore between $3.3 billion and $4.5 billion.

2.2 Model Inputs

These modelled policy measures need to be translated into inputs for the CGETAX model covering company income tax, personal income tax and government spending.

For company income tax the translation is simple. The rate of company tax is reduced from 30 to 25 per cent. For the two personal income tax funding assumptions, CGETAX requires inputs for representative average and marginal rates of tax. These were obtained using the ITM model. This process is explained first for the **bracket creep** assumption and then for the income levy assumption.

Recalling that the Baseline Scenario already factors in bracket creep to 2021/22, the first step was to use the ITM model to simulate further bracket creep from 2021/22 to 2023/24. ITM simulates a gain in personal income tax revenue of 2.9 per cent from the lift in average tax rates induced by bracket creep from 2021/22 to 2022/23. However, only 65 per cent of this, or 1.9 per cent, is needed to fund the company tax cut. This percentage rise of 1.9 per cent in the average rate of personal income tax was fed into CGETAX, taking its average tax rate from 25.1 per cent to 25.6 per cent. This generates the required direct funding from bracket creep of $4.4 billion.

To model incentive effects, CGETAX also requires information on marginal tax rates. Marginal rates are higher than average rates, reflecting the progressive nature of the personal income tax scale. After applying some smoothing, ITM projects that the bracket creep described above will reduce the progressivity elasticity from 1.444 to 1.424. These progressivity elasticities are fed into CGETAX and applied to the average tax rates presented in the previous paragraph. When this is done, the Company Tax Scenario is seen to increase the representative marginal tax rate from 36.3 to 36.5 per cent. Thus, under bracket creep, increases in marginal tax rates are smaller than increases in average tax rates (0.2 versus 0.5 percentage points). This limits the disincentive effects relative to the revenue gains.

Turning to the **income levy** assumption, it is required to generate slightly higher direct funding of $4.9 billion rather than $4.4 billion, because it has larger disincentive effects and hence a more negative indirect impact on government budgets. A levy of 0.6 per cent of income is required, lifting average and marginal tax rates by the same amount. In particular, it lifts the representative average rate of tax from 25.1 per cent to 25.7 per cent and the representative marginal rate from 36.3 per cent to 36.9 per cent. The larger lift in the representative marginal rate of tax, relative to the bracket creep case, is responsible for the stronger disincentive effects.

The remaining two alternative funding assumptions involve reductions in government spending. They involve a reduction in lump sum transfers and a cut to real general government final demand, which are discussed in turn.

Lump sum funding refers to budget savings measures that are economically neutral: they do not influence economic behaviour and have a cost to households equal to the benefit to the budget. An example would be a reduction in a government payment that applied to households based on demographic factors but not economic factors. Lump sum transfers do not correspond to any particular budget item and are set to zero in the baseline scenario. To achieve lump sum funding of the company tax cut, households are modelled to make an annual lump sum transfer to government to meet the

funding requirement of $3.7 billion. This reduces household incomes but otherwise does not directly affect household economic decision making.

The remaining alternative funding assumption involves a reduction in general government final demand. As this does not directly affect household behaviour in CGETAX, it is best interpreted as an improvement in government efficiency. If instead government services to households were reduced, this could have an income effect on households, and possibly other effects, but this has not been modelled. Real general government final demand was reduced was 1.2 per cent. This **government efficiency** saving generates the funding requirement for the company tax cut of $3.7 billion.

3 The Economic Modelling Approach

This report simulates the Company Tax Scenario described in the preceding section using the CGETAX model. CGETAX is a large model designed to analyse the economic impacts of many different taxes. In this interests of brevity, this section concentrates on the modelling of the taxes that are varied in this report, namely company tax and personal income tax.

A more comprehensive description of CGETAX can be downloaded from the "models" page of the Independent Economics web-site. For those preferring a theoretical analysis of the company tax cut using a stylised version of CGETAX, this is also provided at the same location:

http://www.independenteconomics.com.au

Computable General Equilibrium (CGE) models such as CGETAX model the interaction of the household, business, government and foreign sectors in economic markets. The household and business sectors aim to maximise their utility and profit respectively. Prices adjust in each market until supply is balanced with demand.

When an economic activity is taxed heavily, economic returns are reduced, which can lead to a tax-driven, economically inefficient shift away from that activity and towards other less-heavily taxed activities. The extent of such shifts and associated economic losses depends on the substitutability between activities, as measured by various elasticities. CGE models provide a means of quantifying these shifts and losses.

The CGE models described in this section are long run models, meaning that their results refer to the ongoing effects on the economy after it has fully adjusted to economic shocks. This is appropriate for policy analysis, because government policy options should be assessed primarily on the basis of their lasting impacts, although it is also appropriate to take adjustment costs into consideration.

This section begins by describing previous CGE modelling of tax policy. In then describes how, in CGETAX, personal income tax influences the behaviour of the household, before moving on to describe how company tax affects the behaviour of businesses. The values of the key elasticities that determine the magnitudes of these behavioural responses are then discussed. As CGETAX is a long run model, the likely timing of its results being realised is discussed. Finally, it is explained how CGETAX is used to assess the impacts of tax policies on economic efficiency or consumer welfare.

3.1 Previous Work

Computable General Equilibrium (CGE) models have been used to analyse the economic efficiency of tax systems since the seminal work for the USA by Ballard, Shoven and Whalley (1985). They estimated marginal excess burdens (MEBs) for the major US taxes.

The MEB shows the consumer loss per dollar of improvement in the government budget from a small tax rise. This loss is measured over and above the amount of the revenue that is raised[1]. Thus, the MEB provides a pure measure of the costs to consumers of disincentive effects from a tax. These disincentive effects may include disincentives to work, save or invest, or to the patterns in the same areas. More

[1] The income effect on consumers from raising revenue from them is neutralised by assuming the revenue is returned as a lump-sum transfer, leaving only the disincentive effects.

narrowly-based taxes may also distort more specific economic choices e.g. between different alcoholic beverages.

Ballard et al. (1985) reached two major conclusions.

"There is growing evidence that MEBs may be in the range of 15 to 50 cents for an economy like that of the United States." Such a wide range means that there is a large potential for consumers benefiting by the US Government relying more on taxes with low MEBs and less on taxes with high MEBs. In principle, tax efficiency would be optimised by shifting the tax burden in this way until MEBs are equalised across all taxes.

"We hope that the large estimates we report will contribute to … a discussion of possibly modifying the cost-benefit criterion for public goods evaluation." For example, if a government spending program is to be funded with a tax with a typical MEB of say 25 cents per dollar, each four dollars of program spending would need to provide consumers with benefits of at least five dollars for the program to be worthwhile. This is so the program covers the direct cost to taxpayers of $4, plus the additional cost from disincentive effects of one dollar (or 25 cents per dollar of additional revenue).

Since that time, the author of this report, Chris Murphy, has led three CGE projects to model the efficiency of various aspects of the Australian tax system. MM900 modelling (KPMG Econtech, 2010) was commissioned by The Treasury for the Australia's Future Tax System Review ("Henry Tax Review"). It focussed mainly on work disincentives and the inefficiencies from narrowly-based taxes. The resulting estimates of MEBs were included in the Henry Tax Review report (AFTSR, 2009). The Treasury contributed important ideas to MM900.

IE CGE modelling (Australian Government, 2012) was commissioned by The Treasury for the Business Tax Working Group (BTWG) and focussed on detailed modelling of investment disincentive effects. The modelling represented many of the features of the company tax system, including its effects on investment decisions and profit shifting. This led to improved estimates of the MEB for company tax.

As was the case with MM900, Treasury contributed important ideas to the development of IE CGE. The Treasury has continued to develop and use this model under licence, most recently in a Working Paper that analysed the efficiency and incidence of broad-based taxes as part of the tax review process (Cao et al., 2015).

In 2014 and 2015 IE further developed its CGE model so that it covered the disincentive effects captured in both of the previous modelling exercises (MM900 and IE CGE). The resulting IE Extended CGE model therefore covered work and investment disincentive effects, as well as the inefficiencies from narrowly-based taxes.

In November 2015 The Treasury commissioned IE to undertake modelling to support the tax review process. As part of this, saving disincentive effects were introduced to the IE Extended CGE model. In addition, the modelling of several taxes, particularly payroll tax, was enhanced. The model was also updated for the latest ABS input-output tables, which refer to 2012-13, and the reference year for policy analysis was advanced to 2015-16. Finally, the model was enhanced to recognise that unexplained economic rents identified outside of the mining sector (e.g. in the finance sector) are likely to be associated with imperfect competition rather than an unidentified fixed factor of production. Given the focus of this model on tax, and the increased use of it in academic research as distinct from consulting work, the extended and updated model is now known simply as CGETAX.

Thus, CGETAX includes detailed modelling of tax-based work, saving and investment disincentive effects, as well as the disincentives from narrowly-based taxes. This allows the effects of tax design on economic efficiency to be assessed more comprehensively than with previous models. CGETAX has a fully up-to-date database. Table 3.1 summarises how the features on the CGE model have developed with each version, beginning with IE CGE, then Extended IE CGE and finally CGETAX.

Table 3.1: Development of Model Features: detail, taxes, behavioural responses and calibration

Feature	*Original IE CGE Model*	*Extended IE CGE Model*	*CGETAX*
Detail			
Industries	114	288	278
Types of labour	1	8	2 x 8
Types of capital	9	9	9
Location rents (land and minerals)	yes	yes	yes
Oligopoly rents	no	no	yes
Taxes			
personal income tax	average rate	Marginal and average rates	Marginal and average rates
superannuation income tax	NA	NA	Contributions, earnings
Payroll tax	NA	NA	threshold and rate
Company income tax	Tax rate, Franking credits, debt deduction, profit shifting, net foreign investment	Tax rate, Franking credits, debt deduction, profit shifting, net foreign investment	Tax rate, Franking credits, debt deduction, profit shifting, foreign investment in both directions
Externality taxes	NA	Beer, spirits, wine	Beer, spirits, wine, fuel, tobacco, gambling
GST	NA	Taxable/exempt/ zero-rated	Taxable/exempt/ zero-rated
Property taxes	generic land tax, conveyancing duty	generic land tax, conveyancing duty	Land tax, municipal rates, residential conveyancing duty, commercial conveyancing duty
Other specific taxes	NA	Import duty, insurance tax	Import duty, insurance tax, mining royalties, PRRT
Behavioural responses / elasticities			
labour supply (compensated)	0.4	0.4	0.4
within consumption	0.6	0.6 broad, 0.6-2.4 detailed	0.6 broad, 0.6-2.4 detailed
labour-capital	0.9 equipment, 0.5-0.7 structures	0.9 equipment, 0.5-0.7 structures	0.9 equipment, 0.5-0.7 structures
between occupations	NA	2	3
between taxed & untaxed labour	NA	NA	3
present-future consumption (EIS)	NA (0)	NA (0)	0.25
Calibration			
I-O Table	2007/08	2009/10	2012/13
Tax Revenue	2007/08	2013/14	2015/16

Some of the additional modelling of tax inefficiencies seen in the final two columns of Table 3.1 was made possible by developing the model's industry detail. Instead of relying on the standard input-output tables that contain around 114 industries, the two more recent models use the ABS product details tables to distinguish around 280 industries. For example, this involves subdividing the original alcohol and tobacco industry so that the inefficiencies from taxing beer, wine and spirits differently can be modelled. It also involves subdividing the insurance and superannuation industry so that the inefficiencies from heavily taxing general insurance can be modelled robustly.

The changes to personal income tax and company tax that are simulated in this report affect household and business behaviour respectively. Those behaviours are now discussed in turn.

3.2 Personal Income Tax and Household Behaviour

In CGETAX a single, structured utility function cover all aspects of household decision making. Such an integrated approach is necessary so that changes in consumer welfare due, for example, to changes in tax policy, can be measured in a fully consistent way. There are four tiers to household decision making.

In the top tier, a representative household maximises its utility from a planned future time path for a bundle of consumption and leisure services. This leads to an Euler equation that sets the optimal or planned rate of growth in per capita consumption (and leisure) as,

$$\frac{\dot{c}}{c} = \sigma t.\left[(1 - tam).r - \delta\right]$$

where σt is the elasticity of intertemporal substitution, r is the real rate of return on assets and tam is the marginal tax rate for asset income. Households are thrifty if the post-tax rate of return to assets, (1-tam).r, exceeds their rate of discount of the future, δ. In that case they forego current consumption in return for future consumption, so that growth in per capita consumption is positive. The extent of this growth is proportional to the **elasticity of intertemporal substitution**. Thus, the value of the elasticity of intertemporal substitution, which is discussed in section 3.4, determines the strength of the **saving disincentive** effect when asset income is taxed (tam>0). In CGETAX asset income is taxed through personal income tax and superannuation income tax, and is reduced through the franking credits associated with company tax.

In the second tier, and within each time period, the representative household chooses the combination of leisure and consumption that maximises utility. This combination will depend on the price of leisure relative to the price of consumption. The price of leisure is the income foregone by not working and hence equals the post-tax wage, based on the marginal tax rate for labour income. The strength of the labour supply and **employment** effect when labour income is taxed depends on the **compensated elasticity of the labour supply** with respect to the marginal after-tax real wage. While labour supply decisions made at the intensive margin (i.e. hours worked in a year) depend on the marginal tax rate, decisions made at the extensive margin (i.e. whether to work in a year) depend on the average tax rate. To take this into account, the effective marginal tax rate used in the model is constructed as a weighted average of the marginal and average tax rates.

The saving and employment or work incentive effects presented above are driven by taxation of asset and labour incomes. This involves taking into account both personal income tax and superannuation taxes. Within superannuation, a distinction is made between taxation of contributions, which is treated

as a tax on labour income, and taxation of earnings, which is treated a tax on asset income. The same distinction between taxing labour and asset income is made in modelling personal income tax. Both personal income tax and superannuation tax are then considered together in calculating the overall level of taxation of labour income on the one hand, and asset income on the other. In finally assessing tax rates on asset incomes, franking credits are also taken into account.

For both labour and asset incomes a distinction is also made between average and marginal tax rates. Average tax rates drive revenue collections. Marginal tax rates drive tax-based disincentive effects, as discussed above.

While households determine the time path of consumption in the first tier of decision making and the division between consumption and leisure in the second tier, there are two remaining tiers. The third tier allocates consumption across 19 broad categories (including food, financial services etc) and the third tier takes the consumption allocation down to the level of the 278 industries appearing in the model.

These third and fourth tiers do not play an important role for the changes to the broad-based taxes that are considered in this report. Rather, they are designed for modelling specific taxes such as those on specific forms of alcohol, different petroleum fuels, different forms of insurance, and so on. Hence they are not discussed further here.

3.3 Company Tax and Industry Behaviour

As in CGE models generally, in each industry in CGETAX a representative business maximises profit subject to the constraints of technology. The nature of this process is similar for nearly all of the 278 industries in the model, so here it is described for a typical industry.

In a typical industry, the representative business maximises profit subject to the overall production technology depicted in Diagram 3.1. This is assumed to occur under constant returns to scale and either perfect or imperfect competition. Perfect competition is assumed in industries where rates of return on capital are not exceptionally high, after taking into account the contributions of fixed factors i.e. mineral resources and land.

Imperfect competition is assumed in some other industries, the main examples being the finance and telecommunications industries. The widely-used Cournot-Nash model of oligopoly is used, which leads to firms applying a mark-up relative to competitive pricing. That mark-up represents oligopoly rents.

Profit maximisation gives rise to demands for four broad categories of primary inputs:

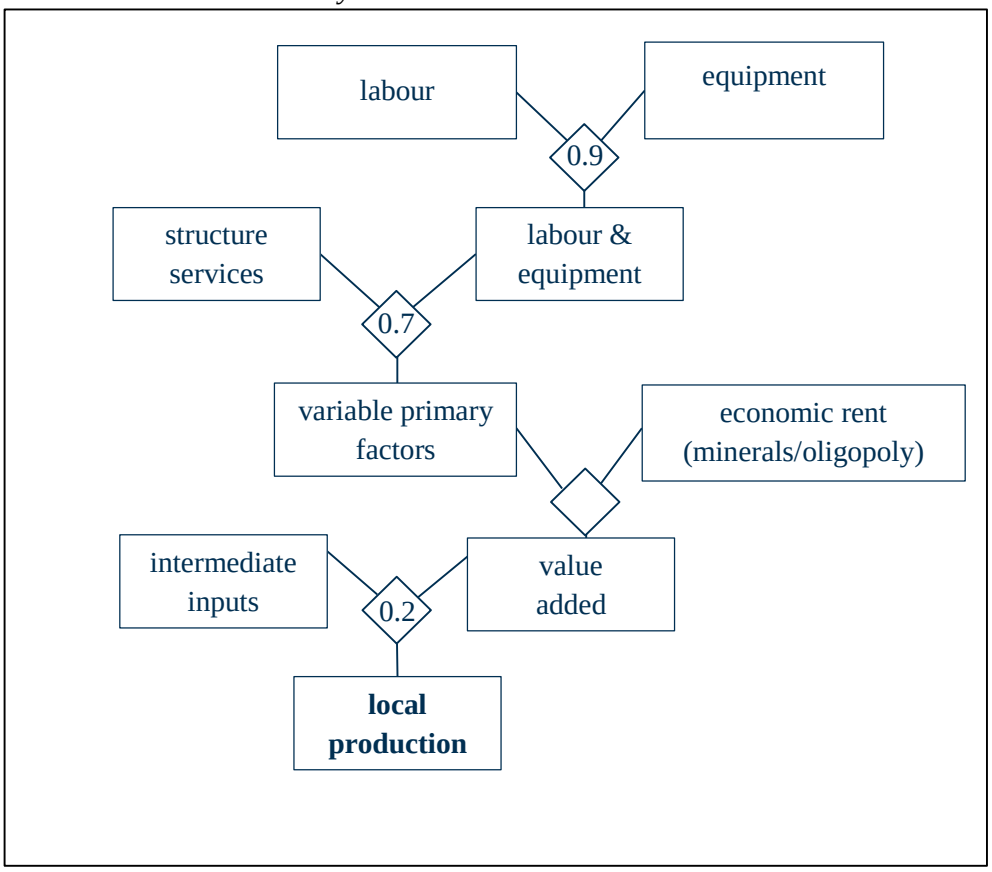
- minerals;
- labour;
- non-structure capital; and
- and structure services.

Minerals

Minerals are treated as a location-specific fixed factor that is present in certain mining and energy extraction industries. With fixed supplies, taxation of mining economic rents does not lead to behavioural responses or associated inefficiencies. Rather, the full incidence of the tax falls on the

owners of the mineral resources. The only existing example of such a tax is the petroleum resource rent tax or PRRT.

Diagram 3.1: Production in each industry



Labour

CGETAX distinguishes eight types of labour by occupation and hence has eight labour markets. Employment of labour is subject to payroll tax. This adds to the labour market tax wedge and the associated work disincentive effect in a similar way to the taxes on labour income (and consumption).

Exemptions from payroll tax, which are modelled in CGETAX, mean that only around 56 per cent of labour is taxed. This distorts the demand for labour from labour that is subject to payroll tax to labour that is exempt. However, because payroll tax is not varied in the Company Tax Scenario, the modelling of it in CGETAX is not discussed further here.

Capital (equipment and structure services)

CGETAX distinguishes nine types of business capital, which are substitutable within the broader categories of equipment and structure services. Capital is subject to company tax. The modelling of company tax was developed with The Treasury for the Business Tax Working Group.

CGETAX makes the open economy assumption that the required rate of return on capital, post company tax, is determined on world capital markets so that Australian company tax cannot lead to lower returns to foreign investors. Instead, it leads to a compensating increase in pre-tax rates of return achieved

through lower real wages. Thus, the incidence of company tax is passed on from capital to labour. This leads to the two textbook inefficiencies of company tax in an open economy.

- Company tax adds to the labour market tax wedge, adding to the **work disincentive** effect. This effect depends on a labour supply elasticity, as discussed above.
- Company tax raises the cost of capital, lowering the capital-labour ratio. This investment disincentive effect reduces **productivity**. The strength of this productivity effect depends on the elasticity of substitution between capital and labour.

Importantly, CGETAX also allows for profit shifting. Following the approach of Devereux and de Mooij (2009), businesses are assumed to maximise post-tax profits, after assuming that the costs of profit shifting to a tax haven varies with the square of the difference between the national tax rate and the tax haven tax rate. This leads to a semi-elasticity of the national tax base with respect to the difference between the national tax rate and the tax haven tax rate. A lower national tax rate reduces the extent of profit shifting to the tax haven.

CGETAX also allows for four factors that partly mitigate the disincentive effects of company tax:

- the immediate write-off of investment in mineral exploration and (with a loading) research and development – mineral exploration and research and development are distinguished as part of detailed modelling of different types of capital;
- debt deductibility;
- the ability of some foreign investors to claim some tax credits in their home country for Australian company tax; and
- the inclusion of economic rents on fixed factors (land and minerals) in the company tax base.

For a full mathematical presentation of all of the above aspects of modelling company tax and the user cost of capital in CGETAX, see Appendix A.

The above features are inherited from the IE CGE modelling developed in collaboration with The Treasury for the BTWG. However, CGETAX allows for four factors that are not taken into account in the previous modelling.

- CGETAX separately models foreign investment in Australia and Australian investment abroad, rather than modelling foreign investment in Australia in net terms. Hence it more fully captures the high level of foreign investment in Australian companies. This is important because foreign investment increases the efficiency of company tax to the extent that company tax applies to economic rents.
- As noted previously, CGETAX models saving disincentives. It therefore recognises that by reducing the net tax paid on asset income, franking credits reduce saving disincentives.
- As also noted previously, CGETAX recognises that high economic rents in certain sectors (e.g. finance, telecommunications) are due to imperfect competition rather than fixed factors of production. This is important because company tax and some other taxes lead to greater inefficiencies when economic rents are due to imperfect competition rather than fixed factors.
- CGETAX makes fully consistent the modelling of the revenue and price impacts of company tax.

When all of the effects taken into account are weighed up in a model simulation of changing the company tax rate, the negative disincentive effects dominate, leading to a high marginal excess burden (MEB) for company tax, as shown in section 4.

CGETAX also models in detail behavioural responses to taxes on property. These include stamp duty on conveyances, which discourages transfers of ownership, land tax and municipal rates. Further, the behavioural responses to mining royalties as a production tax are modelled and the PRRT is treated as a resource rent tax.

3.4 Elasticities

The modelling of the Company Tax Scenario depends importantly on the size of behavioural responses of households and businesses to changes in company tax and personal income tax. In particular, the preceding discussion identified four key elasticities that drive these responses. The values chosen for these elasticities in CGETAX are as follows.

- Tax disincentives to work: the compensated elasticity of the labour supply with respect to the marginal, post-tax real wage is 0.4.
- Tax disincentives to save: the elasticity of intertemporal substitution is 0.25.
- Tax disincentives to invest: the elasticity of substitution between capital and labour is 0.7 to 0.9.
- Profit shifting: the semi-elasticity of the company tax base with respect to the company tax rate is -0.73.

In addition, the modelling results are influenced by the open economy assumption that Australia is fully integrated into the world capital market. The chosen values for the four elasticities and the implications of the world capital markets assumption are now discussed in turn.

Work Incentives

In the Company Tax Scenario, labour supply and employment are stimulated by higher real wages when company tax is cut. On the other hand, under the two funding assumptions in which personal income tax is increased, there is an offsetting effect on labour supply. As noted in section 3.2, the strength of these labour supply effects depends on the compensated elasticity of the labour supply with respect to the post-tax wage. This in turn depends on two underlying parameters – the elasticity of substitution between leisure and consumption and the calibrated ratio of leisure time to work time.

However, Ballard (2000) argues convincingly that it makes more sense to begin with values for elasticities of the labour supply with respect to the wage and work backwards to derive values for the two underlying parameters. This is for two reasons: labour supply elasticities are more readily observable and they drive estimates of the inefficiency of labour taxes.

In CGETAX, the elasticity of the labour supply with respect to the post-tax wage is set at 0.4 as a compensated elasticity and 0.15 as an uncompensated elasticity. Working backwards, this leads to an elasticity of substitution between leisure and consumption of 1.1 and a calibrated ratio of leisure to work time of 0.48.

The compensated elasticity is based on the widely-cited study of Gruber and Sayers (2002) who find an "elasticity of taxable income" of 0.4. This refers to the elasticity of declared labour income with respect to the marginal retention rate (defined as one minus the marginal tax rate). This is a broader concept than the labour supply elasticity, but is more appropriate for tax efficiency analysis. In captures the effects of labour income tax not only on labour supply, but also on avoidance and evasion. It also focusses specifically on the effects of changes in tax rates.

While the compensated elasticity determines the efficiency costs of labour income tax, the uncompensated elasticity is a more widely understood concept. The value used here of 0.15 is consistent with the literature. For example, Evers, de Mooij and van Vuuren (2008) find a lower value for men but a higher value for women.

Saving Incentives

In the Company Tax Scenario, the cut in company tax reduces the value of franking credits for personal income tax and superannuation tax. It therefore represents a small increase in the net tax on asset incomes. Under the two funding assumptions in which personal income tax is increased, there is a further small increase in the net tax on asset incomes. As noted in section 3.2, the strength of the resulting saving disincentive effect depends on the value of the elasticity of intertemporal substitution (EIS).

Gunning, Diamond and Zodrow (2008) point out that the EIS values used in CGE models typically range from 0.25 to 0.50. Australia's system of compulsory superannuation is likely to make voluntary saving less important, and so CGETAX uses the value for the EIS at the bottom of this range i.e. the EIS is set to 0.25.

Investment Incentives

In the Company Tax Scenario, the cut in company tax reduces the user cost of capital, raising the incentive to invest. As noted in section 3.3, the strength of this investment disincentive effect is driven by the elasticity of substitution between labour and capital.

For this elasticity, the Gunning et al. (2008) literature survey reports values ranging from 0.4 to the Cobb-Douglas case of 1.0. Similarly, Devereux and de Mooij (2009) assume an elasticity of substitution of 0.7 in the CORTAX model of the EU countries.

Consistent with these studies, CGETAX uses values ranging from 0.7 to 0.9, depending on the type of capital. This can be seen from Diagram 3.1. The elasticity of substitution between labour and equipment is set to 0.9. For structures capital, the substitution with labour is indirect. The elasticity of substitution between structure services, which include structures, and the labour-equipment composite is 0.7.

Profit Shifting

In the Company Tax Scenario, the cut in the company tax rate reduces the incentive to shift profits out of Australia. Before considering the strength of this effect, some background may be useful.

The OECD is aiming to better align rights to tax multinational corporations (MNCs) with the country locations of their economic activity. This is consistent with the "source" principle for company tax, which in practice Australia largely follows.

The OECD's concern is that MNCs may shift profits from higher taxed to lower taxed jurisdictions via a range of methods. These methods transfer pricing, shifting debt and associated interest expenses to higher taxed jurisdictions, and charging higher-taxed jurisdictions higher licensing fees for access to

the MNC's intellectual property. Many governments, including Australia's, aim to limit profit shifting through transfer pricing rules and thin capitalisation rules that limit deductions on debt. In fact, CGETAX is designed to model the impacts of changes to thin capitalisation rules.

Such rules play an important role in limiting profit shifting. However, despite the rules, some profit shifting will always occur. This is because there are inherent difficulties in designing tight, one-size-fits-all rules that do not at the same time limit normal market behaviour that is unrelated to profit shifting. Over-reaching rules that limit normal behaviour may discourage foreign investment and hence do more harm than good.

Many studies have attempted to estimate the responsiveness of profit shifting to changes in a country's company tax rate. The two studies of de Mooij and Devereux (2009, 2011) were originally used in the IE CGE model as the source for a semi-elasticity of the company tax base with respect to the company tax rate of -0.5.

However, further investigation of those two studies shows that this elasticity did not allow for profit shifting via transfer pricing, which was accounted for separately. Factoring in profit shifting raises the semi-elasticity to -0.73, as confirmed in de Mooij and Devereux (2011). This larger elasticity is now used in CGETAX. An elasticity of around this magnitude is also confirmed by other recent studies. Both Heckemeyer and Overesch (2013) and Dharmapala (2014) estimate a semi-elasticity of -0.8 from the available evidence.

This raises the question of whether it is reasonable to apply this elasticity, which is based on pooled evidence for a range of countries, to Australia. This depends on whether profit shifting is considered to be a larger or smaller problem in Australia than is the international norm.

On the one hand, the AFTSR (2009) argued that Australia's franking system may discourage profit shifting for MNCs with Australian headquarters. This is because while declaring profits in Australia may lead to a higher company tax rate, it also leads to franking credits that may be utilised by shareholders. This could suggest that profit shifting is a smaller problem in Australia than is the international norm. However, the strength of this argument is limited by the fact that only around 30 per cent of company profits are claimed as franking credits; a related point is that this argument only applies to outbound investment, not inbound investment.

On the other hand, Dharmapala (2014) finds that profit shifting is more pronounced for inbound investment than outbound investment. As Australia has more inbound investment than outbound investment, this could indicate that profit shifting is a larger problem in Australia than is the international norm.

Given these arguments operate in opposite directions, profit shifting in Australia is assumed to be close to the international norm; CGETAX uses the de Mooij and Devereux (2011) estimate of -0.73.

As detailed in Appendix A, under the existing statutory company tax rate of 30 per cent, this value for the semi-elasticity implies that profit shifting reduces effective rates of tax to 25.4 per cent for Australian revenue raising and 28.1 per cent for the cost of capital. The reduction for the cost of capital is less because it includes tax avoidance costs and tax paid in tax havens.

Australia and the World Capital Market

CGETAX assumes Australia is fully integrated into the world capital market. This means that post-tax rates of return on capital in Australia are determined globally through the free movement of funds. The company tax that Australia applies therefore only adds to the hurdle pre-tax rate of return that needs to be available to attract investment to Australia. To achieve this elevation in the pre-tax rate of return, the incidence of Australian company tax must be passed on fully from capital to labour in the form of lower real wages.

Conversely, cutting company tax leads to higher real wages. This has a positive effect on work incentives, which is responsible for the labour supply or employment effect discussed elsewhere in this report.

While capital may not be perfectly integrated into the world capital market, there is no doubt that it is highly integrated. This raises the issue of how sensitive the modelling results would be to assuming that capital is highly rather than perfectly integrated into world capital markets.

Fortunately this issue has been considered in previous studies. For example, KPMG Econtech (2010) finds that assuming capital is highly mobile rather than perfectly mobile leads to only a small reduction in estimates of the impact on consumer welfare from company tax.

3.5 Timing

CGETAX is a model of long run equilibrium. This raises the issue of the likely timing of the long run effects that are presented in this report. Other studies are available that provide a guide. The UK Treasury (UK Treasury & Revenue and Customs, 2013) modelling of a phased cut in the UK corporate tax rate from 20 to 28 per cent was undertaken using a dynamic CGE model. It found that the gains accrued reasonably quickly. In particular, more than one-half of the long-run gains had already accrued by the time the corporate tax cut was fully phased in.

Similarly, a study from the US Federal Reserve (Roberts, 2003) finds that the investment/capital stock response to a changes in the cost of capital (e.g. due to a cut in company tax) is fully complete in around nine years. Further, the adjustment is front-end loaded, with half of the long run effects realised after three to four years.

3.6 Marginal Excess Burdens

As noted above, the MEB measures the consumer loss per dollar of improvement in the government budget from a small tax rise. Importantly, the gain to the government budget is returned to the consumer as a lump-sum transfer ("transfer"), so the consumer loss that is measured only reflects the disincentive or substitution effects from the tax rise.

In CGETAX, this consumer loss is measured by the equivalent variation (EV), the maximum amount consumers would be prepared to pay to stop the tax rise occurring.

4 Excess Burden of Company Tax

The Company Tax Scenario detailed in section 2 involves reducing company income tax and funding this through four alternative methods. This is an example of using tax reform to improve economic efficiency or consumer welfare. This involves relying less on a tax with a high drag on the economy and more on funding methods with a low drag on the economy.

This economic drag is conventionally measured using the concept of excess burden. The excess burden is the cost to consumers of a tax, over and above the revenue that its raises from them. These costs arise from economic disincentive effects, including disincentives to work, save and invest. Thus, a tax that does not distort economic behaviour and hence is economically-neutral would have an excess burden of zero.

The marginal excess burden (MEB) refers to the excess burden per dollar of additional revenue that is raised. Inefficient taxes have high MEBs. Hence, the Company Tax Scenario will improve consumer welfare provided the MEB for company tax exceeds the MEBs for the four alternative funding methods. Thus, this section presents and compares the MEB for company tax with other MEBs, including for the four alternative funding assumptions.

4.1 MEBs of Company Income Tax and Other Taxes

Table 4.1 compares the MEBs. The MEB from having a company tax rate of 30 per cent rather than 25 per cent is estimated at 139 cents per dollar of revenue, indicating that company tax is highly inefficient at its current rate of 30 per cent. Conversely, this implies that there is a large gain in consumer welfare per dollar of cost to the budget from reducing the company tax rate from 30 to 25 per cent.

The effects of cutting company tax depend on its final incidence. Company income tax is a tax on the returns to capital. However, as explained in section 3, in an open economy such as Australia, the required rate of return on capital, post company tax, is determined on world capital markets so that Australian company tax cannot lead to lower returns to foreign investors. Instead, it leads to a compensating increase in pre-tax rates of return achieved through lower real wages. Thus, the incidence of company tax is passed on from capital to labour.

Conversely, when company tax is reduced, the benefit is largely passed on from internationally mobile capital to labour. Taking this into account, the company tax cut stimulates three favourable behavioural responses. These responses at the same time lift consumer welfare by lifting national income and have indirect effects on government budgets that partly self-fund the direct cost of the company tax cut.

- Reducing company tax has a positive effect on investment incentives. Stronger investment leads to a more capital intensive economy and higher **productivity**. This productivity gain lifts incomes, which in turn boosts most tax collections.
- Reducing company tax also improves the international competitiveness of Australia's effective average rate of corporate tax. Specifically, based on data from the Centre for Business Taxation at Oxford University, our ranking improves from 35th to 23rd among a broad group of 46 countries. This improvement to a middle ranking reduces the extent of **profit shifting** to other jurisdictions, adding to Australian company tax collections.
- Because post-tax rates of return on capital are largely determined globally rather than nationally, as noted above, the incidence of a nation's company tax is generally passed on from capital to

labour. Cutting company tax therefore leads to higher real wages, which has a positive effect on work incentives. Like higher productivity, higher labour supply and **employment** lifts incomes, which boosts tax collections.

Table 4.1: Marginal Excess Burdens of Tax Changes (per cent of net revenue)

Tax Change	MEB
Company income tax	
CIT from 25% to 30%	139%
Personal and super income taxes	
PIT bracket creep	18%
PIT income levy	31%
PIT surcharge	41%
GST	
raise rate: incremental	18%
broaden base to fresh food	10%
Payroll Tax	
raise rate	37%
reduce threshold	24%
Government spending restraint	
lump sum cut	0%
efficiency gain	-97%

Source: CGETAX model simulations

At the same time, section 3 identified a range of factors that mitigate these major economic impacts of company tax. These mitigating effects include immediate write-off provisions, debt deductibility, some foreign investors being able to claim some tax credits in their home country for Australian company tax, and taxation of mineral and land rents. The CGETAX model allows for all of these mitigating effects, but the three major effects – on productivity, profit shifting and employment – dominate, leading to a large gain in consumer welfare from the modelled company tax cut. Thus, the company tax cut provides a large lift in consumer welfare because it stimulates productivity and employment and reduces profit shifting.

At the same time, the direct cost to government budgets of achieving this gain in consumer welfare is reduced by the franking credits system. Specifically, as detailed further in section 5, around 26 per cent of the direct cost to company tax collections is offset by a direct gain to personal income tax and superannuation income tax collections, because the company tax cut automatically reduces the value of franking credits. On the other hand, the reduced value of franking credits also implies a net increase in tax on asset incomes, adding to saving disincentives. These effects from the franking credits system are also taken into account in the CGETAX MEBs presented in Table 4.1.

Table 4.1 shows that the MEBs for improving government budgets using any of the four funding methods are much lower.

The first funding method is **lump sum** funding, which by definition has no behavioural impacts. An example would be a cut to a government spending program that reduces consumer welfare by an amount equal to its budget value, and has no effects on economic choices. Thus the MEB – the change in consumer welfare relative to the budget gain – is zero.

Alternatively, a cut in spending might be based on **government efficiency** savings rather than a reduction in government services to consumers. This is the case under the fourth, alternative funding assumption. With the budget saving passed on to consumers as a lump sum transfer, they receive around

$1 of benefit for each dollar of budget improvement, leading to an MEB of close to minus 100 per cent (or more precisely, minus 97 per cent as shown in Chart 4.1). Clearly this is the best option for budget improvement, but the reliance that can be placed on this option is limited by the availability of efficiency improvements.

As noted earlier, raising personal income tax reduces work incentives, leading to some loss of labour supply and employment. Further, raising personal income tax also increases taxation of asset income, adding to saving disincentives. Thus, Table 4.1 shows an MEB of 18 or 31 per cent for funding budget improvement through raising personal income tax through **bracket creep** or an **income levy**.

Bracket creep has a lower MEB because, as discussed in section 2, it involves increasing representative marginal rates of tax by less than representative average rates of tax. Because work and saving disincentive effects depend more on marginal rates and revenue gains depend on average rates, this means that bracket creep has relatively mild disincentive effects relative to the revenue gains. This leads to the estimated MEB of only 18 cents per dollar of additional revenue.

On the other hand, the hypothetical levy calculated as a fixed percentage of income would lift marginal and average tax rates by the same number of percentage points. This greater impact on marginal tax rates leads to a higher MEB of 31 cents per dollar of additional revenue (Table 4.1).

In any case, all of these MEBs fall well short of the MEB associated with the difference between a company income tax rate of 30 and 25 per cent. Hence, funding the company income tax cut by any of the four funding methods still results in a large net gain to consumers, driven by higher productivity and less profit shifting.

Similarly, the MEB for company tax of 139 per cent is much higher than for other broad-based taxes. This leads to a large benefit to living standards from relying less on company tax in the overall tax mix. By comparison, MEBs are 18 to 41 per cent for personal income tax, depending on the nature of the change to the rate scale, 10 to 18 per cent for GST and 24 to 37 per cent for payroll tax, depending in both cases on whether the base or rate is varied.

More generally, given the high MEB for company tax, many analysts have recommended that the company tax rate be cut from 30 to 25 per cent. This includes the AFTSR (2009) and the Independent Economics (2015) report to the Australian Council of Learned Academies.

4.2 Two Methods of Estimating MEBs

In Table 4.1, the marginal excess burden (MEB) of a tax was calculated as the loss in consumer welfare per dollar of additional revenue that is raised. As explained in section 3.6, the loss in consumer welfare was calculated using the concept of the equivalent variation. However, the loss in consumer welfare can be estimated to a first approximation in a simpler and more intuitive way, using only the impacts of the tax change on government budgets. This can be shown using the company tax cut as an example. Because this is a tax cut rather than a tax increase, the MEB is now interpreted as the welfare gain per dollar of revenue that is lost, rather than the welfare loss per dollar of revenue that is gained.

From the budget impacts presented in section 2.1, the company tax cut involves a direct cost to government budgets of $8.2 billion. This is also a measure of the ultimate benefit to consumers. However, favourable economic responses result in indirect gains to the budget of $4.5 billion. This partial self-funding of the company tax cut means that governments only need a policy to fund the

remaining cost of $3.7 billion. If this is funded in an economically-neutral way, this funding policy will cost consumers the same amount. This leaves consumers with a net benefit of $4.5 billion, corresponding to the indirect gain to the budget from the company tax cut. This is also known as the fiscal dividend or self-funding resulting from the cut. It provides an approximate measure of the gain in consumer welfare.

The approximate MEB for the company tax cut is simply calculated as the ratio of the indirect gain to the budget ($4.5 billion) divided by the net cost to the budget ($3.7 billion) giving 122 per cent. This is of a similar broad magnitude to the true MEB of 139 per cent. The approximate MEB provides an even closer approximation to the true MEB for the three types of personal income tax changes. In CGETAX the actual MEBs can differ from the approximate MEBs for a range of reasons including externalities and oligopoly power.

This budget-based interpretation of MEBs highlights the importance of self-funding effects in improving the efficiency of the tax system. It allows the benefit to consumers of tax reductions to outweigh the cost to consumers of the tax increases or spending cuts that fund those reductions. Self-funding is driven by economic gains that improve the government budget when inefficient taxes are reduced.

4.3 Previous Estimates of the Company Tax MEB

In recent years, published estimates of MEBs for Australian company tax have been consistently high but somewhat variable (KPMG Econtech, 2010; Rimmer et al., 2014; Cao et al., 2015). The estimate here of 139 per cent is towards the top of the range, but it is considered that this reflects improvements in the modelling compared to the three earlier studies.

All four studies use similar estimates for the elasticity of demand for capital and supply of labour that drive the investment incentive and labour supply responses. So the reasons for the differences in results lie elsewhere. In particular, they are explained by two main factors.

The first factor is economic rents. Some of the modelling, including in CGETAX, explicitly allows for economic rents generated by land and minerals. However, even after allowing for these specific rents, some industries, notably the finance industries, generate further large economic rents, as evidenced by persistent above-normal rates of return on capital.

The earlier modelling assumed that these large rents were generated by some unidentified fixed factor of production. This fixed factor absorbed some of the incidence of company tax, diluting its adverse economic impacts. However, CGETAX makes the more realistic assumption that these rents are generated by oligopoly power.

Oligopoly power results in company tax being largely passed on to labour in these oligopoly industries, as it is competitive industries, although not in the same way. In particular, in these Cournot-Nash mark-up oligopolies, company tax falling on capital is passed through with a markup added, while company tax falling on the oligopoly rent is absorbed.

The importance of this issue for estimating MEBs can be seen from two of the previous studies (Rimmer et al., 2014; Cao et al., 2015). For example, Cao et al. (2015) found that varying the assumed level of rents from (mostly unidentified) fixed factors from a high to a low value led to the MEB for company tax varying from 32 per cent to 135 per cent. This suggests that the high level of economic rents

attributed to unidentified fixed factors in the three earlier studies led to substantial understatement of the MEB for company tax.

The second factor is that this study assumes profit shifting is somewhat more important. As discussed in section 3.4, the assumed semi-elasticity of the company tax base with respect to the company tax rate has been changed from -0.5 in the earlier studies to -0.73 in this study. This better reflects the evidence in the extensive literature on this subject. This increase in the estimated amount of profit shifting makes company tax more inefficient, giving it a higher MEB.

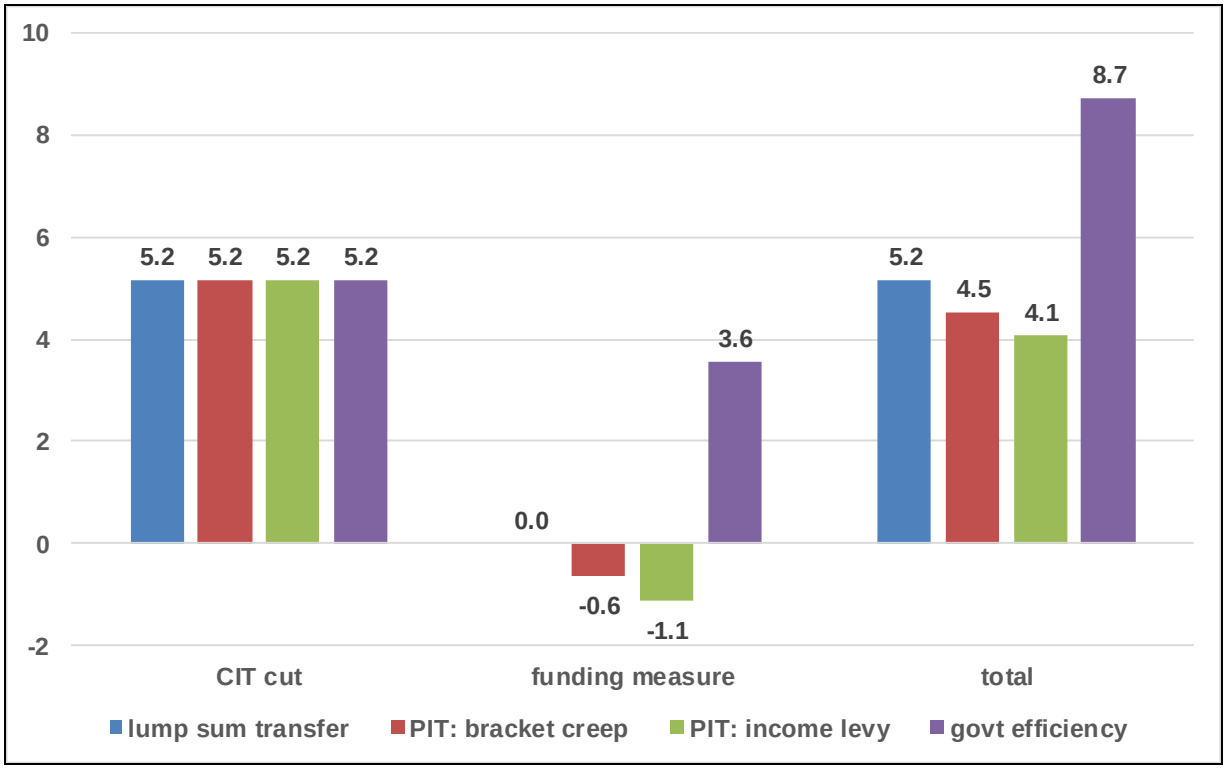
5 Scenario Results

The section presents the results from simulating the Company Tax Scenario that was specified in section 2. The simulation is undertaken using the CGETAX model described in section 3. The impacts on living standards are driven by the effects on consumer welfare that were identified in section 4.

The results for the Company Tax Scenario are now presented. An overview of the results emphasises the impacts on living standards, GDP by expenditure and the external account. This is followed by an analysis of the impacts on government budgets. Next, the incidence of the Company Tax Scenario for different income groups is analysed. Finally, sectoral impacts are shown.

5.1 Overview

Chart 5.1: Effects of Company Tax Scenario on living standards ($billion, 2015-16 annual terms)



Source: CGETAX simulations

Chart 5.1 shows how consumer welfare is affected by the components of the Company Tax Scenario.

Reducing the company tax rate from 30 to 25 per cent generates a gain in annual living standards of $5.2 billion. This reflects the economic gains discussed in section 4, including a substantial capital-driven improvement in productivity, a reduction in profit shifting and an improvement in work incentives leading to higher labour supply and employment. These economic gains lead to the widespread gains in budget revenues that are discussed in more detail in section 5.2. It shows that the net, long run, annual cost to the budget of the company tax cut is only $3.7 billion.

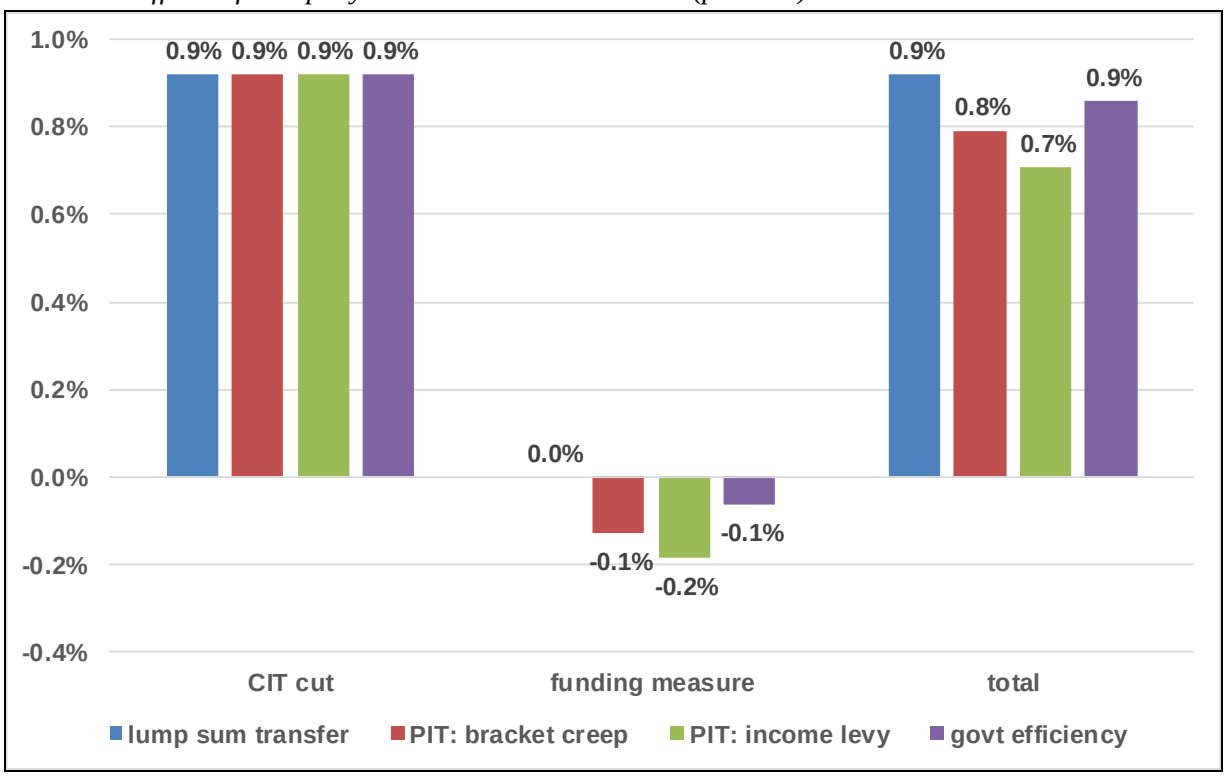
The final impact on living standards depend on how the company tax cut is funded. Lump sum funding is by definition economically neutral, so the gain in living standards on an annual basis remains at $5.2 billion. A government efficiency saving by definition provides consumers with the same government

services at a lower cost, adding a further benefit of $3.6 billion. This takes the final gain in living standards to $8.7 billion.

The work and saving disincentive effects from raising personal income tax have a cost to living standards, as seen in Chart 5.1. The net gain in living standards is reduced to $4.1 billion under income levy funding and $4.5 billion under bracket creep funding.

The long-run impacts on GDP are shown in Chart 5.2. The company tax cut is estimated to permanently add 0.9 per cent to GDP in the long run.

Chart 5.2: Effects of Company Tax Scenario on real GDP (per cent)



Source: CGETAX simulations
Note: In the chart and text, percentage impacts are rounded to the nearest one-tenth of a per cent.

This is driven primarily by a productivity boost of 0.7 per cent from a higher capital stock. The capital stock is driven higher by a permanent gain in the rate of business investment of 2.7 per cent. This is broadly comparable with UK Treasury (UK Treasury & Revenue and Customs, 2013) modelling of a gain in investment of 2.5 to 4.5 per cent from a larger corporate tax rate cut from 28 to 20 per cent.

The remaining 0.2 percentage points of the gain in GDP is due to higher employment; higher real wages stimulate labour supply.

Although the company tax cut also reduces profit shifting out of Australia, this does not affect GDP. However, living standards are more appropriately measured by National Income (NI) and consumer welfare, both of which capture the benefits of a reduction in profit shifting.

The final impact on real GDP depends on how the company tax cut is funded, but in any case it varies between 0.7 and 0.9 per cent.

If the funding method is economically neutral (lump sum), the gain in GDP remains at 0.9 per cent. As noted earlier, a government efficiency saving raises living standards by providing consumers with the same government services at a lower cost. However, this gain in living standards is not captured by GDP because it measures government services based on their cost, reflecting the difficulty of measuring their value to consumers. Thus, the gain in GDP remains at 0.9 per cent.

The work disincentive effects from raising personal income tax offset that gains in employment from reducing company tax. Under bracket creep funding the GDP gain from cutting company tax is 0.8 per cent while under income levy funding it is 0.7 per cent.

Table 5.1 summarises the effects of the Company Tax Scenario on key indicators, some of which are discussed elsewhere.

Table 5.1: Effects of Company Tax Scenario on Key Indicators (per cent)

Funding assumption	lump sum	PIT: bracket creep	PIT: income levy	govt efficiency
Consumer welfare ($bn)	5.2	4.5	4.1	8.7
Household Consumption (%)	0.74%	0.58%	0.47%	1.02%
National Income (%)	0.52%	0.38%	0.30%	0.76%
GNI (%)	0.73%	0.62%	0.54%	0.66%
GDP (%)	0.92%	0.79%	0.71%	0.86%
Business investment (%)	2.73%	2.60%	2.52%	2.69%
Employment (%)	0.17%	0.04%	-0.05%	0.02%
Real wage (%)	0.99%	1.02%	1.05%	0.96%
Real after-tax wage (average tax rate) (%)	0.99%	0.43%	0.39%	0.96%
Real after-tax wage (marginal tax rate) (%)	0.99%	0.79%	0.29%	0.96%

Source: CGETAX simulation

With the pass on of the company tax cut to labour, real wages are higher by 0.96 to 1.05 per cent, depending on which of the four funding methods is assumed. When personal income tax funding is assumed, the gain in real wages on an after-tax basis is reduced to 0.39 to 0.43 per cent using average tax rates and 0.29 to 0.79 per cent using marginal tax rates.

Under lump sum funding, the positive effect on work incentives from a higher real wage stimulates a gain in employment of 0.17 per cent. Under the other three funding methods, the impact on employment is broadly neutral. When personal income tax funding is assumed, the more moderate gains in after-tax real wages (using marginal tax rates) lead to the smaller employment effects. When government efficiency savings are assumed, consumers no longer need to fund the company tax cut; this has a positive income effect relative to the other funding methods, leading consumers to take more leisure time.

Taking the impacts on both after-tax real wages and employment into account, real after-tax labour incomes are higher by 0.34 to 1.16 per cent, depending on the funding method. This supports gains in real household consumption ranging from 0.47 to 1.02 per cent, as seen in Table 5.1.

The gain in total GDP has already been discussed in the context of Chart 5.2. Tables 5.2a and 5.2b shows how those gains vary between expenditure components. The company tax cut stimulates a permanent gain in business investment of 2.5 to 2.7 per cent depending on the funding method.

Dwelling construction, like household consumption, is supported by the gains in real after-tax labour incomes. Hence, the percentage gains in dwelling construction are similar to the percentage gains in

household consumption. The percentage gains in both exports and imports are broadly in line with the percentage gains in GDP. The impact on general government final demand is broadly neutral, except when government efficiency savings are used as the funding method. As noted above, conceptually an efficiency saving does not reduce government services, but the national accounts measure government services based on their cost, reflecting the difficulty of measuring their value to consumers.

Table 5.2a: Effects of Company Tax Scenario on GDP by Expenditure (per cent)

Funding assumption:	lump sum	PIT: bracket creep	PIT: income levy	govt efficiency
Households consumption	0.74%	0.58%	0.47%	1.02%
General Govt final demand	0.09%	0.07%	0.06%	-0.98%
Dwelling construction	0.72%	0.55%	0.44%	1.00%
Business investment	2.73%	2.60%	2.52%	2.69%
Non-dwelling construction	3.63%	3.50%	3.42%	3.56%
Other GFCF	2.23%	2.10%	2.01%	2.20%
Exports	1.04%	0.90%	0.81%	1.02%
less Imports	1.11%	1.00%	0.93%	1.12%
GDP	0.92%	0.79%	0.71%	0.86%

Source: CGETAX simulation

Table 5.2b: Effects of Company Tax Scenario on GDP by Expenditure ($m, 2015/16 prices)

Funding assumption:	lump sum	PIT: bracket creep	PIT: income levy	govt efficiency
Households consumption	6,714	5,277	4,320	9,307
General Govt final demand	298	247	212	-3,343
Dwelling construction	629	486	390	880
Business investment	7,390	7,043	6,811	7,280
Non-dwelling construction	3,525	3,401	3,319	3,458
Other GFCF	3,865	3,642	3,492	3,822
Exports	3,388	2,943	2,643	3,319
less Imports	-3,364	-3,028	-2,805	-3,390
GDP	15,056	12,968	11,572	14,052

Source: CGETAX simulation

The effects of the Company Tax Scenario on the external account are shown in Table 5.3. The lower local company tax cut rate leads to less profit shifting offshore, resulting in lower tax payments to tax havens and lower offshore expenditure on tax avoidance. This adds to the external account balance.

Table 5.3: Effects of Company Tax Scenario on the External Account ($m, 2015/16 prices)

Funding assumption:	lump sum	PIT: bracket creep	PIT: income levy	govt efficiency
Exports	2,780	2,290	1,959	2,676
Imports	-3,409	-3,019	-2,759	-3,378
less foreign tax and profit shift expense	3,947	3,963	3,974	3,948
less other net income to abroad	-7,286	-6,981	-6,774	-7,362
net capital inflow	3,969	3,747	3,599	4,115
balance	0	0	0	0

Source: CGETAX simulation

Note: All external account items here are converted to constant prices using the GDP price deflator, so impacts aggregate to zero. This leads to some differences from estimates in the tables where more specific price deflators are used.

The company tax cut also stimulates foreign investment in Australia, leading to a higher stock of foreign liabilities. The resulting additional servicing cost adds to net income to abroad, reducing the external account balance. On the other hand, net capital inflow is higher because foreign liabilities continue to grow at the same rate as GDP, but this growth is from a higher base, adding to the external account balance.

These three effects have broadly offsetting effects on external account balance, as seen in Table 5.3. Hence external balance is maintained without a significant movement in net exports. Exports and imports can both increase by around the same percentage as GDP.

5.2 Government Budget Impacts

The overall impacts of the Company Tax Scenario on the government budget have already been discussed in section 2. Here the focus is on the more detailed impacts, as shown in Table 5.4a and 5.4b. Table 5.4b is a conventional presentation of the effects on individual budget line items, while Table 5.4a provides an analytical overview that separates direct and indirect effects on the budget. Direct effects reflect the impacts of budget measures before allowing for behavioural responses, while indirect effects show the impacts of those behavioural responses.

The effects of the company tax cut are best isolated by referencing the results for the "lump sum" transfer scenario. In this scenario, unlike in the other scenarios, the method of funding the company tax cut does not lead to economic responses that have indirect effects on government budgets. Thus, in the following discussion, the "lump sum" scenario is considered first, before the other scenarios are discussed.

Beginning with Table 5.4a, in the Company Tax Scenario the company tax rate is reduced from 30 to 25 per cent, at a direct annual cost to government budgets of around $8.2 billion. This takes into account a loss of company tax revenue of $11.3 billion, partly offset by a gain in personal income tax and superannuation income tax of $3.1 billion as the cut in company tax automatically reduces the value of franking credits, although this reduces saving incentives.

Table 5.4a: Effects of Company Tax Scenario on Government Budgets: direct vs indirect effects ($m, 2015/16 prices)

Funding assumption:	lump sum	PIT: bracket creep	PIT: income levy	govt efficiency
direct cost of policy for CIT	11,311	11,311	11,311	11,311
less reduced value of franking credits (SIT/PIT)	-3,108	-3,108	-3,108	-3,108
net direct cost to Budget of CIT cut	8,203	8,203	8,203	8,203
CIT: lower pre-tax rate of return	-3,770	-3,770	-3,770	-3,770
CIT: higher capital stock and less profit shifting	5,680	5,596	5,541	5,672
higher govt expenditure from higher wages	-926	-930	-933	-866
higher social transfers from higher wages	-1,227	-1,263	-1,286	-1,207
higher PIT/SIT from higher labour income	2,457	1,707	1,490	2,084
higher other tax revenue from higher gdp	2,287	2,479	2,256	2,566
total self-funding or fiscal dividend	4,500	3,819	3,296	4,479
direct gain to budget from funding policy	3,703	4,356	4,879	3,696
self-funding/direct cost of policy	55%	47%	40%	55%

Note:
All budget items here are converted to constant prices using the GDP price deflator, so budget impacts aggregate to zero. This leads to some differences from estimates in the tables where more specific price deflators are used.

Reducing company tax also stimulates three favourable behavioural responses. These responses at the same time lift national income and have indirect effects on government budgets that partly self-fund the $8.2 billion direct cost of the company tax cut.

- Reducing company tax has a positive effect on investment incentives. Stronger investment leads to a more capital intensive economy and higher productivity. This productivity gain lifts incomes, which in turn widely boosts tax collections.
- Reducing company tax also improves the international competitiveness of Australia's effective average rate of corporate tax, lifting us to a middle ranking of a broad group of 46 countries. This reduces the extent of profit shifting to other jurisdictions, adding to Australian company tax collections.
- Because post-tax rates of return on capital are largely determined globally rather than nationally, the incidence of a nation's company tax is generally passed on from capital to labour. Cutting company tax therefore leads to higher real wages, which has a positive effect on work incentives. Like higher productivity, higher employment lifts incomes, which boosts tax collections.

In the long run, these productivity, profit-shifting and employment effects provide an indirect boost of $4.5 billion to budgets at all three levels of government. That is, they self-fund 55 per cent of the direct cost of the company tax cut of $8.2 billion. The self-funding percentage of 55 per cent is in line with recent UK Treasury modelling. It found a self-funding percentage of 45 to 60 per cent for a cut in the UK corporation tax rate from 28 to 20 per cent (UK Treasury & Revenue and Customs, 2013).

The self-funding or fiscal dividend for the company tax cut of $4.5 billion is broken down into six components in Table 5.4a.

Beginning with company tax itself, the company tax cut induces an expansion in the stock of business capital and reduced profit shifting to other jurisdictions, adding $5.7 billion to company tax revenue. On the other hand, the company tax cut also reduces the hurdle pre-tax rate of return required for new investment; this lower profitability reduces company tax revenue by $3.8 billion. Thus, in net terms, the company tax cut leads to an indirect gain of (5.7-3.8=) $1.9 billion in company tax revenue. Table 5.4a also shows that the company tax cut also leads to a direct loss in company tax revenue of $11.3 billion. Combining these direct and indirect effects together gives the overall impact on company tax revenue of (11.3-1.9=) $9.4 billion shown in Table 5.4b.

The other major indirect gain to government budgets from the company tax cut is in tax collected from labour incomes. As seen in Table 5.1, a gain in real wages of 0.99 per cent combines with a gain in employment of 0.17 per cent, implying an increase in real labour incomes of 1.16 per cent. Table 5.4a shows the resulting $2.5 billion gain in income taxes on labour income. Table 5.4b shows that this is made up of $2.4 billion in personal income tax and $0.1 billion is superannuation contributions tax.

The remaining indirect impacts are broadly offsetting. On the one hand, Table 5.4a shows that the boost to real GDP from the company tax cut leads to widespread gains in government revenues totalling $2.3 billion. Table 5.4b reveals that the largest of these gains are for GST, payroll tax and municipal rates. On the other hand, the gain in real wages of 0.99 per cent adds to the costs of government services and to transfer payments (which in CGETAX are assumed to be adjusted in line with wages). This adds $2.2 billion to real government spending).

The overall budget impact of the company tax cut can be summarised as follows. It involves a direct cost of $8.2 billion but generates self-funding of $4.5 billion. This leaves $3.7 billion to be funded under one of the four alternative assumptions:

- "lump sum" funding i.e. budget savings measures that are economically neutral: they do not influence economic behaviour and have a cost to households equal to the benefit to the budget;
- An increase in personal income tax through bracket creep;
- An increase in personal income tax through an income levy; and
- A reduction in spending through government efficiency savings.

Table 5.4b: Effects of Company Tax Scenario on Government Budgets ($m, 2015/16 prices)

Funding assumption:	lump sum transfer	PIT: bracket creep	PIT: income levy	govt spending
general govt final demand	926	930	933	-2,830
lump sum transfer	-3,703	-27	-28	-28
social transfer	1,227	1,263	1,286	1,207
WET: wine	6	4	4	8
WET: cider	0	0	0	0
Luxury Car Tax	8	8	7	8
SD conveyances	195	170	154	220
Excise: petroleum	159	133	116	171
Excise: beer	20	16	13	23
Excise: spirits	20	16	13	27
Excise: tobacco	61	47	37	87
Gambling taxes	42	33	27	59
Insurance taxes	49	40	35	60
Other product taxes	47	41	36	48
Petroleum subsidies	-61	-53	-48	-63
Other product subsidies	-100	-85	-76	-111
GST	481	385	321	639
Import Duty	28	25	23	28
Payroll tax	292	264	246	250
Land tax	146	129	117	157
Municipal rates	297	253	224	343
Other taxes on production NEI	92	65	46	98
Other subsidies on production	-79	-64	-54	-78
Mining Royalties	72	67	63	71
PRRT	30	28	27	30
Company Income Tax	-9,401	-9,484	-9,540	-9,409
Superannuation contributions tax	107	97	90	90
Superannuation income tax: gross	-351	-373	-412	-347
Superannuation income tax: credits	1,834	1,853	1,887	1,831
PIT on labour income	2,350	5,966	6,278	1,994
PIT on asset income: gross	-1,745	-1,303	-1,400	-1,729
PIT on asset income: credits	3,850	3,888	3,956	3,843
Total budget impact (long-run)	**0**	**0**	**0**	**0**

Note:
All budget items here are converted to constant prices using the GDP price deflator, so budget impacts aggregate to zero. This leads to some differences from estimates in the tables where more specific price deflators are used.
Source: CGETAX simulation

As shown in Table 5.4a, of these alternative funding measures, the first and the last have little effect on economic behaviour, preserving the $4.5 billion in self-funding of the company income tax cut. Consequently, either of these measures only needs to raise $3.7 billion to achieve a neutral budget outcome in the long run.

The middle two measures increase personal income tax, partly offsetting the gains in real wages from cutting company tax. This neutralises the gain in labour supply and employment from cutting company tax and reduces saving incentives. This in turn reduces the self-funding or indirect budget gain from the company tax cut from $4.5 billion to between $3.3 billion and $3.8 billion. After taking this into account, bracket creep would need to directly raise $4.4 billion and the income levy $4.9 billion to achieve a neutral budget outcome in the long run.

Hence, the funding measure needs to directly raise between $3.7 billion and $4.9 billion annually, depending on which one is assumed, to achieve a neutral budget impact in the long run. Nevertheless, this is well below the direct value of the company tax cut of $8.2 billion. The net self-funding (or fiscal dividend or indirect budget impact) from the Company Tax Scenario is therefore between $3.3 billion and $4.5 billion.

5.3 Incidence

The gain in GDP from cutting company tax of 0.7 to 0.9 per cent is equivalent to $11.6 billion to $15.1 billion in 2015/16 terms. Table 5.5 shows how this gain is shared among different income groups based on GDP by income. That is, it shows the incidence of the Company Tax Scenario.

Table 5.5: Sources of Real resident income and GDP ($m 2015/16 prices)

Funding assumption:	lump sum transfer	PIT: bracket creep	PIT: income levy	govt spending
labour income	9,985	9,126	8,552	8,346
less labour income taxes	-2,439	-6,062	-6,378	-2,039
after-tax labour income	7,546	3,065	2,174	6,307
local asset income	3,284	3,158	3,074	3,413
offshore asset income	591	568	553	614
asset income	3,875	3,727	3,627	4,027
less asset income taxes	-3,557	-4,032	-3,994	-3,565
after-tax asset income	318	-305	-367	462
government transfers	-2,486	1,234	1,264	1,153
Resident income	5,379	3,994	3,071	7,922
general govt final demand	298	247	212	-3,343
National income at market prices	5,677	4,241	3,283	4,579
depreciation	6,039	5,709	5,489	6,060
GNI	11,716	9,950	8,772	10,638
foreign tax and profit shift expense	-3,947	-3,963	-3,974	-3,948
other net income to abroad	7,286	6,981	6,774	7,362
GDP	15,056	12,968	11,572	14,052

Source: CGETAX simulation

A broad distinction can be made between the gains in GDP that relate to the cost to the economy of the expansion in the stock of business capital, and the gain in national income. These two types of gains are considered in turn.

Around $9 billion of the gain in GDP is required to fund the expansion in the stock of business capital. With a larger stock of business capital, there is additional depreciation expenses of around $6 billion. The additional capital is funded by additional foreign investment, which receives the post-tax rate of return prevailing on world capital markets. This adds around $7 billion to net income to abroad. However, the reduction in profit shifting from the company tax cut reduces payments abroad by around $4 billion, reducing the net increase to around $3 billion.

These modelling results assume that the avoidance costs in profit shifting all take the form of payments abroad. Some of the avoidance costs will take that form e.g. (low) payments of company tax in tax havens, payments to offshore legal and accounting advisors (not just in Panama). However, some of the avoidance costs may be incurred in Australia. To the extent that is true, some GDP will be wasted on unproductive tax avoidance activities. However, irrespective of whether avoidance costs take the form of offshore payments or onshore unproductive use of GDP, the loss in consumer welfare will be the same.

Removing these depreciation and net income abroad elements from GDP leaves real National Income at Market Prices (NI), which is a better indicator of living standards. The gain in real NI varies between $3.3 billion and $5.7 billion, depending on the funding assumption. This is broadly comparable to the more precise measure of the gain in living standards of $4.1 billion to $5.2 billion shown in Chart 5.1 for the first three funding measures. Thus, the breakdown into components of the gain in real NI shown in Table 5.5 gives an indication of how the overall gain in living standards is shared across income groups.

Labour income earners receive the majority or all of the benefit to National Income under all four funding assumptions. This is because under each funding assumption, the productivity gain from the company tax cut drives a permanent gain in pre-tax real wages of 1.0 per cent.

Under lump sum funding, the gain in real wages improves work incentives, leading to a boost to employment of 0.2 per cent. The total gain in real annual labour income from higher real wages and employment is $10.0 billion before tax and $7.5 billion after tax. There is a similarly high after-tax gain of $6.3 billion when the company tax cut is funded from government efficiency savings.

Under personal income tax funding, higher tax rates mean that more of the gain in real wages from the company tax cut is clawed back in higher personal income tax. This also leads to an approximately neutral effect on employment. Nonetheless, annual, real after-tax labour incomes are $3.1 billion higher under bracket creep funding and $2.2 billion higher under the income levy.

There are three main effects on asset income earners. First, a gain in real asset values raises real pre-tax asset incomes by around $4 billion, as seen in Table 5.5. This occurs as a higher stock of business capital leads to stronger demand for fixed assets such as land and minerals, increasing their real value. This is partly offset by the reduction in the value of franking credits under a lower company tax rate. Hence, there is a small gain in real post-tax asset income of $0.3 billion to $0.5 billion under the two funding assumptions involving lower government spending. Under the two funding assumptions in which personal income tax is increased, these tax increases leave real post-tax asset incomes lower by $0.3 billion to $0.4 billion. Hence, the overall effect on real post-tax asset incomes is broadly neutral across the four funding assumptions at between -$0.4 billion and +$0.5 billion.

The final component of the gain in real National Income is real government spending, made up of transfers and general government final demand. Not surprisingly, it is lower under the two funding

assumptions in which government spending restraint is used to fund the company tax cut. However, it is higher when personal income tax funding is used. This is because higher real wages add to the costs of government services and to transfer payments (which in CGETAX are assumed to be adjusted in line with wages).

As seen in Table 5.6, the automatic reduction in the value of franking credits from the company tax cut leads to a small reduction in saving.

Table 5.6: Uses of real resident income ($m 2017/18 prices)

Funding assumption:	lump sum transfer	PIT: bracket creep	PIT: income levy	govt spending
Saving	-1,335	-1,283	-1,249	-1,385
Consumption	6,714	5,277	4,320	9,307
Resident income	5,379	3,994	3,071	7,922

Source: CGETAX simulation
Note: In this table real values are obtained by deflating nominal values by the price of household consumption

This saving disincentive effect also reduces the gain in consumer welfare by around $0.5 billion. For example, under lump sum funding, the gain in living standards is $5.7 billion before the saving disincentive effect is taken into account and $5.2 billion after it is taken into account, as seen in Table 5.7.

Table 5.7: Household welfare

Funding assumption:	lump sum transfer	PIT: bracket creep	PIT: income levy	govt spending
consumption	0.74%	0.58%	0.48%	1.02%
leisure	-0.34%	-0.08%	0.10%	-0.03%
Household welfare $m 2015/16 terms (static)	5,679	5,067	4,659	5,491
life cycle utility factor	-0.04%	-0.04%	-0.05%	-0.04%
Household welfare $m 2015/16 terms (intertemporal)	5,158	4,540	4,067	4,969

Source: CGETAX simulation

5.4 Sectoral Impacts

So far the discussion has focussed on the effects on real GDP by expenditure and real GDP by income. To complete the real GDP picture, this section considers the effects on GDP by industry. While CGETAX provides these results for 278 industries, in the interests of brevity here industries are aggregated to the one-digit level.

Table 5.8 shows that most industries experience percentage gains in activity that are broadly in line with the percentage gains in overall GDP. For example, in the "lump sum" funding scenario, the overall gain in GDP is 0.9 per cent, and most industries experience gains that fall within a range of 0.6 to 1.2 per cent. Six of the 19 sectors are exceptions to this rule.

As a capital-intensive sector exposed to competitive world markets, mining receives the largest percentage production gain from the company income tax cut. Construction also experiences a large gain as it helps meet the large lift in demand for business investment. As an industry allied to construction, the real estate services component of the Rental, Hiring and Real Estate Services industry also receives a relatively large gain.

Table 5.8: Effects of Company Tax Scenario on GDP by Industry (per cent)

Funding assumption:	lump sum transfer	PIT: bracket creep	PIT: income levy	govt spending
A Agriculture, Forestry and Fishing	1.0%	0.9%	0.8%	1.1%
B Mining	2.2%	2.1%	2.1%	2.2%
C Manufacturing	1.2%	1.1%	1.0%	1.2%
D Electricity, Gas, Water and Waste Services	1.2%	1.1%	1.0%	1.2%
E Construction	1.8%	1.7%	1.6%	1.7%
F Wholesale Trade	1.2%	1.1%	1.0%	1.2%
G Retail Trade	0.9%	0.7%	0.6%	1.1%
H Accommodation and Food Services	1.0%	0.8%	0.7%	1.2%
I Transport, Postal and Warehousing	1.1%	1.0%	0.9%	1.0%
J Information Media and Telecommunications	1.2%	1.1%	1.0%	1.2%
K Financial and Insurance Services	0.8%	0.6%	0.5%	0.9%
L Rental, Hiring and Real Estate Services	1.3%	1.1%	1.0%	1.2%
M Professional, Scientific and Technical Services	0.9%	0.8%	0.7%	0.8%
N Administrative and Support Services	0.8%	0.6%	0.6%	0.6%
O Public Administration and Safety	0.2%	0.2%	0.1%	-0.7%
P Education and Training	0.0%	-0.1%	-0.1%	-0.3%
Q Health Care and Social Assistance	0.2%	0.1%	0.0%	-0.3%
R Arts and Recreation Services	0.8%	0.7%	0.6%	0.8%
S Other Services	0.7%	0.5%	0.4%	0.8%
T Ownership of Dwellings	0.6%	0.5%	0.4%	0.8%
Taxes less subsidies on production	0.8%	0.7%	0.6%	0.9%
GDPP	0.92%	0.79%	0.71%	0.86%

Source: CGETAX simulation

Because real General Government Final Demand is taken as given as a modelling assumption, the gains in activity for the three government-related sectors are modest. Those sectors are Public Administration and Safety, Education and Training, and Health Care and Social Services. However, as government spending targets are sometimes set relative to GDP, it is possible that in practice these government-related sectors would share more fully in the gain in GDP.

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Appendix A: Company Tax Rate and Cost of Capital

This Appendix shows how, in CGETAX, the company tax rate affects the cost of capital. It begins by deriving the core relationship. It then takes into account two complications – profit shifting and tax credits. The general approach follows de Mooij and Devereux (2009), but with some adjustments to match the Australian tax system as well as a correction to their modelling.

The relationships derived are used in the CGETAX modelling of the investment disincentive effect and the profit shifting effect of changing the company tax rate.

A.1 Cost of Capital

Deriving the cost of capital involves considering the present value for the firm of a new unit of investment. Revenue and deductions are now considered in turn.

The present value of the revenue to the firm from one unit of new investment is the value of the marginal product from the additional unit of capital (P.MPK), after allowing for depreciation of that unit of capital over time, time discounting of future revenue, and tax.

$$PV(revenue) = \int_0^{\infty} (1 - tax).P.MPK.\exp(-\delta.t).\exp(-r.t)\,dt$$

$$PV(revenue) = (1 - tax).P.MPK/(\delta + r)$$

where:

tax	corporate tax rate
P	price of value added
MPK	marginal product of capital
δ	the rate of economic depreciation
r	the real discount rate

A range of tax deductions may be available with respect to the unit of investment. Where an investment allowance applies, a proportion of the investment, φ, may be expensed immediately. In some cases, such as the research and development tax offset, this immediate investment deduction may attract a loading, α.

The remaining proportion of the investment, (1-φ), is assumed to be depreciable for tax purposes. Tax depreciation is on an historic rather than replacement cost basis so it does not account for inflation. Hence the real value of the deduction will erode at a rate that includes both the rate of inflation and the rate of tax depreciation.

Finally, there may also be a deduction for the nominal interest on debt.

The present value of these tax deductions is calculated below after also allowing for time discounting.

$$PV(deductions)$$
$$= tax.PI.\{\alpha.\varphi + (1-\varphi)\int_0^{\infty} dtax.\exp(-(dtax+\pi).t).\exp(-r.t)\,dt$$
$$+ \theta.(\pi + rb)\int_0^{\infty}\exp(-(\delta+r).t)\,dt$$
$$+ (1-\varphi).\int_0^{\infty}(dtax.\exp(-(dtax+\pi+r).t)\,dt\}$$

$$PV(deductions) = tax.PI.\{\theta.\frac{\pi+rb}{\delta+r} + (\alpha-1).\varphi + \varphi + (1-\varphi).\frac{dtax}{dtax+\pi+r}\}$$

where:

θ	ratio of debt to assets
rb	real (inflation-adjusted) interest rate for debt finance
PI	price of new investment
φ	proportion of new investment that can be expensed immediately
α	loading applied to immediate tax expense
dtax	the rate of depreciation for tax purposes
π	the inflation rate

Under the assumption of zero long run pure profits, the present value of the revenue to the firm, inclusive of the deductions, will equal the price of the investment.

$$PV(revenue) + PV(deductions) = PI$$

$$(1-tax).P.\frac{MPK}{\delta+r} + tax.PI.\left\{\theta.\frac{\pi+rb}{\delta+r} + (\alpha-1).\varphi + \varphi + (1-\varphi).\frac{dtax}{dtax+\pi+r}\right\} = PI$$

This can be re-expressed as follows.

$$(1-tax).P.\frac{MPK}{\delta+r} - tax.PI.\left\{-\theta.\frac{\pi+rb}{\delta+r} - (\alpha-1).\varphi + (1-\varphi).\frac{\pi+r}{dtax+\pi+r}\right\} = (1-tax).PI$$

Dividing by (1-tax).P,

$$\frac{MPK}{\delta+r} - \frac{tax}{1-tax}.\frac{PI}{P}.\left\{(1-\varphi).\frac{\pi+r}{dtax+\pi+r} - \theta.\frac{rb}{\delta+r} - (\alpha-1).\varphi\right\} = \frac{PI}{P}$$

Now solving to equate the marginal product of capital with its user cost.

$$MPK = \frac{PI}{P}.[\delta + r + \frac{tax}{1-tax}.\left\{(1-\varphi).\frac{(\delta+r).[\pi+r]}{dtax+\pi+r} - \theta.rb - (\alpha-1).\varphi.(\delta+r)\right\}] \quad [1]$$

The expression on the right-hand side is the user cost of capital for each asset type. The first line shows the cost of capital in the absence of a corporate tax. The remainder of the expression captures the distortion to the user cost of capital from corporate tax. It can be seen that this distortion can be eliminated by either:

- setting the corporate tax rate, "tax", to zero (eliminating corporate tax); or
- allowing immediate expensing of all new investment without any loading and no interest deduction i.e. φ=1, α=1, θ=0 (a Brown tax).

A.2 Profit Shifting

Companies may seek to reduce their business tax liability by shifting profits from Australia to countries with lower rates of business tax. This profit shifting means that effective tax rates may be below the statutory or headline tax rate. Here effective tax rates in the presence of profit shifting are derived for both the cost of capital and Australian company tax revenue.

In the absence of profit shifting, tax paid by an industry, T, equals the headline tax rate, t, times the tax base in the absence of profit shifting, Base.

$T = t.Base$

However, the representative company in the industry is assumed to be able to shift a proportion, θ, of its tax base to a tax haven where it is taxed at the rate, t_h, by incurring the cost given by C.

$C = (1/A).\theta^2/2.Base$

The resulting reduction in tax paid leads to the following new expression for T.

$T = t.(1-\theta).Base + t_h.\theta.Base = t.Base - \theta.(t-t_h).Base$

The representative company is assumed to choose θ to maximise its after-tax profit, that is, to minimise the sum of its tax and tax haven costs. This leads to the following first order condition.

$d(T+C)/d\theta = (t_h-t).Base + (1/A).\theta.Base = 0$

This gives the following solution for θ.

$\theta = A.(t-t_h)$

This implies the following outcome for Australian tax collections, TA.

$TA = t.Base - t.A.(t-t_h).Base$

The final term in the above is the loss in Australian tax revenue due to use of the tax haven. The implied effective tax rate for Australian revenue raising, tr, is as follows.

$tr = t.(1 - A.(t- t_h)).Base$ [2]

De Mooij and Devereux (2009) calibrate their model to achieve a certain semi elasticity, -k, of the effective tax base, (1-θ).Base, with respect to the tax rate, "t". It can be shown that this involves choosing A according to the following formula.

$A = k/[1+k.(t-t_h)]$ [3]

Finally, the effect of profit shifting on the cost of capital needs to be considered. De Mooij and Devereux (2009) appear to assume that the cost of capital is not affected but in reality it will fall. In particular, a company engaged in profit shifting will receive some reduction in tax liability, T, partly offset by the cost of profit shifting, C.

Calculating the sum of tax, T, and tax haven costs, C.

$T + C = t.Base - \theta.(t-t_h).Base + (1/A).\theta^2/2.Base$

Using the solution for θ this becomes.

$T + C = t.Base - A.(t-t_h)^2.Base + A.(t-t_h)^2/2.Base$

$= t.Base - A.(t-t_h)^2/2.Base$

$= [t - A.(t-t_h)^2/2].Base$

This implies that one-half of the tax saving from using the tax haven is offset by the associated costs. It also implies that the effective tax rate facing the representative company (the sum of tax paid and tax haven costs relative to the tax base), tc, is given by the following, where A is calculated using equation [3].

$$tc = t - A.(t-t_h)^2/2 \quad [4]$$

Hence in CGETAX, the cost of capital is calculated using the effective tax rate facing the company, tc, rather than the headline tax rate, t.

To operationalise this approach in an economy-wide model such as CGETAX, it is necessary to model tax avoidance activity. For simplicity, it is assumed that all tax avoidance costs, like the tax paid in the tax haven, are incurred offshore. If instead part of the tax avoidance costs were assumed to be incurred onshore, this would make no difference to the model results for consumer welfare or living standards. This is because the costs of avoiding Australian tax represent a deadweight loss irrespective of where the avoidance costs are incurred.

Under this approach, profit shifting results in an income payment abroad made up of tax paid in the tax haven plus the costs of tax avoidance activity. The total amount of this income payment reflects the difference between the two effective tax rates: tc (for the user cost of capital) and tr (for Australian revenue raising), as captured in the following equation in CGETAX.

$$\text{net income to abroad from profit shifting} = (tc-tr).Base \quad [5]$$

Hence in calculating the cost of capital in CGETAX using equation [1], the statutory tax rate "t" is replaced with the effective tax rate for the cost of capital, "tc", as given by equation [4]. Thus, the effective tax rate is below the statutory tax rate, and this gap increases with the size of difference between the statutory tax rate and the tax haven tax rate. Similarly, in calculating Australian company tax revenue, the statutory tax rate, "t" is replaced with the effective tax rate for revenue collections, "tr", as given by equation [2].

Under the assumed value for the semi-elasticity of the tax base with respect to the tax rate of -0.73 (see section 3.4), when the statutory tax rate is cut from 30% to 25%, effective tax rates fall as follows.

tc = 28.1% to 23.7%

tr = 25.4% to 21.8%

A.3 Foreign Tax Credits

Further complications in modelling the user cost of capital arise from foreign tax credits.

The Australian subsidiary of a foreign-based MNC will generally pay Australian company tax on its income sourced in Australia (apart from any profit shifting). Most countries, including the UK and Australia, now effectively operate source-based tax systems, so that the Australian-sourced income in not taxed again in the headquarters country of the MNC. This means that it is the Australian company tax rate that affects the cost of capital for investment decisions in Australia, as assumed in the preceding sections of this Appendix.

The main exception to this is the USA. It taxes the income of subsidiaries in Australia and other countries of US-based MNCs. However, this tax only applies to income that is remitted back to the USA, not to income that is retained in Australia and re-invested. In taxing this remitted, Australian-sourced income, the US government gives a tax credit for the tax that has already been paid in Australia.

The effect of this tax arrangement for the company is that it pays the Australian company tax rate on earnings retained in Australia and the US company tax rate on earnings remitted to the USA. This requires an adjustment to the effective company tax rate used for the user cost of capital.

At the same time, this arrangement does not affect Australian tax collections. Thus, no adjustment is required to the effective company tax rate used in modelling Australian company tax collections.

The cost of capital for the Australian-sourced income of foreign investors is modelled as a weighted average of two cost of capitals. These are the cost of capital when final tax is paid in Australia (95 per cent weight) and the cost of capital when a full tax credit is received for the Australian tax and the final tax in paid in the foreign country (5 per cent weight). The weight on the second case is low because it mainly only refers to foreign investment in Australia that is: (i) from the US, and (ii) takes the form of direct investment rather than portfolio investment, and (iii) for earnings that are remitted rather than retained. The cost of capital in the first case was derived in sections A.1 and A.2 above. The cost of capital in the second case is assumed to take the following basic form, where "taxus" is the US corporate tax rate.

$$\frac{PI}{P}.[\delta + r + \frac{taxus}{1 - taxus}.r]$$