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Modelling Australian corporate tax reforms

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Abstract

As a small open economy, Australia can expect that foreign investors will add our corporate tax burden to the hurdle rate of return that they require to invest here, rather than absorb it. This discourages foreign investment and leaves local labour to bear the final burden of local corporate tax, discouraging labour supply. This double disincentive effect led Gordon (1986) to recommend against applying corporate tax in a small open economy. More recently, international profit shifting has added to the case against corporate tax (Auerbach, Devereux, Keen and Vella, 2017). Australia further undermines the efficiency of corporate tax as a revenue raiser by returning a substantial portion of the revenue through the dividend imputation system (Fuest and Huber, 2000). At the same time, corporate tax can be efficiently applied to the returns from immobile assets such as land, minerals and local market power, leading to calls to narrow the corporate tax base to only capture such economic rents (Boadway and Bruce, 1984). Using economy-wide modelling, this paper quantifies the substantial consumer benefits from tax reforms that reduce the corporate tax rate, narrow the base to economic rents, or replace imputation with less generous dividend tax concessions. The substantial benefits of reducing the local tax rate increase if the US makes the corporate tax changes proposed by the Trump administration.

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The author worked with David Ingles and Miranda Stewart of the TTPI, ANU, to develop jointly a set of corporate tax policy reform options covering tax bases ranging from the ACC or ACE to the CBIT, the removal of imputation and the choice of tax rate, so as to investigate their different efficiency and revenue effects in the Australian context. The detailed results and modelling parameters are presented here, while Ingles and Stewart focus on the policy principles and options in a forthcoming paper.

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1 Introduction

This paper models potential reforms to the Australian corporate tax system. It considers the corporate tax rate, the corporate tax base, and options for funding corporate tax reductions.

In the most recent development in the Australian corporate tax system, in the 2016-17 Budget the Australian Government proposed a phased cut in the corporate tax rate from 30 to 25 per cent. This was supported by economy-wide modelling, including modelling commissioned by The Treasury (Murphy, 2016) and modelling The Treasury undertook in-house (Kouparitsas, Prihardini and Beames, 2016).

To date, the Federal Parliament has passed the proposed tax cut into law for smaller companies but not for larger companies. In particular, a tax cut has been introduced for companies with an annual turnover of under $50 million, known as base rate entities. For such entities, the corporate tax rate will fall from 30 per cent in 2014-15 to 25 per cent in 2026-27. For larger companies, the tax rate remains at 30 per cent.

The Federal Government continues to press for the tax cut to be extended from base rate entities to larger companies. This is in line with the original Budget proposal and would avoid the less-than-ideal outcome of a permanent 2-tier rate system.

Ingles and Stewart (2017) step back from the current impasse in fully implementing a 25 per cent rate to consider the broader issues of corporate tax policy. They focus on a series of policy options for improving the corporate tax system, covering the tax rate, the tax base and the funding of rate cuts. This companion paper models some of those options.

The literature provides useful guidance on the optimal approach to corporate tax in a small open economy such as the Australian economy. The basic result due to Gordon (1986) is that "a small open economy should … not attempt to tax capital, regardless of the tax policies in other countries". This is because in an open economy corporate income tax has similar economic impacts to a labour income tax, but also reduces corporate investment. However, there are two important qualifications to the basic result that corporate tax should not be imposed (Bruce (1992) and McKeehan and Zodrow (2017)).

First, it is optimal to impose a local corporate income tax to the extent that multinational firms are able to claim a tax credit in their home country for that local corporate tax, the so-called "Treasury transfer" effect. However, the importance of this effect has diminished as most countries now tax the territorial income, rather than the world income, of their resident companies, and consequently do not provide tax credits for corporate tax paid in other jurisdictions.

Second, it is optimal to tax location-specific economic rents, whereas Gordon (1986) only considered corporate income taking the form of a normal return to capital. This has led to calls to narrow the base of corporate tax so that it no longer taxes normal returns to capital, but does tax economic rents. This would remove the investment disincentive effect of corporate tax. Without such an economic rent tax, some positive rate of corporate income tax may be justified as a blunt way of taxing rents (Bruce, 1992).

Two other design issues with corporate tax are often discussed.

First, because corporate tax is usually source-based, tax avoidance is possible by shifting corporate income from higher-taxed to lower-taxed jurisdictions. This may be achieved via transfer pricing, debt

re-allocation or re-location of corporate headquarters and the associated income from firm-specific capital. To reduce profit shifting, it has been proposed that corporate tax be applied on a destination basis, like a VAT, rather than on a source basis (Auerbach, Devereux, Keen and Vella, 2017).

Second, the traditional corporate income tax allows a deduction for the cost of debt but not for the cost of equity. This differential tax treatment creates a bias favouring debt over equity finance. An economic rent tax removes this tax bias because it provides investment-related deductions with a present value equal to investment costs, irrespective of the method of financing.

An alternative way of removing the financing bias is to vary the standard corporate income tax by denying a deduction for interest expenses (de Mooij, 2012). Under this comprehensive business income tax (CBIT), the tax bias is removed because there is no deduction available for either debt or equity financing costs.

Aside from the financing bias issue, the CBIT has both an advantage and a disadvantage compared to the standard corporate tax (de Mooij and Devereux, 2011). The advantage is that the broader base of the CBIT can fund a lower tax rate, reducing profit shifting. The disadvantage is that CBIT increases tax on normal returns to capital relative to tax on economic rents, increasing investment disincentives.

For a more complete policy assessment, this paper also considers the tax treatment of corporate income at the shareholder level. Australia, unlike most countries, provides relief from corporate income tax to the extent that profits are distributed to resident shareholders as dividends. However, Fuest and Huber (2000) demonstrate that such dividend imputation systems are "not desirable" in an open economy where the marginal investors are foreign shareholders. Because foreign shareholders do not benefit from imputation credits, dividend imputation fails to achieve its objective of increasing investment, while imputation credits for resident shareholders are costly to the government budget.

Section 2 provides a fuller account of the guidance provided by the literature on the optimal approach to corporate tax policy in an open economy. That guidance is placed in the Australian context using a series of tables that display data on the local corporate tax system. The remaining sections of this paper are organised as follows.

Section 3 covers the modelling approach used in this paper. It explains the main features of CGETAX (a computable general equilibrium model of the Australian economy) that are pertinent to the modelling of corporate tax policy. Full details on the modelling of the corporate tax system and the cost of capital are set out in Appendix A.

Section 4 provides background on the costs to consumers of the economic disincentive effects from the more significant taxes. Of particular interest is the consumer cost of the three major taxes – personal income tax, corporate income tax and GST – relative to the amount of revenue that they raise. This analysis provides support for the aim of reducing the reliance placed on corporate income tax.

Section 5 uses modelling to investigate the extent to which the corporate tax rate should be cut. Economic outcomes are compared under rates of 30, 25, 20 and 15 per cent. The modelling abstracts from the recent introduction of a 2-tier rate system. The sensitivity of the results to the existence of the Treasury transfer effect, which could largely disappear under the Trump administration tax reform proposals (US Government, 2017), is investigated.

Section 6 models potential changes to the base of corporate tax and the taxation of dividends. The first two options have been modelled previously by de Mooij and Devereux (2009) in an EU study.

- Option one narrows the tax base so that only economic rents are taxed to remove the investment disincentive effect of corporate tax. There has been recent interest in this option in the USA.
- Option two broadens the tax base by making interest non-deductible under a CBIT. This reduces profit shifting but increases the investment disincentive of corporate tax.
- Option three replaces the dividend imputation system with concessional taxation of dividends. This recognises the ineffectiveness of imputation in encouraging investment in an open economy.

Section 7 models the proposed cut in the corporate tax rate to 25 per cent under alternative funding options. Both business tax and non-business tax funding options are modelled.

2 Optimal corporate tax policy

This section provides an account of the guidance provided by the literature on the optimal approach to corporate tax policy in a small open economy. That guidance is placed in the Australian context using a series of tables that display data on the local corporate tax system.

2.1 Corporate tax rate

As noted in the introduction, Gordon (1986) obtained the basic result that it is not optimal to tax capital in a small open economy that is a price taker in world capital markets. If labour and capital are the only factors of production and competition is perfect, Gordon (1986, pp. 1095-96) reasoned as follows.

> *Since the supply of capital from abroad is infinitely elastic, labor bears the entire burden of either a labor income tax or a corporate income tax, so both lead to a change in labour supply decisions. A corporate tax, however, simultaneously creates an additional distortion which reduces capital investment in the economy. It is therefore dominated by a labor income tax…A small country should therefore not attempt to tax capital, regardless of the tax policies in other countries.*

The finding that corporate income should not be taxed continues to hold if corporate income includes not only normal returns to capital but also firm-specific rents (McKeehan and Zodrow, 2017). This is because firm-specific rents, which can arise from managerial skill or intangible assets, share the same property with capital of being globally mobile, and hence are not taxed under an efficient tax system. Rents that are location-specific, rather than firm-specific, have different implications for an optimal corporate tax system, as discussed later.

Despite Gordon's finding, one reason for imposing a corporate income tax in a small open economy is the "Treasury transfer" effect. This arises when multinational (MNC) firms are able to claim a tax credit in their home country for corporate tax that is imposed by the host country. This means that the host country is able to use corporate tax to transfer revenue to it from the home country. McKeehan and Zodrow (2017) elaborate on this argument for a host country, such as Australia, to impose corporate tax.

> *The "treasury transfer" argument suggests that a host country that imports capital primarily from countries that use residence-based corporate income tax systems and grant foreign tax credits (FTCs) should raise its tax rate approximately to the rate utilized by those countries, since such a rate increase will essentially transfer revenues from the treasury of the home countries to the treasury of the host country without having any deleterious effects on FDI (since the combined host and home countries tax burden borne by the MNC is always determined solely by the statutory tax rate of the home country).*

At the same time, McKeehan and Zodrow (2017) acknowledge that the "Treasury transfer" effect has become of "limited relevance". This is because countries have been switching from residence-based to territorial-based corporate tax systems. By the time Japan and the UK switched to "territorial" tax systems in 2009, the USA was "the only major industrialized country" that continued to provide tax credits for company tax paid in other jurisdictions.

Table 2.1 shows the extent to which credits are claimed in the USA for Australian company tax. On average, such credits have covered only about 5 per cent of Australian company tax revenue. This proportion is relatively low, even though US foreign investment in Australia is substantial. This is because credits are only paid for direct investment, not portfolio investment, and the US only taxes the foreign earnings of its MNCs that are remitted as dividends.

Table 2.1
US Tax Credits for Australian Company Tax

Year	US credits ($ million, USD) (a)	USD/AUD exchange rate (b)	US credits ($ million, AUD)	company tax revenue (accrual) (d)	US credits (% of company tax revenue)
2007	2,546	0.8448	3,014	58,297	5.2%
2008	2,825	0.8632	3,272	64,687	5.1%
2009	2,121	0.8097	2,619	60,593	4.3%
2010	3,151	0.9467	3,329	53,092	6.3%
2011	3,142	1.0624	2,957	57,302	5.2%
2012	2,968	1.0668	2,783	66,541	4.2%
2013	2,618	0.9987	2,621	68,054	3.9%
average					4.9%

Sources:
(a) US Internal Revenue Service, "Corporate Foreign Tax Credit Statistics", Table 2.
(b) Australian Taxation Office
(d) Australian Government, 2017-18 Budget Paper No. 1, Statement No. 5

This small Treasury transfer effect would only justify a low Australian company tax rate. Further, under Trump's proposed "Unified Framework for Fixing our Broken Tax Code" (US Government, 2017), the Treasury transfer effect would largely disappear if either one of two proposals are adopted.

Under the "territorial" proposal, the USA would switch to a "territorial" corporate tax system. With the US no longer taxing dividends remitted from Australia to the US, it would also no longer provide tax credits on those dividends, eliminating the Treasury transfer effect[3].

Under the "rate cut" proposal, the US corporate tax rate would be reduced from 35 per cent to 20 per cent. US tax credits would then only be available for Australian company tax applied up to the new US rate, whether it be 20 per cent or a higher compromise rate of 25 per cent. This means that when reducing the Australian company tax rate, the Treasury transfer effect would only come into play once the Australian tax rate was reduced to the new US tax rate. Further, if the "territorial" proposal were adopted, the Treasury transfer effect would never come into play, irrespective of the Australian tax rate.

The standard modelling in this paper assumes a continuation of the existing Treasury transfer effect with a US tax credit for 5 per cent of Australian company tax, in line with historical experience in Table 2.1. However, given the potential US policy developments, for some scenarios, alternative results are also presented without the Treasury transfer effect.

Abstracting from the Treasury transfer effect, Bruce (1992) shows that there is another potential reason for applying corporate tax in a small open economy. He extends Gordon's work by allowing for corporate income from location-specific economic rents ("economic profits"), in addition to corporate income from normal returns to capital. Location-specific economic rents can include land rents, mineral resource rents and local oligopoly rents. Bruce found that, under a first-best tax policy, the corporate income from location-specific economic rents would be taxed away, while at the same time confirming Gordon's results that corporate income from normal returns to capital should not be taxed.

[3] I would like to thank Dhammika Dharmapala for this point.

Bruce (1992) believed that it was realistic to assume that the first-best tax policy of fully taxing location-specific economic rents would not be implemented. Consequently, he favoured imposing a corporate income tax as a second-best tax on location-specific economic rents.

These sharply different prescriptions of taxing away location-specific rents on the one hand, and not taxing normal returns to capital and firm-specific rents on the other hand, raise the question of their relative contributions to corporate income tax revenue in Australia. Using the CGETAX model and its database, it is estimated in Table 2.2 that 42 per cent of company income tax is collected from the efficient tax base of location-specific economic rents. CGETAX does not attempt to split firm-specific economic rents from normal returns to capital, but in any case both are inefficient tax bases and together they generate the remaining 58 per cent of corporate tax revenue.

Clearly, Bruce's second-best policy of using corporate income tax as a blunt way of taxing location-specific economic rents is far from the first-best policy, given our estimate that such rents generate less than one-half of corporate tax revenue.

Table 2.2
Company Income Tax by Economic Base (2015-16, est.)

	$bn	%
normal returns to capital	36.9	58%
oligopoly rents: financial services	14.9	23%
oligopoly rents: other industries	2.2	3%
land and mineral rents	9.3	15%
total	63.3	100%

Source: CGETAX database for 2013-13 uprated to 2015-16 in a model simulation.

2.2 Corporate tax base

A potentially superior approach to that suggested by Bruce is to narrow the tax base to only tax economic rents. This improves the efficiency of the tax base by removing normal returns to capital. However, it still leaves some inefficiency because mobile, firm-specific rents would be taxed alongside location-specific rents.

Versions of source-based economic rent taxes include the Allowance for Corporate Equity (ACE) tax, the Allowance for Corporate Capital (ACC) tax and the source-based Cash Flow Tax (CFT). These taxes have the common feature that they remove normal returns to capital from the tax base by allowing deductions that have a present value equal to the cost of investment. The CFT does this in the simplest way, by making new investment immediately deductible, and therefore does not provide any further investment-related deductions such as those for depreciation or interest expenses.

The ACC, which was first proposed by Boadway and Bruce (1984), provides the usual deduction for depreciation, plus a deduction based on an allowance rate applied to the book value of depreciable assets. This allowance aims to compensate investors for the funding cost of having to wait for depreciation deductions after they make an investment. Because the ACC compensates investors for this waiting cost, Boadway and Bruce (1984) were able to show that the ACC achieves investment neutrality even if tax depreciation rates are set arbitrarily.

Concern about applying a source-based tax (either corporate tax or a rent tax) to firm-specific economic rents arises from the relative ease of avoidance. Such avoidance requires moving the generators of

firm-specific rents – management and intangible assets – to a lower-tax jurisdiction. This may be achieved by simply moving the location of the MNC's headquarters.

Partly to address this problem, some authors have supported using a destination-based economic rent tax, specifically the destination-based cash flow tax (DBCFT), in preference to a source-based economic rent tax such as the CFT (Auerbach et al., 2017). Instead of taxing economic rents in the country in which they are generated, the DBCFT, in effect, taxes MNC rents when they are used to fund the household consumption of the MNC's shareholders. On the assumption that an MNC's shareholders are less internationally mobile than an MNC's headquarters, the DBCFT will tax firm-specific economic rents more efficiently than a CFT.

At the same time, there is a significant difference between the CFT and DBCFT in how the revenue they raise would be distributed between countries. The CFT taxes rents in the country in which they are generated, so an Australian CFT would tax rents generated from Australian-based oligopolies, land and minerals. Thus, the tax generated from these Australian-based assets would stay in Australia.

In contrast, the DBCFT taxes rents in the country where they are used to fund shareholder consumption. This means that rents received by foreign shareholders from Australian-based assets would not be taxed in Australia. On the other hand, rents received by Australian shareholders from foreign-based assets would be taxed in Australia.

This suggests that from a revenue-raising perspective, Australia may prefer a source-based economic rent tax such as the CFT, rather than a DBCFT. The source-based tax has the advantage of taxing in Australia the substantial foreign share of the considerable rents generated by both the Australian financial services oligopoly and Australian mineral resources; those rents are estimated in Table 2.2. More generally, from a revenue-raising perspective, countries such as Australia where inbound investment dominates may prefer a source-based economic rent tax such as a CFT. By the same token, countries where outbound investment dominates, such as the USA, may prefer a DBCFT. For that reason, this paper models a source-based economic rent tax for Australia.

At the same time, it is acknowledged that, besides taxing firm-specific rents more efficiently, a DBCFT has a range of other advantages over a source-based economic rent tax (Auerbach et al. 2017). These advantages are especially in relation to reducing profit shifting. Hence, a DBCFT may be modelled in future work.

In modelling a source-based economic rent tax, this paper uses an ACC rather than an ACE or CFT. This choice is partly for modelling convenience. It is also partly because this research considers a tax system that is a hybrid of a rent tax and a CBIT. Conveniently, one can move along the spectrum from an ACC towards a CBIT simply by scaling down the ACC allowance rate (de Mooij and Devereux, 2011).

To date, the limited international experience with general economic rent taxes has mainly involved the ACE. However, this could be about to change. The Trump administration recently spent some time considering a DBCFT. While this option was ultimately rejected, the most recent proposal (US Government, 2017) references the two central elements of a CFT. First, it allows for immediate write-off of new investments in depreciable assets, although structures are excluded and this policy will only extend for five years in the first instance. Second, it limits the deduction for interest expenses in an unspecified way; this deduction would be eliminated under an R-base CFT. Thus, there still appears to be interest in the USA in implementing some form of cash-flow based economic rent tax.

At an unchanged company tax rate of 30 per cent, the estimates in Table 2.2 appear to suggest that excluding normal returns to capital from the tax base would involve a 58 per cent loss of revenue. In practice, the revenue loss would be less than this, even before allowing for favourable behavioural responses. One reason for this is that the ACC allowance rate can be set at a risk-free rate, rather than at the higher risky rate associated with the normal rate of return on investments (de Mooij and Devereux, 2011). This is because the allowance rate is used to compensate businesses for the funding cost of having to wait for depreciation deductions from government after they make an investment. That is, the allowance rate represents the notional nominal interest rate on a loan from the business to the government, who can be viewed as a riskless borrower. The modelling presented later in this report does not allow for this point, and hence overstates the budget cost of shifting to the ACC.

In any case, the budget cost of shifting to an ACC could be addressed by applying a higher tax rate. In fact, as noted above, Bruce (1992) points out that, in theory, it is efficient to fully tax location-specific economic rents i.e. to apply a tax rate of 100 per cent. However, in practice there are four practical problems with this full taxation approach. First, a higher tax rate than at present would exacerbate profit shifting to jurisdictions with lower tax rates. Second, economic rents include firm-specific rents, which are inefficient to tax. Third, when an asset generating an economic rent such as oligopoly profits is sold, the capitalised value of the rent is received by the seller (Freebairn, 2016) and appears on the balance sheet of the buyer as goodwill. Assuming that the ACC deduction does not cover goodwill, the financial capacity of the buyer to pay an ACC tax may be constrained. Fourth, excluding the normal returns to capital is an uncertain exercise, particularly when a cash flow tax is not used, so a pure tax on economic rents is difficult to achieve. These practical considerations considerably moderate the extent to which the tax rate should be increased in narrowing the corporate tax base to economic rents.

Switching to an ACC has another advantage beyond removing the investment disincentive effect of the traditional corporate income tax. It removes the anomaly of allowing a deduction for the cost of debt but not for the cost of equity. This differential tax treatment under the traditional income tax creates a tax bias favouring debt finance over equity finance of investment. An ACC removes this tax bias because it provides a deduction with a present equal to investment costs, irrespective of whether investment is financed by debt or equity or some combination.

An alternative way of overcoming the financing tax bias is to vary the standard corporate income tax by denying a deduction for interest expenses (de Mooij and Devereux, 2011). Under this comprehensive business income tax (CBIT), the tax bias is removed because there is no deduction available for either debt or equity financing costs. On the other hand, Sørensen (2017) finds that thin capitalisation rules are preferable to a CBIT as a way of countering the tax bias favouring debt finance.

In any case, addressing the tax bias through a CBIT, rather than through an economic rent tax, has the drawback of increasing tax on normal returns to capital relative to tax on economic rents, thus increasing the investment disincentive effect of corporate tax. On the other hand, a CBIT has the advantage of raising more revenue at a given tax rate. If this advantage is used to reduce the tax rate, a CBIT has the advantage of reducing profit shifting, a topic which is discussed later.

Table 2.3 can be used to estimate in a simple way the extent of the broadening in the Australian company tax base from switching to a CBIT. Aside from financial services, other industries have a net interest expense of $27.5 billion. Under a CBIT, this net interest expense would no longer be deductible, adding $8.2 billion to company tax revenue at a tax rate of 30 per cent. Adding this to baseline revenue of $68.1 billion, revenue is higher by a factor of 1.12. This funds a reduction in the tax rate by the same factor, taking it from 30 per cent to 26.8 per cent.

Table 2.3
Company Interest Income and Expenses ($ million)

	interest income	interest expense	net interest expense	net tax
financial & insurance services	161,046	97,664	-63,382	24,598
other industries	15,436	42,896	27,460	43,523
total	176,482	140,560	-35,922	68,121

Source: Australian Taxation Office, Taxation Statistics 2014-15, Companies, Tables 4 and 5.

Financial services complicate a CBIT. This industry receives income in the form of an interest margin and fees from intermediating between borrowers and lenders. A naïve application of CBIT to financial services would mean that the interest margin was no longer taxed, leading to a narrowing rather than a broadening of the tax base, as can be discerned from Table 2.3. Further, this would likely induce a tax avoiding shift away from charging for financial intermediation in the form of fees to charging in the form of interest margin.

Instead, a more sophisticated CBIT is implicitly assumed under which all income derived from financial intermediation is taxable. The model used, CGETAX, is based on national accounts data that imputes interest margin income using the national accounts concept of Financial Intermediation Services Indirectly Measured (FISIM). This approach treats financial services in a consistent way to other sectors. It also further broadens the CBIT tax base, such that the overall CBIT base broadening funds a reduction in the tax rate to around 25 per cent.

An alternative, simpler approach to this problem with a CBIT would be to tax the net interest income of all firms, while not allowing a deduction for firms with a net interest expense. There would be a risk of avoidance by financial institutions merging with non-financial institutions so that the latter could claim its interest expense against the net interest income of the former. An anti-avoidance provision would be needed stopping financial service businesses consolidating with non-financial service businesses for tax purposes.

Like the standard CBIT, the standard ACC does not include a deduction for interest expenses (because investment costs are already fully deductible through the ACC allowance). Hence the same issues arise in dealing with financial services and a similar solution could be adopted.

2.3 Profit Shifting

Profit shifting is a phenomenon that has implications for the choice of the tax rate and the tax base. McKeehan and Zodrow (2017, p.3) explain profit shifting as follows.

> *The application of a relatively high corporate tax rate to the income of MNCs encourages them to engage in profit shifting, that is, to use various financial manipulations, including transfer pricing, the relocation of the ownership of intangibles, and the use of loan reallocations that facilitate interest stripping, to shift revenues to relatively low tax countries and deductions to relatively high-tax countries.*

A desire to reduce profit shifting has been one factor leading to lower corporate tax rates around the globe.

Furthermore, "it is the statutory tax rate that determines the value to the firm of shifted revenues and deductions" McKeehan and Zodrow (2017, p.3). Consequently, profit shifting can be reduced by using a broadening of the tax base to fund a reduction in the tax rate. Therefore, profit shifting is a factor that

favours a broadening of the tax base, as in a CBIT, rather than a narrowing of the tax base, as in an economic rent tax such as the ACC (de Mooij and Devereux, 2011).

The importance of profit shifting for the choice of both the rate and base of corporate tax depends on its extent. In CGETAX the proportion of profits shifted abroad, θ, is determined by the following formula.

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

Thus, the proportion of profits shifted depends on the gap between the statutory tax rate, *t*, and the tax haven tax rate, $t_{h,}$. The sensitivity parameter, *A*, can be selected by using evidence from the literature on either the proportion of the profits that are shifted, θ (as in McKeehan and Zodrow, 2017), or the absolute value of the semi-elasticity of the tax base to the tax rate, *k* (as in de Mooij and Devereux, 2011). *A* is linked to this semi-elasticity as follows.

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

In CGETAX the value selected for *k* is 0.73, as discussed in section 3. When this value is used in the above formula (setting t=30%, t_h=5%), the value obtained for *A* is 0.62. Using this value for *A*, Table 2.4 shows how the proportion of profits shifted varies with the statutory tax rate. The remaining proportion of profits is taxed, leading to the effective tax rates for revenue-raising shown in the table.

Table 2.4
Profit shifting under alternative company tax rates

statutory tax rate	30.0%	25.0%	20.0%	15.0%
effective tax rates:				
revenue	25.4%	21.9%	18.1%	14.1%
cost of capital	28.1%	23.8%	19.3%	14.7%
proportion of profit shifted	15.4%	12.3%	9.3%	6.2%

Source: CGETAX model

For example, at the existing statutory tax rate for large companies of 30 per cent, an estimated 15.4 per cent of profits are shifted, reducing the effective tax rate for revenue raising from 30 per cent to 25.4 per cent. However, the effective tax rate driving the investment decisions of MNCs, *tc*, falls by considerably less to 28.1 per cent, and is given by the following formula, which is derived in Murphy (2017b). This formula takes into account tax paid in the tax haven as well as tax avoidance costs.

$$tc = t - (0.5).\theta.(t - t_h)$$

These estimates indicate that profit shifting results in a substantial loss of revenue for a relatively small reduction in the cost of capital for investment. Thus, profit shifting adds to the inefficiency of corporate income tax. This can be addressed through a combination of an anti-avoidance strategy and an internationally competitive tax rate. In addition, as noted above, profit shifting can also be addressed by choosing a broader, rather than a narrower, tax base, as this helps fund a lower tax rate.

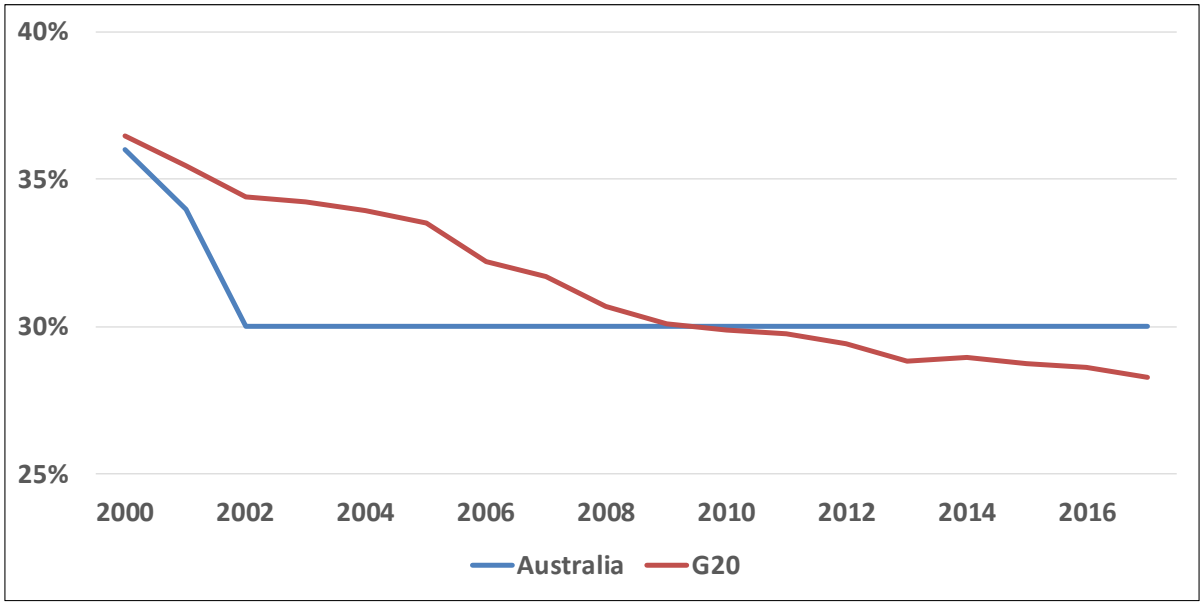
One way of considering Australia's potential exposure to profit shifting is to compare our statutory tax rate with rates in other countries. Chart 2.1 makes the comparison with the average tax rate for the G20 countries. In Australia, the tax rate was cut from 36 per cent in 1999/00 to 34 per cent in 2000/01 and 30 per cent in 2001/02, taking it well below the average G20 rate of 34.4 per cent. However, in

subsequent years the Australian large company tax rate has remained unchanged, while tax cuts in other countries have reduced the average G20 rate to 28.3 per cent.

Looking ahead, corporate tax rates are continuing to fall across the G20, reflecting concerns about the inefficiency of corporate tax as a way of raising revenue in a world of mobile capital and profit shifting. For example, based on further future tax cuts already announced by 2016, Devereux, Habu, Lepoev and Maffini (2016) imply that the average G20 rate will fall further from 28.3 per cent in 2017 to 27.0 per cent in 2020. Hence, on existing trends, the proposal to reduce the Australian large company tax rate to 25 per cent by 2026-27 is likely to do no more than restore the Australian rate to around the average G20 rate. It may not even achieve this if the Trump administration succeeds in substantially reducing the US rate, as they would likely spur further rate cuts in G20 countries.

As explained above, CGETAX bases its modelling of profit shifting on a comparison of the Australian tax rate with an indicative tax haven rate of 5 per cent. Thus, falling tax rates in other G20 countries do not have an effect on profit shifting in CGETAX. In reality, some effect can be expected, as some profit shifting by MNCs takes the form of transfer pricing and debt shifting within the G20.

Chart 2.1
Australian Statutory Tax Rate compared to average for G20



Source: Oxford University Centre for Business Taxation database and own calculations.

2.4 Dividends

Gordon's basic result that it is not optimal to apply a corporate tax in a small open economy arises because investment is discouraged when the marginal investors, who are foreign investors, are taxed. By the same logic, investment is not discouraged if a tax only applies to the capital income of resident investors. This is the case under both the personal income tax and superannuation income tax systems, as they are residence-based.

Taxing resident investors gives rise to a different disincentive effect, namely that domestic saving is discouraged. However, give that all of the major taxes have some disincentive effects, some positive rate of tax on the capital income of residents will be optimal. At the same time, the optimal tax rate on capital income is likely to be lower than for labour income, giving rise to dual income tax systems that

incorporate that feature. Consistent with this, the Australia's Future Tax System Review (2009), better known as the Henry Review, recommended that a discount be applied to certain non-labour income.

In taxing the capital income of residents, Bruce (1992, p. 217) points out that in a small open economy the same rate of tax should be applied irrespective of whether that income is locally or foreign sourced.

> *A small open capital-exporting economy should tax the capital income of its residents at the same rate whether the capital is invested at home or abroad. In other words, Gordon's argument implies that capital income should be taxed on a residence basis only.*

In the case of dividend income, Australia, unlike most advanced economies, does not follows this optimal principle of taxing local and foreign sourced capital income at the same rate. Rather, Australia provides a concessional tax treatment for locally-sourced dividends, but not for foreign-sourced dividends. Specifically, under the dividend imputation system, resident shareholders receive a tax credit for the Australian company tax that has already been deducted before the dividends are paid. This tax credit is based on the premise that the incidence of Australian company tax falls on shareholders, so that dividend imputation is needed to avoid double taxation. However, Gordon's argument implies that the final incidence of company tax, as it applies to normal returns to capital, falls on labour, so imputation credits are not justified.

Fuest and Huber (2000) specifically address this issue of using a dividend imputation system in a small open economy. Consistent with Gordon (1986) and Bruce (1992), they find that dividend imputation is "not desirable" when the marginal investors are foreign shareholders.

> *In an open economy, it is not desirable to offer double taxation relief for dividends paid by domestic firms to domestic households…The reason is that the marginal shareholder in domestic firms is a foreign investor. This implies that the level of real investment is not affected by the taxation of domestic dividend income at the household level. A reduction of the tax burden on dividends is therefore merely an undesirable subsidy on domestic asset holdings.*

This "subsidy on domestic asset holdings" under dividend imputation introduces another disincentive effect. Subsidising locally-sourced dividends, but not foreign-sourced dividends, exacerbates home country bias in the share portfolios held by residents either directly, or indirectly via managed funds and superannuation funds. Looked at from a national perspective (as distinct from a private perspective), this lack of diversification is at the expense of lower returns and/or higher risk.

Bond, Klemm and Devereux (2007) provide some evidence that removal of dividend imputation has the effects predicted above. The 1997 UK dividend tax reform removed the dividend tax credit for UK pension funds for their holdings of UK equities. There was little evidence that this led to lower share prices and hence lower business investment. Rather, it led the UK pension funds to reduce their holdings of UK equities and increase their holdings of foreign equities. Thus, it has the positive impact of reducing home country bias in the portfolios of UK pension funds, reducing risk through greater diversification into foreign equities.

Table 2.5 shows that imputation credits are claimed on an average of 30 per cent of company income tax revenue. The main reasons that credits are not claimed on 100 per cent of revenue is that credits cannot be utilised by foreign investors or on earnings that are retained rather than distributed as dividends. While these credits are taxable, they nonetheless cause a large leakage of company income tax revenue, without ameliorated the investment disincentive effect of company tax. Thus, the imputation system makes company income tax an even more inefficient way of raising revenue.

Table 2.5
Usage of Franking Credits ($ billion)

	APRA funds	SMS funds	Individuals	Trusts	Total franking credits	CIT revenue	Credits/CIT revenue
2005-06	2.8	1.4	6.6	2.2	12.9	48.7	27%
2006-07	3.3	1.8	8.1	2.9	16.1	58.3	28%
2007-08	2.8	1.9	8.5	3.2	16.4	64.7	25%
2008-09	2.7	2.0	8.7	3.4	16.8	60.6	28%
2009-10	2.4	1.9	7.9	3.5	15.7	53.1	30%
2010-11	4.2	3.1	8.9	4.0	20.1	57.3	35%
2011-12	3.3	2.5	8.8	4.2	18.7	66.5	28%
2012-13	3.6	2.7	9.2	4.5	20.0	68.1	29%
2013-14	4.0	3.1	10.0	4.9	22.0	69.1	32%
2014-15	4.4	3.6	9.5	4.8	22.2	65.5	34%
average							30%

Source: Australian Taxation Office (2017), Taxation Statistics 2014-15, Individuals Table 1 and Super Funds Tables 1 and 2.

2.5 Other Issues

Many smaller businesses are unincorporated (as are some larger businesses such as real estate investment trusts) and so are not subject to corporate income tax. Rather than modelling unincorporated enterprises, CGETAX allows for the partial coverage of corporate tax by calibrating the model corporate tax rate to actual corporate tax collections, so that the overall burden of corporate tax on investment is correctly represented.

A low corporate tax rate may encourage tax avoidance whereby owner-workers in smaller corporations disguise part of their labour income as corporate income. McKeehan and Zodrow (2017) consider the case where income disguised in this way is only taxed once, at the corporate level. This is consistent with the owner-worker being able to access the disguised income by borrowing from the company in a sham loan that is never repaid.

Australian tax law aims to prevent such sham loans, and in practice disguised income is generally accessed by distributing it as a dividend, leading to further taxation. Under the imputation system, this results in a tax deferral benefit between the year in which the disguised income was taxed in the company and the year in which it was distributed as a dividend. This makes the tax benefit both smaller and more complex than that considered by McKeehan and Zodrow (2017) and it has not been modelled in CGETAX.

3 Modelling approach

This section covers the modelling approach used in this paper. The model used is CGETAX, a computable general equilibrium model of the Australian economy focussing on tax policy. CGETAX is a large model designed to analyse the economic impacts of many different taxes, but its modelling of corporate tax is the main focus here. Full details on the modelling of the corporate tax system and the cost of capital are set out in Appendix A.

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.

CGETAX is a long run model, meaning that their results refer to the ongoing effects on the economy after it has fully adjusted to economic shocks. This is appropriate 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.

3.1 Previous CGE Modelling of Tax Policy

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[4]. Thus, the MEB provides a pure measure of the costs to consumers of the disincentive effects from a tax. These disincentive effects may reduce work, saving or investment, and may distort patterns of saving and consumption. Tax efficiency and consumer welfare are improved by relying more on taxes with low MEBs and less on taxes with high MEBs, until the point is reached where MEBs are equated across taxes.

The author has led three CGE modelling projects focussed on the efficiency of various aspects of the Australian tax system.

- The MM900 model was used in work commissioned by the Treasury for the Australia's Future Tax System Review ("Henry Tax Review"). That model (KPMG Econtech, 2010) focussed mainly on work disincentives and the inefficiencies from narrowly-based taxes and its estimates of MEBs were included in the Henry Tax Review report (AFTSR, 2009).
- The IE CGE model was used in work commissioned by The Treasury for the Business Tax Working Group (BTWG) (Australian Government, 2012). That model focussed on detailed modelling of the economic impacts of changes to the corporate tax rate and base, leading to

[4] 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.

improved estimates of the MEB for corporate tax. The Treasury used the IE CGE to model the proposed cut in the corporate tax rate from 30 per cent to 25 per cent (Kouparitsas, Prihardini and Beames, 2016).

- Since 2014, the IE CGE model has been developed further to more comprehensively model tax policies, and has been renamed the CGETAX model. Like the MM900 model, CGETAX covers work disincentives from labour-based taxes and inefficiencies from narrowly-based taxes, and like the IE CGE model it models in detail the investment disincentive and profit shifting effects of corporate tax. In addition, CGETAX includes saving disincentive effects. Further, it extends the treatment of economic rents beyond land and mineral rents to also represent oligopoly rents in certain sectors. These new developments strengthen the modelling of corporate tax and dividend imputation.

Because CGETAX is designed to model many taxes and some of those taxes have narrow bases, the model possesses considerable detail. There are 278 industries employing eight types of labour and nine types of capital. Some industries generate economic rents from oligopoly power or access to minerals or land.

3.2 Corporate Tax and Industry Behaviour

In each industry in CGETAX, a representative firm operating under constant returns to scale maximises profits. Highly profitable industries are modelled as oligopolies practicing mark-up pricing, while other industries operate under perfect competition with a mark-up factor of unity. The main oligopolies are within finance, telecommunications and food and beverage processing.

Profit maximisation gives rise to demands for four broad categories of primary inputs, some of which are further sub-divided into different types:

- labour;
- equipment;
- structure services; and
- minerals.

Corporate income takes the form of both location-specific economic rents and normal returns to capital.

Location-specific economic rents are generated by land, which contributes to structure services, by minerals, and by oligopoly price mark-ups. As explained in section 2, it is efficient to apply corporate tax to location-specific rents.

Normal returns are generated from nine types of business capital, which are substitutable within the broader categories of equipment and structure services. As also explained in section 2, in a small open economy it is inefficient to apply corporate tax to the normal returns to capital.

CGETAX makes the small open economy assumption invoked in section 2 that the required rate of return on capital, post corporate tax, is determined on world capital markets. Hence, a cut in the Australian corporate tax rate, as applied to normal returns to capital, only temporarily increases post-tax returns to foreign investors, who are the marginal investor. Over time, a lower corporate tax rate stimulates higher foreign investment pushing pre-tax returns down and real wages up. This continues until the post-tax rate of return to foreign investors is restored to that prevailing on world capital markets.

Thus, cuts in corporate tax on normal returns to capital ultimately are passed on from capital to labour. On the other hand, cuts in corporate tax on location-specific economic rents are retained by shareholders, both domestic and foreign. As a long run model, CGETAX captures the final outcome, not the adjustment process described above.

With the incidence of corporate tax on normal returns to capital eventually passed on from capital to labour, there are two textbook inefficiencies.

- Corporate tax adds to the labour market tax wedge, adding to work disincentives. The size of this effect depends on the compensated elasticity of the labour supply with respect to the post-tax wage.
- Corporate 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.

CGETAX also allows for profit shifting. Similar to Devereux and de Mooij (2009) and McKeehan and Zodrow (2017), businesses are assumed to maximise post-tax profits, after allowing for the local tax saving from profit shifting, the tax avoidance costs of profit shifting, and the tax applied in the tax haven to which the profits are shifted. Such a model can be calibrated using evidence from the literature on 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, as explained in section 2.

CGETAX also allows for various factors that mitigate the disincentive effects of corporate tax. As explained in section 2, these mitigating effects include the Treasury transfer effect and the fact that corporate tax applies not only to the inefficient tax base of normal returns to capital, but also the efficient tax base of location-specific economic rents.

CGETAX also allows for another mitigating features of the company tax system that was not discussed in section 2. In particular, there is 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 in CGETAX.

With the foreign investor as the marginal investor, taxation of domestic investors does not affect post-company tax returns or investment, as explained in section 2.1. However, it does affect saving, as discussed in section 2.4. In particular, a cut in the corporate tax rate reduces the value of franking credits, increasing the effective tax rate on domestic asset incomes and thereby discouraging saving. The strength of this effect depends on the elasticity of intertemporal substitution (EIS).

3.3 Key Elasticities

The preceding discussion identified four key elasticities, the values of which are important in determining the effects of corporate tax reform in CGETAX. The evidence used in selecting the values for these elasticities is now discussed. These four elasticity values, together with other elasticity values that are important in modelling other major tax reforms, are presented in Table 3.1. The four elasticity values are now discussed in turn.

First, as explained above, in CGETAX a cut in the corporate tax rate stimulates higher real wages, and the strength of the resulting labour supply response depends on the elasticity of the labour supply with respect to the post-tax wage. In CGETAX, this is set as 0.4 as a compensated elasticity and 0.2 as an uncompensated elasticity. 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.

Second, as also noted above, in CGETAX a cut in corporate tax automatically reduces the value of franking credits for personal income tax and superannuation tax, discouraging private saving, and strength of this effect depends on the 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 of 0.25.

Third, a cut in corporate tax raises the incentive to invest, and the strength of this effect is determined 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.

Fourth, a cut in the corporate tax rate reduces the incentive to shift profits out of Australia. After allowing for both profit shifting to tax havens and transfer pricing, de Mooij and Devereux (2009, 2011) estimate a semi-elasticity of the corporate tax base with respect to the tax rate of -0.73. Similarly, Dharmapala (2016) states that "the consensus of the recent literature is a semi-elasticity of reported income with respect to the tax rate differential across countries of (minus) 0.8". CGETAX uses the de Mooij and Devereux (2011) estimate of -0.73, leading to the profit shifting estimates already reported in Table 2.4.

Another factor influencing the modelling results is that CGETAX utilises the small open economy assumption that post-company tax rates of return on capital in Australia are determined globally through the free movement of funds. However, capital may be only highly mobile rather than perfectly mobile. KPMG Econtech (2010) finds that assuming capital is highly mobile rather than perfectly mobile leads to only a small reduction in estimates of the gains in consumer welfare from corporate tax cuts.

Table 3.1
Key Elasticities in CGETAX

Households:	
Elasticity of intertemporal substitution (tier 1)	0.25
Labour supply elasticity (compensated) (tier 2)	0.4
Elasticity of substitution between broad consumption categories (tier 3)	0.6
Elasticity of substitution within broad consumption categories (tier 4)	0.6-2.4
Businesses:	
Elasticity of substitution between capital and labour	0.7-0.9
Elasticity of substitution between types of capital	0.3
Elasticity of substitution between taxed and untaxed labour	3
Elasticity of substitution between 8 occupational types of labour	3
Elasticity of substitution between land and structures	0.5
Elasticity of substitution between structures-land and mobility	0.3
Elasticity of substitution between value added and intermediates	0.2
Semi-elasticity of corporate income tax base to the rate	-0.73

3.4 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 corporate 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.

3.5 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.

Popular discussion of economic policies often focusses on GDP impacts. EV improves in four important ways on GDP as a measure of gain in living standards:

- EV takes into account that some income from domestic production goes to foreigners;
- EV values consumption smoothing over time;
- EV values leisure time; and
- EV correctly values consumer preferences over the consumption mix.

4 Consumer Costs of the Tax System

This section provides background on the costs to consumers of the economic disincentive effects from many of the taxes collected by federal, state and local governments. Of particular interest is the consumer cost of the three major taxes – personal income tax, corporate income tax and GST – relative to the amount of revenue that they raise. This analysis provides support for the aim of reducing the reliance placed on corporate tax relative to most other taxes.

4.1 Consumer Costs in CGETAX

Table 4.1 presents the results from simulating the consumer costs of various taxes in CGETAX. The Average Excess Burden (AEB) shows the consumer cost of a tax relative to its contribution to the government budget. The Marginal Excess Burden (MEB) makes the same comparison, but for the last dollar of revenue that is raised from the tax. Consumer welfare is increased by reducing rates of taxes with high MEBs and funding this by increasing rates of taxes with low MEBs. In that way, the economic drag of the tax system on the economy is reduced.

According to the OECD (2010), "corporate taxes are the most harmful type of tax for economic growth, followed by personal income taxes and then consumption taxes". This is supported by the CGETAX MEBs. In particular, corporate income tax has the highest MEB of 97 per cent, followed by personal income tax with 30 per cent (in the case of a tax increase through an income levy) and GST with 24 per cent. The textbook argument for this ranking is as follows.

- In an open economy, corporate income tax, like personal income tax, acts as a disincentive to supply labour (see section 2). However, corporate income tax also acts as a disincentive to demand capital. Thus, corporate income tax has a higher MEB cost than personal income tax.
- GST partly taxes consumption funded out of labour income, and in that regard is similar to labour income tax, with both taxes acting as a disincentive to supply labour. However, GST also taxes consumption funded out of economic rent, which is an efficient tax base. Hence, GST has a lower economic cost per dollar of revenue raised than personal income tax.

Associated textbook MEB formulas for each of the three taxes, under simple assumptions, are presented in Box 4.1. All three formulas incorporate the same labour supply disincentive effect. However, comparison of the consumption tax MEB formula with the labour income tax MEB formula confirms that the MEB for consumption tax is lower to the extent that consumption is funded from rents rather than labour income (i.e. *slab* is less than unity). Further, comparison of the corporate income tax formula with the labour income tax formula shows that the MEB for corporate income tax is higher to the extent that this is a demand for capital effect operating through capital-labour substitution.

The modelling with CGETAX allows for other factors not captured in the formulas, as discussed below.

Corporate Tax

As discussed in sections 2 and 3, corporate income tax has other inefficiencies, besides acting as a disincentive to supply labour and demand capital. These other effects are represented in CGETAX.

- A higher statutory rate leads to a shifting of accounting profits offshore, eroding the effectiveness of corporate tax in raising revenue and diverting scarce economic resources to wasteful tax avoidance activity.
- A higher corporate rate increases franking credits, leading to a revenue leakage without encouraging investment.

Box 4.1
Textbook MEB formulas for the three major taxes

Labour income tax:

MEB = x/(1-x), where x = η*tlab

where:

η = compensated labour supply elasticity with respect to the after-tax wage
tlab = "tax revenue from labour" relative to after-tax labour income
tax revenue from labour = labour taxes + corporate tax to the extent it is collected from normal returns to capital + consumption tax (e.g. GST) to the extent that consumption is funded from labour incomes

Consumption tax:

MEB = x/(1-x), where x = η*tlab*slab

where:

η = compensated labour supply elasticity with respect to the after-tax wage
slab = share of consumption funded from labour income

Corporate income tax:

MEB = x/(1-x), where x = η*tlab+(σ/α).tke

where:

σ = elasticity of substitution between capital and labour
α = labour share of (non-rent) factor income
tke = effective capital tax rate (taking into account that depreciation is deductible)

Source: Murphy (2016b)

At the same time, these adverse effects of corporate tax are partly mitigated by two other effects.

- While corporate tax applied to normal returns to capital is highly inefficient, corporate tax applied to location-specific economic rents is efficient. CGETAX recognises location-specific economic rents from oligopoly mark-up pricing, mineral resources and land.
- US direct investment in Australia generally receives full tax credits in the US for corporate tax paid in Australia on remitted earnings. This Treasury transfer effect was explained in section 2 and is fully taken into account in CGETAX.

Table 4.1 shows that the MEB for corporate income tax declines with the rate of tax. This result, which is consistent with textbook analysis for taxes in general, means that there is a limit to the extent to which it is optimal to reduce the rate of corporate tax. That limit is explored further in section 5.

Table 4.1 also shows the sensitivity of the MEB for corporate income tax to the presence of the Treasury transfer effect. If the Treasury transfer effect were to disappear, the already high MEB of 97 per cent would climb to a very high 131 per cent. As explained in section 2, this will occur if either the "territorial" or "rate cut" proposals of the Trump administration are implemented. That is, corporate tax reform in the US has the potential to substantially add to reform pressures in Australia.

Personal Tax

The estimate of an MEB of 30 per cent for personal income tax refers to a tax increase that is not redistributive: an income levy calculated as a fixed percentage of income is added to tax liabilities.

Redistributive changes in the tax scale have higher MEBs because, by definition, they lift marginal tax rates, which reduce work incentives, relative to average tax rates, which lift revenue. The budget repair levy, which added 2 percentage points to the top marginal tax rate, was highly redistributive and hence had a very high MEB of 64 per cent. At the other extreme, bracket creep is a regressive means of raising additional revenue and has a relatively low MEB of 25 per cent.[5]

In Australia taxes on asset income are very low. This mainly reflects the tax treatments of owner-occupied housing, rented housing and superannuation, as well as the system of franking credits. In CGETAX it is optimal for taxes on asset income to be lower than taxes on labour income, but this is currently overdone. As a result, the MEB for increasing the rate of tax on asset income, through reducing franking credits, is low at 14 per cent.

GST

As would be expected, raising the GST rate has a higher MEB (24 per cent) than broadening the base, so base broadening is to be preferred. One base broadening option is to change the treatment of banking, life insurance and superannuation from input-taxed to taxable (13 per cent). The issues in implementing such a change are addressed in Murphy (2017a). Another base broadening option is to change the treatment of fresh food from GST free to taxable (11 per cent).

Economic Rent Taxes

In CGETAX, mining company shareholders receive economic rents from access to mineral resources. The existing mining royalties based on the value of production act as a disincentive to production. However, in principle, a well-designed rent tax does not distort production. Thus, the MEB for a minerals rent tax, such as the existing petroleum resources rent tax (PRRT), is considerably lower (-11 per cent) than for royalties (33 per cent). Therefore consumers would benefit from the replacement of royalties with a resource rent tax.

This issue in taxation of mining has parallels in financial services. The oligopoly power of the big four banks leads to oligopoly rents. The new major bank levy is based on bank size (as measured by selected liabilities) and hence, like mining royalties, acts as a disincentive to production. This disincentive is exacerbated by the pricing power of the major banks. In principle, a well-designed rent tax would not distort production. Thus, the MEB for a financial services rent tax (-11 per cent) is considerably lower than for the major bank levy (79 per cent).

One limitation of the major bank levy, compared to the IMF recommendations for a financial services charge, is that it is a flat 6 basis points of selected liabilities, and so does not vary with the risks taken by banks. Another limitation is that it applies to uninsured deposits rather than the deposits insured for free by government under the financial services claims scheme. These limitations undermine the user pays argument for the levy. The taxation of financial services is analysed in detail using CGETAX in Murphy (2017a).

[5] Patricia Apps has made the point that the MEBs reported here assume that the compensated labour supply elasticity is the same for both low and high wage earners, as is generally the case in economy-wide models.

Table 4.1
MEBs and AEBs in CGETAX

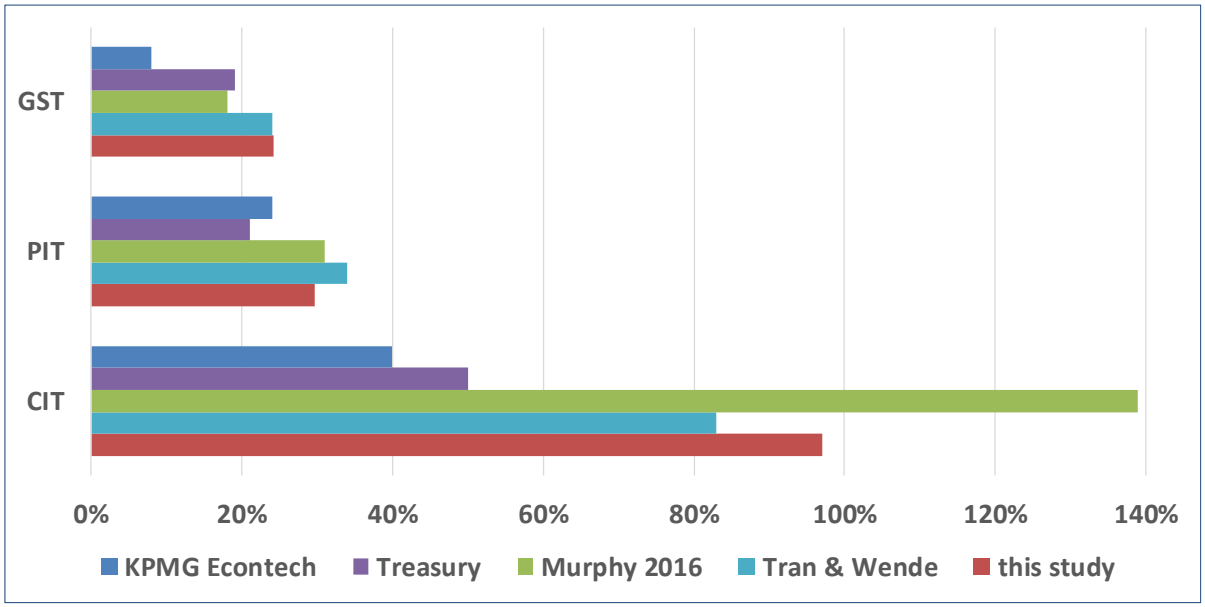
	MEB	AEB
Personal Income Tax		21%
budget repair levy	64%	
tax surcharge	42%	
medicare levy	42%	
income levy	30%	
bracket creep	25%	
labour income levy	31%	
reduce franking credits	14%	
Corporate Income Tax		
existing policy environment:	97%	21%
25% to 30%	75%	
20% to 25%	46%	
15% to 20%	27%	
without Treasury transfer effect:	131%	36%
25% to 30%	102%	
20% to 25%	66%	
15% to 20%	43%	
GST		21%
raise rate	24%	
broaden base to fresh food	11%	
remove financial services concession	13%	
Other Taxes		
	MEB	**AEB**
Payroll Tax		28%
raise rate	34%	
abolish threshold	20%	
Property taxes:		
municipal rates	0%	-2%
land tax	45%	28%
conveyancing duty: residential	65%	49%
conveyancing duty: commercial	144%	100%
Insurance taxes	61%	40%
Mining taxes:		
PRRT	-11%	-11%
royalties	46%	33%
Financial service taxes:		
major bank levy		79%
rent tax (hypothetical)		-11%

For a fuller analysis of an earlier version of the MEBs in CGETAX, see Murphy (2016b).

4.2 Previous Studies

The estimated MEBs for the three major taxes presented in this paper are compared, in Chart 4.1, with estimates from four earlier Australian studies. The results from all five studies are consistent with the OECD (2010) ranking in which corporate tax is the most inefficient tax and GST the least inefficient.

Chart 4.1
Comparison of Major MEBs with Previous Studies



Sources:
"KPMG Econtech" is KPMG Econtech (2010).
"Treasury" is Cao, Hosking, Kouparitsas, Mullaly, Rimmer, Shi, Stark and Wende (2015).
"Murphy 2016" is Murphy (2016b)
"Tran & Wende" is Tran and Wende (2017)

While the five studies are in fairly close agreement, that they are not entirely separate, because some of the models used share the same model developer. However, Tran and Wende (2017) is an entirely separate study. While the other four studies are based on long run equilibrium, Tran and Wende (2017) use an overlapping generations model that features different types of households and is dynamic. With this additional detail, in other respects its treatment of the three major taxes is much simplified compared to the other studies. However, its estimates for the three MEBs are similar to those presented in this paper, as can be seen by comparing the final two bars in Chart 4.1. Hence, it does not appear that the MEB estimates for the three major taxes are particularly sensitive to whether a model is dynamic or refers to a long run equilibrium.

Murphy (2016b) estimates a relatively high MEB for corporate income tax, as can be seen in Chart 4.1. However, improvements to the method for modelling profit shifting have resulted in estimates that are more consistent with the other studies.

5 Alternative rates of corporate tax

Taking the corporate tax base as given, this section models alternative corporate tax rates to help judge the appropriate rate. The following section models alternative tax bases. Alternative options for funding corporate tax rate cuts are considered in section 7.

At the existing larger company rate of 30 per cent, corporate income tax has a high marginal excess burden (MEB) of 97 per cent, as seen in Table 4.1. That is, the economic costs of the last dollar of revenue that is raised, even after it has been returned to consumers in a lump sum form, results in a loss in consumer welfare of 97 cents. This is a high MEB relative to other sources of taxation revenue, making company income tax a highly inefficient way of raising revenue at the rate of 30 per cent. For example, as noted in section 4, the GST has an estimated MEB of 24 per cent.

The factors making corporate tax inefficient were covered in preceding sections and in summary are:

- its investment disincentive effect;
- its labour supply disincentive effect (via a lower real wage);
- profit shifting to lower-taxed jurisdictions; and
- the franking credits system, which adds further to the concessional tax treatment of saving at a substantial cost to revenue.

Factors ameliorating the inefficiency of corporate tax were:

- to the extent that corporate tax applies to location-specific economic rents, the investment and labour supply disincentive effects are avoided; and
- the Treasury transfer effect that enables some US investors to receive a US tax credit for Australian corporate tax, although this credit would disappear under proposed US tax changes.

Like other taxes, corporate income tax imposes lower marginal costs on the economy as its rate is reduced. Modelling of reducing the rate in five percentage point steps indicates that there is a case for reducing the rate to as low as 20 per cent. As shown in Tables 4.1 and 5.1, the MEB from having a corporate tax rate of 30 per cent rather than 25 per cent is a very high 75 per cent. The MEB from having a corporate tax rate of 25 per cent rather than 20 per cent is still quite high at 46 per cent. However, in the current international tax environment, the case for reducing the corporate rate further, from 20 to 15 per cent, appears weak. This is because the MEB from having a corporate rate of 20 per cent rather than 15 per cent is a moderate 27 per cent.

Caution is needed in using these results because they assume the continuation of the "Treasury transfer" effect. As explained in section 2, this effect may largely disappear under potential US tax reforms proposed by the Trump administration. Without the offsetting influence of the Treasury transfer effect, corporate tax would be more inefficient, leading to the higher MEBs shown in the second panel of Table 5.1. For example, the MEB from having a corporate tax rate of 20 per cent rather than 15 per cent moves from moderate to high, rising from 27 per cent to 43 per cent.

From these results, the optimal Australian company tax rate is clearly well below the existing large company rate of 30 per cent. The optimal rate is certainly no higher than the proposed rate of 25 per cent and can be argued to be as low as 20 per cent. Further, the Trump tax reforms have the potential to reduce the optimal rate by a further 5 percentage points, as under the reforms MEBs are similar at tax rates that are about five percentage points lower.

Table 5.1
Effects of reducing the corporate tax rate

bus tax scenario:	30 to 25	25 to 20	20 to 15
existing policy environment:			
Consumer welfare (2015/16, $bn)	3.1	2.3	1.6
Budget gain (2015/16, $bn)	-4.2	-5.1	-5.8
Marginal Excess Burden (%)	75%	46%	27%
Household Consumption (%)	0.52%	0.43%	0.34%
GDP (%)	0.79%	0.74%	0.69%
Business investment (%)	2.33%	2.20%	2.08%
Employment (%)	0.19%	0.19%	0.20%
Real after-tax wage (%)	0.80%	0.73%	0.67%
without Treasury transfer effect:			
Consumer welfare (2015/16, $bn)	4.1	3.2	2.4
Budget gain (2015/16, $bn)	-4.0	-4.9	-5.7
Marginal Excess Burden (%)	102%	66%	43%
Household Consumption (%)	0.62%	0.52%	0.43%
GDP (%)	0.83%	0.78%	0.73%
Business investment (%)	2.45%	2.32%	2.19%
Employment (%)	0.18%	0.19%	0.19%
Real after-tax wage (%)	0.86%	0.79%	0.73%
less profit shifting:			
Consumer welfare (2015/16, $bn)	2.6		
Budget gain (2015/16, $bn)	-5.2		
Marginal Excess Burden (%)	49%		
Household Consumption (%)	0.48%		
GDP (%)	0.84%		
Business investment (%)	2.47%		
Employment (%)	0.22%		
Real after-tax wage (%)	0.83%		

Another uncertainty is the strength of the profit shifting effect. As explained in section 3, based on the evidence in the literature, CGETAX assumes a semi-elasticity of the corporate tax base with respect to the corporate tax rate of -0.73. The final panel shows the effect of reducing this semi-elasticity to a rather conservative -0.5. With company tax less inefficient, the annual consumer welfare gain from the proposed cut in the corporate tax rate from 30 to 25 per cent eases back from $3.1 billion to $2.6 billion.

The modelling reported in Table 5.1 assumes that corporate tax cuts are funded through a lump sum tax. In reality, any funding method is likely to involve economic costs of its own. Alternative methods of funding cuts in the corporate tax rate are considered in section 7.

6 Alternative bases for corporate tax

While the previous section considered options for reducing the corporate tax rate, this section holds the tax rate unchanged at 30 per cent and considers potential changes to the base of corporate tax and the taxation of dividends.

The first two options refer to the base of corporate tax and have been modelled previously by de Mooij and Devereux (2009) in an EU study. The reasons for considering these two options were explained in section 2 and so are only summarised briefly here.

- The first option is to narrow the tax base by making investment costs fully deductible in present value terms. This removes the investment disincentive effect of corporate tax by making it a pure tax on economic rents. For the reasons explained in section 2, the economic rent tax modelled is the ACC rather than the ACE or CFT.
- The second option is to broaden the tax base by making interest non-deductible, leading to a CBIT. This broadening of the tax base raises more revenue without increasing profit shifting. At the same time, a CBIT increases the investment disincentive effect of corporate tax, because it increases inefficient taxation of normal returns to capital relative to efficient taxation of location-specific economic rents.

As explained in section 2, the CBIT and a rent tax are also alternative ways of removing the existing tax bias in favour of debt over equity that arises from the deductibility of interest costs under the traditional corporate tax. However, CGETAX holds the debt-equity ratio fixed and therefore does not allow for the bias to debt funding under the traditional corporate income tax. Therefore, the modelling understates the benefits from removing the existing tax bias by moving to either an ACC or CBIT.

In de Mooij and Devereux (2011) the rent tax that is modelled is an ACE. Here an ACC is used. In practice, a CFT is likely to be the most reliable way of taxing economic rents because it avoids the inevitable errors involved in the authorities estimating appropriate nominal allowance rates for equity or capital under an ACE or ACC respectively. The modelling does not allow for such errors.

The third option concerns Australia's internationally unusual dividend imputation system. It was introduced in 1987 to integrate the corporate and personal tax systems in a way that avoided double taxation of investment. However, as explained in more detail in section 2, this argument does not hold in a small open economy such as Australia. As shown by Fuest and Huber (2000), in that case corporate tax on normal returns to capital is borne by labour, not shareholders, and investment is driven by the tax treatment of foreign investors rather than of domestic investors.

Hence, the third option is to remove the dividend imputation system and replace it with concessional taxation of dividends, irrespective of their source, bringing Australia into line with other advanced economies. The logic of Fuest and Huber (2000) holds in the CGETAX model. That is, removing dividend imputation does not lead to lower business investment but it does provide a substantial gain to the government budget.

At the same time, CGETAX does not currently capture a further benefit from removing dividend imputation. As explained in section 2, removing this subsidy on locally-sourced dividend income compared to foreign-sourced dividend income reduces home country bias in portfolios. Hence, the CGETAX modelling results presented below are likely to understate the benefits from removing dividend imputation.

The results from modelling the three tax base options are presented in Table 6.1. In each case, the corporate tax rate is maintained at its baseline rate of 30 per cent. Impacts of the base changes on the government budget are offset through lump sum transfers to households.

The first option involves using a CBIT to broaden the corporate tax base. Raising additional revenue in this way has a medium to high MEB of 36 per cent. On the one hand, this broadening of the tax base has the benefit of raising additional revenue without increasing the rate of profit shifting, as discussed in section 2. On the other hand, this base broadening also has the cost of imposing higher inefficient taxation on normal returns to capital, while leaving efficient taxation of economic rents unchanged, so business investment is lower.

Interestingly, Sørensen (2017) finds that, even in the absence of economic rents, it is optimal to stop short of moving to a CBIT by imposing thin capitalisation rules instead. Thus, future work may consider modelling of thin capitalisation rules.

Table 6.1
Effects of changing the corporate tax base at an unchanged tax rate of 30 per cent

bus tax scenario:	CBIT	ACC with franking	no franking	ACC w/out fr	CBIT w/out fr
Consumer welfare (2015/16, $bn)	-2.1	12.5	-1.5	10.9	-3.6
Budget gain (2015/16, $bn)	5.8	-23.8	11.1	-13.1	16.7
Marginal Excess Burden (%)	36%	52%	14%	84%	21%
Household Consumption (%)	-0.33%	2.19%	0.02%	2.21%	-0.32%
GDP (%)	-0.62%	4.46%	0.00%	4.46%	-0.62%
Business investment (%)	-1.85%	14.15%	0.00%	14.14%	-1.86%
Employment (%)	-0.17%	1.22%	0.00%	1.21%	-0.17%
Real after-tax wage (%)	-0.60%	4.31%	0.00%	4.32%	-0.59%

The second option involves narrowing the tax base through an economic rent tax in the form of the ACC. This generates a high welfare gain relative to the budget cost. With normal returns to capital removed from the tax base, there is a large gain in business investment of over 14 per cent. At the same time, the annual budget cost of around $24 billion is large in current budget circumstances. However, the modelling overstates this budget cost. As explained in section 2, in practice the ACC allowance rate used in calculating the ACE deduction can be based on a risk-free interest rate rather than the higher normal rate of return on capital that has been used in the modelling.

As cautioned above, the modelling is likely to understate the benefits of moving to either a CBIT or an ACC. This is because CGETAX does not account for the benefit of removing the existing tax bias favouring debt finance over equity finance.

The third option is to abolish franking credits. This has a low MEB of 14 per cent, making this an attractive option. The cost to consumer welfare from this measure, while modest, arises from the reduced incentive to save. In fact, as explained in section 2, the MEB from abolishing franking credits is likely to be even lower than suggested by the modelling, because of the benefit, which is not modelled, of reducing home country bias in portfolios.

As noted above, it is sometimes argued that the franking credit system supports investment but this is not true under the small open economy assumption made here. In any case, even in a closed economy, introduction of a rent tax such as an ACC means that normal returns to capital are no longer taxed. This

removes any argument that the franking credit system may be justified as a method of offsetting an investment disincentive effect from tax applied at the corporate level.

Consequently, the rent tax was re-simulated in combination with removing the franking credit system. Removing franking credits helps reduce the modelled annual budget cost from introducing a rent tax from $24 billion to $13 billion. However, as noted above, the modelled budget costs are overstated because of the use of a high ACC allowance rate. The MEB burden from maintaining the current business tax system, rather than an alternative system based on an ACC without franking credits, is very high at 84 per cent, as seen in Table 6.1, pointing to the strong case for reform.

For completeness, the CBIT was also re-simulated in combination with removing the franking credit system. The small open economy argument for removing franking credits also applies under a CBIT, although this is no longer the case under a closed economy assumption because, unlike the ACC, the CBIT taxes normal returns to investment.

Raising additional revenue by simultaneously broadening the tax base to a CBIT and removing the franking credit system has a moderate MEB of 21 per cent, as seen in the final column of Table 7.1. However, comparing this scenario with the separate scenarios for the two policy measures, it can be seen that this favourable outcome arises more from removing the franking credit system than from introducing the CBIT.

Comparing the results presented in this section with those presented in section 5, the modelling provides support for reducing the corporate tax rate, removing dividend imputation and narrowing the tax base to an ACC. As one moves down this list of three reform options, the changes to the business tax system become more radical, and therefore perhaps less likely.

It has sometimes being suggested that introducing an investment allowance is to be preferred to reducing the corporate tax rate. However, an investment allowance is really a poor cousin to a rent tax in the form of a cash flow tax (CFT). Both a CFT and an investment allowance make new investment immediately deductible. The main difference is that an investment allowance maintains interest deductibility, making debt-funded investment doubly deductible. Thus, in considering alternatives to reducing the corporate tax rate, it makes more sense to focus on a rent tax such as an ACC or CFT than on an investment allowance.

7 Options for funding a 25 per cent corporate tax rate

Section 5 modelled a sequence of corporate tax rate cuts using the conventional, but unrealistic assumption, that they are funded by a lump sum tax. Using the proposed cut in the corporate rate from 30 to 25 per cent as an illustration, this section models a corporate tax cut under five more realistic funding options. All five funding options are calibrated to provide broadly budget-neutral outcomes.

Section 5 estimated the annual budget cost of cutting the corporate tax rate from 30 to 25 per cent at $4.1 billion on a 2015/16 basis. This is substantially lower than implied by the official Budget estimates.

This difference arises because the modelling allows for the budget gains from the favourable behavioural responses to the corporate tax cut. Higher investment drives higher wages and GDP, lifting tax revenue widely. A lower corporate tax rate also reduces profit shifting. These responses approximately half the budget cost of the tax cut, in line with other studies (for a survey, see UK Treasury & Revenue and Customs, 2013). However, the Budget estimates do not allow for this fiscal dividend.

As all scenarios achieve broad budget-neutrality, it is valid to directly compare their outcomes for annual consumer welfare. Under the lump sum funding assumption of section 5, the gain in annual consumer welfare from this corporate tax cut was $3.1 billion. The modelling results for all scenarios, covering consumer welfare and other economic impacts, are compared in Table 7.1.

It can be argued that under existing policy the proposed corporate tax cut is to be funded by bracket creep. Bracket creep offsets the positive effect on labour supply from the corporate tax cut: a 0.2 per cent gain in employment is eliminated. This in turn erodes the gain in consumer welfare from $3.1 billion under lump sum funding to $2.0 billion under bracket creep funding, as seen in Table 7.1.

The proposed cut in the corporate tax rate to 25 per cent could be fully funded by broadening the corporate tax base by introducing a CBIT. However, this reduces the benefit to business investment from the corporate tax cut. The gain in business investment is eroded from 2.3 per cent to 0.8 per cent. This in turn erodes the gain in consumer welfare from $3.1 billion under lump sum funding to $1.7 billion, as seen in Table 7.1.

A halving of franking credits is another way of funding the proposed corporate tax cut. The effects on the general economy, as measured by GDP, investment, employment and real wages, are virtually unchanged from those seen under lump sum funding. However, lower franking credits increase the average effective tax rate on asset incomes, inhibiting consumption smoothing. This erodes the gain in consumer welfare from $3.1 billion under lump sum funding to $2.3 billion.

In practice, a preferable option to halving franking credits would be to fully remove the franking system and replace it with a concessional tax treatment for dividends, as found in the USA and UK. However, this would not substantially change the modelling results.

An 8 per cent financial services rent tax levied on the substantial oligopoly rents generated in this sector is an alternative means of funding the proposed cut in the corporate tax rate. Because this is a neutral tax, the effects on the generally economy are virtually the same as those seen under lump sum funding. In fact, the gain in consumer welfare from the proposed corporate tax cut of $3.1 billion under lump sum funding is boosted to $3.6 billion under funding from this financial services rent tax. This boost is generated by the gain in national income that arises to the extent that the financial services rent tax is borne by foreign shareholders. While such a rent tax would be highly efficient, the Major Bank Levy

introduced in July 2017 is highly inefficient as discussed in section 4 and in more detail in Murphy (2017a).

While the financial services rent tax has been set to 8 per cent (and is non-deductible for corporate tax), this rate has been chosen to fully fund the proposed corporate rate cut. In practice, a more feasible rate may be 5 per cent. This 5 per cent rent tax rate would claw back most of the revenue cost of applying the proposed cut in the corporate tax rate of 5 percentage points to financial services, without eroding the improvement in the incentive to invest from the corporate tax cut.

It is assumed that there is no shifting of profits to other jurisdictions to avoid the financial services rent tax. Most of the financial services that are assumed to be subject to the tax are provided by organisations that are largely Australian-based and focussed. Hence they have little opportunity to shift profits offshore, and in any case they may be reluctant to do so because of the loss of franking credits to distribute to shareholders. Profit shifting is mainly of concern with respect to the foreign-based multinational companies that operate in Australia.

The final funding option is to raise the rate of GST 10.0 to 10.9 per cent. The gain in consumer welfare from the proposed corporate tax cut of $3.1 billion under lump sum funding is eroded to $2.1 billion under funding from this GST rate increase. Increasing the GST burden has a disincentive effect on labour supply.

One striking feature of Table 7.1 is that reducing the corporate tax rate from 30 per cent to 25 per cent generates a substantial welfare gain, irrespective of the choice of funding method. This reflects the very inefficient nature of company tax at its existing rate of 30 per cent and the strong nature of the case for reducing it to 25 per cent. The funding method associated with the largest gain is the financial services rent tax.

Of course it is possible to combine some of the funding options, so making room for a deeper cut in the corporate tax rate to say 20 per cent. For example, the corporate tax rate could be lowered to 20 per cent by a combination of introducing a financial services rent tax and replacing dividend imputation with a less costly dividend tax concession. Such a deeper cut to the company tax rate can be justified based on the modelling results presented in section 5, especially if either of the elements of the proposed Trump US corporate tax reforms that would eliminate the "Treasury transfer" effect are implemented.

Table 7.1
Effects of corporate tax cut to 25 per cent under alternative funding scenarios

funding scenario:	lump sum	br creep	CBIT25	half fr	fin rent 8%	GST
Consumer welfare (2015/16, $bn)	3.1	2.0	1.7	2.3	3.6	2.1
Budget gain (2015/16, $bn)	0.0	0.3	0.9	1.1	0.0	0.2
Household Consumption (%)	0.52%	0.27%	0.28%	0.53%	0.58%	0.29%
GDP (%)	0.79%	0.57%	0.28%	0.79%	0.79%	0.56%
Business investment (%)	2.33%	2.11%	0.78%	2.33%	2.32%	2.01%
Employment (%)	0.19%	-0.04%	0.05%	0.19%	0.18%	-0.01%
Real after-tax wage (%)	0.80%	0.10%	0.32%	0.80%	0.81%	0.21%

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Appendix A: Company Tax Rate, Base and the Cost of Capital

This Appendix shows how, in CGETAX, the company tax rate and base affect the cost of capital. The alternative tax bases considered include standard company income tax or CIT, a CBIT and three versions of a rent tax: a cash flow tax or CFT; an ACC and an ACE. We start by deriving the core relationship for the cost of capital. We then take into account two complications – profit shifting and foreign tax credits.

The general approach here broadly follows de Mooij and Devereux (2009). They set out the approach used in the CORTAX model to obtaining the user cost of capital under alternative tax bases and with profit shifting.

At the same time, there are two main differences between CGETAX and CORTAX in the approaches used to obtaining the user cost of capital. First, CGETAX assumes that a firm faces a hurdle rate of return on its capital, while CORTAX assumes a hurdle rate of return on its equity and models the optimal debt-equity choice. Second, while CGETAX models the government revenue impact of profit shifting in a similar manner to CORTAX, CGETAX also includes the tax avoidance costs associated with profit shifting in the user cost of capital.

A.1 Cost of Capital and the Tax Base

In CGETAX, company tax is applied to both normal returns to capital and economic rents. Economic rents take three forms in CGETAX: rents generated by oligopoly price mark-ups in some sectors; rents from mineral resources in the mining sector; and rents from industry land use. The application of company tax to such rents is relatively straightforward. Hence, the focus here is on how company tax, applied to normal returns to capital, affects the user cost of that capital.

In CGETAX there are eight types of business investment. Those types are: transport equipment; plant machinery & equipment; mineral & petroleum exploration; research & development; information & technology; non-dwelling structures; ownership transfer costs; and other business capital. This is to take into account that the existing company tax system treats some of these investment types in different ways. So while the following discussion refers to the user cost of capital in a generic way, in practice CGETAX contains eight different user costs of capital.

In equilibrium, the cost of an additional unit of investment, PI, will be matched by the present value of the resulting cash flow. That cash flow can be divided into two components: after-tax profits and the cash flow contribution from deductions available until alternative company tax bases. Those two components are now considered in turn.

The present value of the after-tax profits 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 the payment of company tax.

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

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

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. Under a cash flow tax, the investment is expensed immediately. 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, other than under a cash flow tax. 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.

Deductions may also be available for financing costs, depending on which of the five alternative tax systems is in force.

- Under CBIT and a CFT, there is no financing cost deduction.
- Under ACC, there is a deduction for an imputed nominal return, ρ, on the depreciated value of the capital base.
- Under ACE, there is a deduction for an imputed nominal return on the share of the depreciated capital base funded by equity, and an interest deduction for the share that is funded by debt, θ.
- Under a standard company tax or CIT, there is also an interest deduction for debt.

For ease of exposition, the CFT deduction is omitted from the following but is re-introduced later. The present value of these deductions is calculated below after also allowing for time discounting.

$$PV(deductions) = tax.PI.\Big\{\alpha.\varphi + (1 - \varphi).\int_0^{\infty}\big[dtax + \big((1-\theta).DACE + DACC\big).\rho\big].\exp(-(dtax+\pi).t).\exp(-r.t)\,dt + (DCIT + DACE).\theta.(\pi + rb)\int_0^{\infty}\exp(-(\delta+r).t)\,dt\Big\}$$

$$PV(deductions) = tax.PI.\left\{(DCIT + DACE).\theta.\frac{\pi + rb}{\delta + r} + [(\alpha - 1).\varphi + \varphi] + (1-\varphi).\frac{dtax + \big((1-\theta).DACE + DACC\big).\rho}{dtax + \pi + r}\right\}$$

where:
θ ratio of debt to assets
rb real (inflation-adjusted) interest rate for debt finance
DCIT CIT dummy equal to 1 for CIT system, zero otherwise

DACE ACE dummy equal to 1 for ACE system, zero otherwise
DACC ACC dummy equal to 1 for ACC system, zero otherwise
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

Applying the equilibrium condition that the cost of an additional unit of investment, PI, will be matched by the present value of the resulting cash flow gives the following.

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

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

This can be re-expressed as follows.

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

Dividing by (1-tax).P,

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

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

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

The expression on the right-hand side is the user cost of capital for each of the eight types of investment. The first term shows the cost of capital in the absence of a corporate tax, while the remaining term (in square brackets) captures the distortion to the user cost of capital from corporate tax. It can be seen that this distortion can be eliminated by:

- setting the corporate tax rate, "tax", to zero (eliminating corporate tax); or
- a cash flow tax, which expenses all new investment without any loading and allows no interest deduction i.e. φ=1, α=1, θ=0; or

- an ACC, with the "correct" nominal allowance rate of $\pi + r$ and without any loading on any expensing of new investment i.e. $\rho=\pi+r$, $\alpha=1$.

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.

The local tax paid by an industry, *TL*, equals the headline tax rate, *t*, times the tax base in the absence of profit shifting, *Base*, adjusted downwards for the proportion, θ, of the base that is shifted to a tax haven.

$$TL = t.(1-\theta).Base$$

Therefore, the effective tax rate for Australian revenue raising, *tr*, is given by the following.

$$tr = t - \theta.t \qquad [2]$$

Shifting revenue in this way is assumed to incur avoidance costs, *C*, which vary with the square of the proportion of revenue that is shifted.

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

In addition, the proportion of the base shifted to the tax haven is taxed there at some low rate, t_h.

As part of maximising its after-tax profit, the representative company chooses its base shift proportion, θ, to minimise its total tax-related costs, *TC*. These costs are made up of tax paid locally, tax paid in the tax haven and avoidance costs. These three components all contribute to the term in square brackets, which is the effective tax rate for the firm's cost of capital, *tc*.

$$TC = [t.(1-\theta) + t_h.\theta + (1/A).\theta^2/2].Base \qquad [3]$$

This leads to the following first order condition.

$$\frac{dTC}{d\theta} = [(t_h - t) + (1/A).\theta].Base = 0$$

This gives the following solution for θ, which shows that the extent of profit shifting depends on the gap between the local statutory tax rate and the tax haven tax rate.

$$\theta = A.(t - t_h) \qquad [4]$$

Using this to eliminate *A* in equation [3] and simplifying, the effective tax rate for the cost of capital, *tc*, can be written as follows.

$$tc = t - \theta.(t - t_h)/2 \qquad [5]$$

Avoidance costs can be re-expressed in a similar manner.

$$C = \theta.(t - t_h)/2\,.Base \qquad [6]$$

Comparing equations [5] and [6], it can be seen that one-half of the potential saving in a firm's company tax payments from having a proportion of its profits taxed at a lower rate in the tax haven is offset by avoidance costs.

To operationalise this tax rate modelling, a value is needed for the parameter *A*. De Mooij and Devereux (2009) calibrate *A* to achieve a chosen value for the well-researched 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.

$$A = k/[1 + k.(t - t_h)] \qquad [7]$$

Using this approach in CGETAX involves a calibration stage and a simulation stage.

In the calibration state a value of -0.73 was chosen for the semi-elasticity, *-k*, as explained in section 3. Using this value in equation [7] together with the tax haven tax rate of 5 per cent and the historical statutory company tax rate of 30 per cent gives a value for *A* of 0.62, which is fixed at the calibration stage.

In the simulation stage, the model is run and the inputs include a selected statutory tax rate, *t*. This is used in equation [4] in determining the proportion of profits that is shifted. There is then sufficient information to determine the two effective tax rates of *tr* and *tc* using equations [2] and [5] respectively. Table 2.4 in the body of this paper gave numerical examples of this under alternative values of the statutory tax rate.

Finally, tax avoidance costs, *C*, are calculated using equation [6]. For simplicity, it is assumed that the avoidance costs, like the tax paid in the tax haven, are incurred offshore. This assumption makes no difference for the welfare analysis because the avoidance costs represent a deadweight loss irrespective of where they are incurred.

Thus, this approach distinguishes three tax rates. The highest tax rate is the statutory tax rate, *t*. The lowest tax rate is the effective tax rate for Australian revenue raising, *tr*, given by equation [2]. Lying between these two tax rates is the effective tax rate for the user cost of capital, *tc*, given by equation [5]. The elevation of *tc* above *tr* is due to avoidance costs and tax paid in the tax haven.

Under this approach, profit shifting results in an income payment abroad, *yfps*, 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.

$$yfps = (tc - tr).Base \qquad [8]$$

Finally, a common scaling factor is applied to both of the derived tax rates, *tc* and *tr*, so that the model is calibrated to actual company tax collections. The current value of this scaling factor is 1.05.

A.3 Foreign Tax Credits (Treasury transfer effect)

Further complications in modelling of 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 Japan, now effectively operate territorial tax systems, so that the Australian-sourced income is 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.

As explained in section 2 of the body of this paper, the main exception to this is the USA. For US-based MNCs, it taxes the income of their subsidiaries in Australia and other host countries. However, this tax only applies to income that is remitted back to the USA as dividends. In taxing these remitted dividends, the US government gives a tax credit for the tax that has already been paid in Australia. In this way the imposition of Australian company tax allows revenue to be transferred from the US treasury to the Australian treasury, in the so-called Treasury transfer effect discussed in section 2.

The effect of this tax arrangement for the company is that it pays 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, *tc*.

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, *tr*.

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).

These weights are based on the data presented in Table 2.1 of the body of this paper. The foreign weight is weight 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 as dividends. 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, where final tax is paid in the US, is assumed to take the following basic form, where "taxus" is the US corporate tax rate.

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

If the Trump administration reduces the US corporate tax rate to, say, 25 per cent or less, it is likely that US-based companies will pay their final tax in Australia on their Australian operations. That is, the weight on the US tax system will drop from five per cent to near zero. The same outcome will occur if the Trump administration switches to a territorial system of taxation, as it has proposed.