

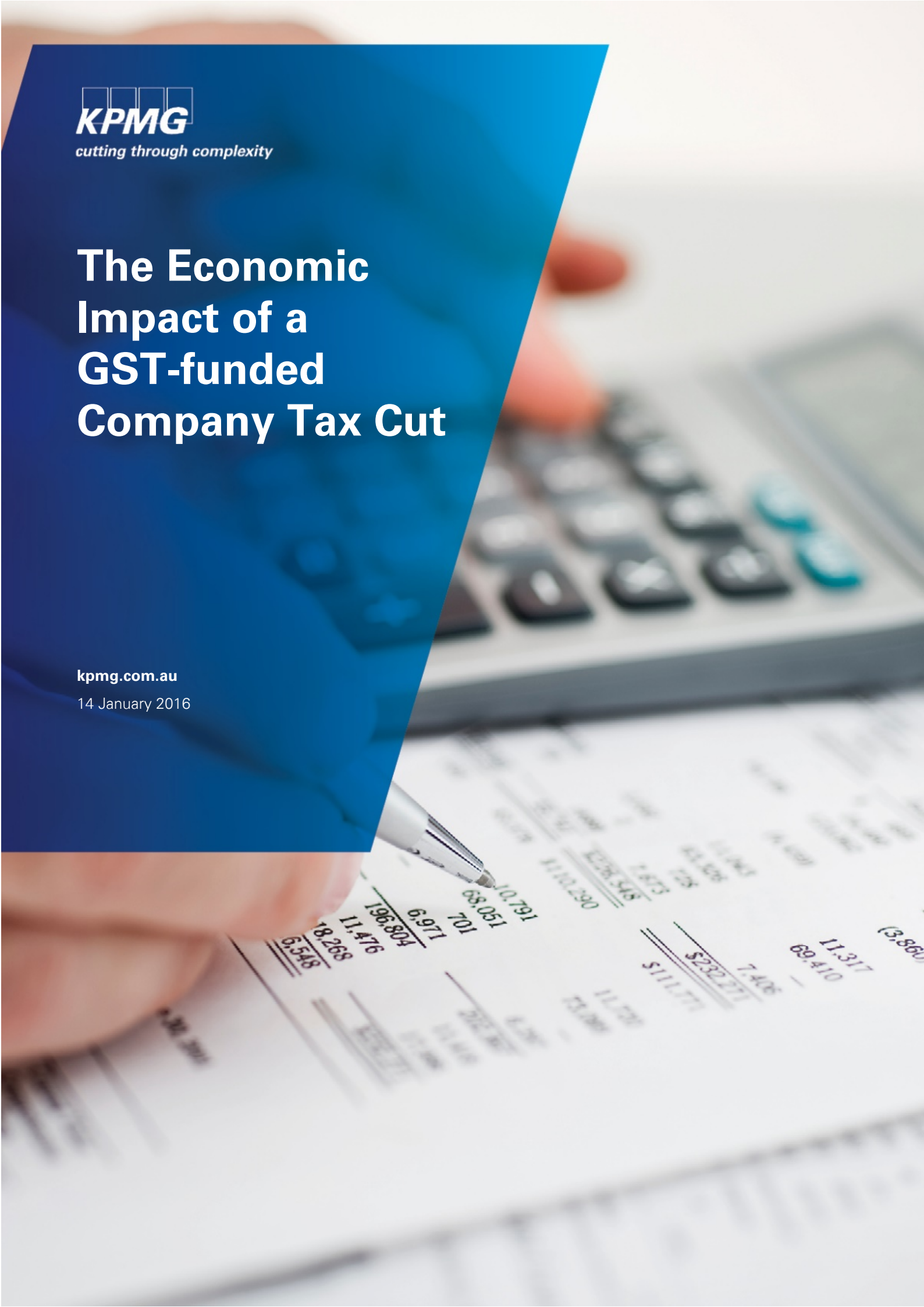


cutting through complexity

The Economic Impact of a GST-funded Company Tax Cut

kpmg.com.au

14 January 2016



Disclaimer

Inherent Limitations

This report has been prepared as outlined in the Scope Section. The services provided in connection with this engagement comprise an advisory engagement, which is not subject to assurance or other standards issued by the Australian Auditing and Assurance Standards Board and, consequently no opinions or conclusions intended to convey assurance have been expressed.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by, the Financial Services Council consulted as part of the process.

KPMG have indicated within this report the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

KPMG is under no obligation in any circumstance to update this report, in either oral or written form, for events occurring after the report has been issued in final form.

The findings in this report have been formed on the above basis.

Third Party Reliance

This report is solely for the purpose set out in the Scope Section and for the Financial Services Council's information, and is not to be used for any other purpose or distributed to any other party without KPMG's prior written consent.

This report has been prepared at the request of the Financial Services Council in accordance with the terms of KPMG's engagement letter dated 22 September 2015. Other than our responsibility to the Financial Services Council, neither KPMG nor any member or employee of KPMG undertakes responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

Electronic Distribution of Report

This KPMG report was produced solely for the use and benefit of the Financial Services Council and cannot be relied on or distributed, in whole or in part, in any format by any other party. The report is dated 14 January 2016 and KPMG accepts no liability for and has not undertaken work in respect of any event subsequent to that date which may affect the report.

Any redistribution of this report requires the prior written approval of KPMG and in any event is to be complete and unaltered version of the report and accompanied only by such other materials as KPMG may agree.

Responsibility for the security of any electronic distribution of this report remains the responsibility of the Financial Services Council and KPMG accepts no liability if the report is or has been altered in any way by any person.

Contents

Disclaimer	2
Glossary and acronyms	3
1. Executive summary	4
2. Background.....	6
2.1. Scope.....	7
3. Economic impacts of a GST-funded reduction in the company tax rate	8
3.1. Macroeconomic impacts	9
3.2. Government budget impacts.....	11
3.3. Industry impacts	12
3.4. Household impacts	13
References.....	15
Appendix 1: Modelling approach.....	16

Glossary and acronyms

The economic measures and acronyms used in the report are listed below.

ABS	Australian Bureau of Statistics
GOS	Gross Operating Surplus
GDP	Gross Domestic Product is a measure of the total value added of industry in Australia plus indirect tax income to government. GDP is a measure of production activity in the economy, but does not account for the destination or the nationality of those accruing income.
Value added by industry	A measure that captures the return to an industry's labour and capital and other fixed factors. It is calculated as the outputs of the company less the goods and services from other industries (including imports), and is therefore the company's contribution to GDP (except for indirect tax payments).

1. Executive summary

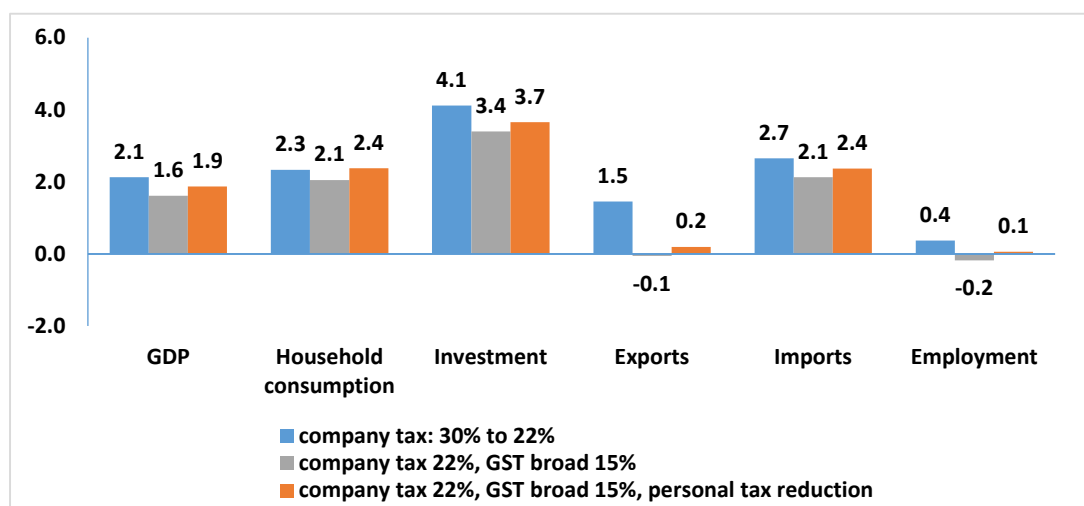
The Financial Services Council's (FSC's) submission to the Tax White Paper proposed a package of changes to meet the challenge of adapting the tax system to support a modern economy, which included reducing the company tax rate to 22 per cent by 2020; lowering personal income taxes; and broadening the GST base and increasing the rate closer to the OECD average.

The analysis in this report has been designed to provide the FSC with a better understanding of how these changes might affect the economy. In particular, in this study, the potential impacts on the economy of the following tax reform package have been examined:

- reducing the company tax rate to 22 per cent by 2020;
- broadening the GST base to include fresh food, health and education, and increasing the rate to 15 per cent; and
- lowering personal income taxes by an amount that allows the government budget balance to be unaffected.

The effects of this FSC tax reform package are analysed using KPMG-CGE: KPMG's in-house computable general equilibrium model. This analytical framework allows us to estimate the direct and indirect effects on the Australian economy of implementing the tax reform package.

Figure A: Economy-wide impacts (% change, deviation from baseline)



Source: KPMG estimates

Reducing the company tax rate from 30 to 22 per cent lowers the cost of capital to Australian producers, which reduces the price of capital relative to labour and induces firms to increase investment and their use of capital relative to labour. The long-run macroeconomic effects of this change are significant: investment rises by 4.1 per cent and capital rises by 4.3 per cent. Employment also rises by 0.4 per cent. The increase in the capital-labour ratio induced by the company tax cut makes workers more productive by increasing the amount of capital per worker; thus, labour productivity rises by 1.7 per cent and the real wage rate by 3.8 per cent. Higher capital and labour usage raise industry output and annual GDP is higher by 2.1 per cent in the long run.

Combining a higher GST and broader GST base with a cut in company tax reduces the increase in GDP from 2.1 per cent to 1.6 per cent. An expanded GST increases the CPI by about 5 per cent. This fully offsets the improvement in competitiveness due to a lower company tax, and so exports fall slightly by 0.1 per cent compared to a 1.5 per cent increase induced by the company tax cut. Similarly, capital usage and investment rise by less in when a higher GST and a broader GST base is combined with a cut in company tax: capital usage rise by 3.9 per cent viz. 4.4 per cent, and investment rises by 3.4 per cent viz. 4.1 per cent.

The much higher CPI response causes the real wage rate to fall by 1.7 per cent compared to a 3.8 per cent rise that company tax cut causes in isolation. Most industries are larger under this combination of changes with the exception of health and education. These two industries contract due to the large rise in their relative prices that the extended GST causes.

We estimate that lowering the company income tax rate will cost the government over \$20 billion in tax revenue in 2014-15 dollars. This is offset by \$8.6 billion as the company tax reduction also reduces the imputation credits available to domestic investors. Further, the rise in nominal wages cause personal tax collections to increase by \$15.8 billion. The overall effect on tax revenue is close to zero (\$0.3 billion). Nevertheless, total government outlays rise by \$11.6 billion due to the positive effect of the company tax reduction on nominal wage rates, which increases the cost of labour for the government, and increases government welfare payments via current indexation arrangements.

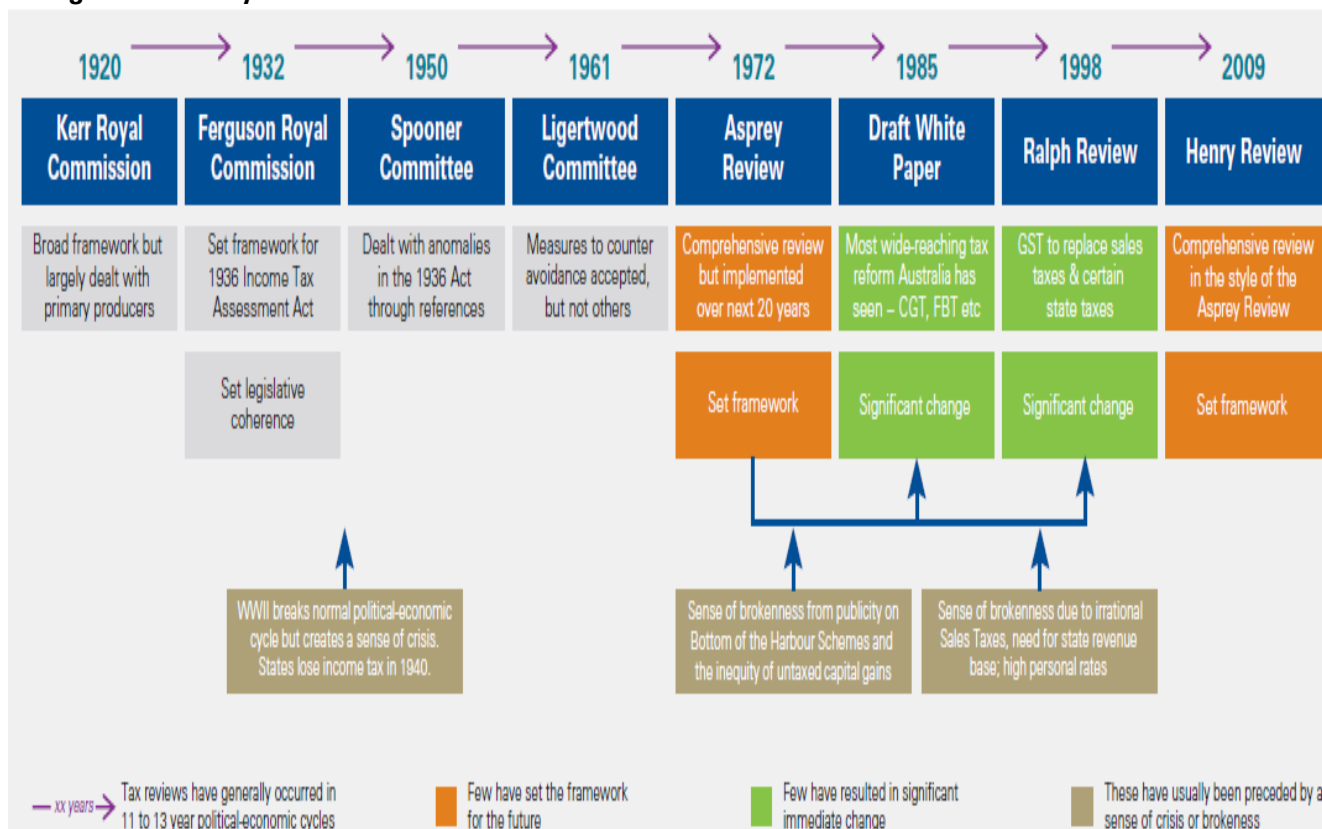
Including an extended GST increases GST revenue by \$49.6 billion and total tax revenue by over \$46 billion. Total government outlays rise by \$9.9 billion. The net effect on the government budget is an increase of \$36.8 billion. When the government budget balance is held constant by returning this extra revenue to households in the form of a personal income tax cut and increased welfare payments, household disposable income increases significantly and real household consumption rises by 2.4 per cent.

A tax reform package that combines a company tax cut with an extended GST while leaving the government budget unaffected, leads to an Australian economy that is larger and more productive. GDP is higher by 1.9 per cent due mainly to higher investment and a larger capital stock. Workers are also more productive by 1.8 per cent and the real wage rate they receive is higher by 1.4 per cent. Although an extended GST raises the cost of household consumption, real household consumption rises significantly by 2.4 per cent.

2. Background

Tax reform affects all facets of the Australian economy, and reform has been in the forefront of Government policy over the past few decades.

Figure 1: History of tax reviews in Australia



Source: KPMG, *Tax reform for our future success*, May 2014.

In particular, recent key tax reform activity includes the following.

- In 1998/99 the Government instigated a *Review of Business Taxation* (“the Ralph Review”). This inquiry resulted in a number of recommendations around business taxation reform, including reducing the headline company tax rate and changes to depreciation, capital gains, and fringe benefits taxation.
- Following this came the introduction of *A New Tax System* – involving, in particular, the introduction of a 10 per cent GST and the removal of wholesale sales tax.
- In May 2010, the Australian Treasury released a comprehensive study into Australia’s tax and transfer system, *Australia’s Future Tax System: Report to the Treasurer*, dubbed ‘the Henry Tax Review’. This review provided numerous recommendations for further taxation reform in Australia, including the recommendation that efforts to raise Government revenue should be focused on four efficient tax bases - personal income, business income, private consumption expenditure and economic rents from natural resources and land.
- In 2011, the government continued to encourage tax reform debate by hosting the 2011 Tax Forum.
- The Federal government has now committed to consult with the community to “create a better tax system that delivers taxes that are lower, simpler, fairer.”
- Further, at the Council on Federal Financial Relations (CFFR) on October 16, Australia's federal, state, and territory treasurers also agreed to review all state and commonwealth taxes.

As part of the latest Federal government tax reform agenda, on 30 March 2015, the Treasurer released the “Better tax system, better Australia, Re:think” discussion paper. This paper outlined the government’s view that the current tax system needs to change to support a modern economy, and invited all Australians to contribute to the tax reform debate.

In response, the Financial Services Council’s (FSC) submission to the Tax White Paper proposed a package of changes to meet the challenge of adapting the tax system to support a modern economy, which included:

- 22 per cent company tax rate by 2020;
- lower personal income taxes; and
- broadening the GST base and increasing the rate closer to the OECD average.

The analysis in this report has been designed to provide the FSC with a better understanding of how these changes might affect the economy, particularly the potential impacts of such changes on stimulating investment and jobs.

2.1. Scope

The scope of the report comprises an analysis of the impact of three FSC tax scenarios on the Australian economy using our in-house CGE model.

- **Scenario 1:** *Reduce the company tax rate to 22 per cent* – this scenario isolates the benefits of a reduction in company tax in terms of stimulating investment and jobs (before taking into account the costs to the government budget of reduced tax revenue collections or the impact of alternative revenue raising measures).
- **Scenario 2:** *Reduce the company tax rate to 22 per cent and broaden the GST base and increase the GST rate to 15 per cent* – this scenario isolates the benefits of a reduction in company tax and the effects of GST reform (before taking into account the costs to the government budget of reduced tax revenue collections or the impact of alternative revenue raising measures).
- **Scenario 3:** *Reduce the company tax rate to 22 per cent, broaden the GST base and increase the GST rate to 15 per cent, and reduce personal income tax* – this scenario captures the benefits of a reduction in company tax, the effects of GST reform while maintaining budget neutrality for the government by using increased GST collections to fund the negative budget impacts of the reduction in company tax. Any additional GST revenue has been used to provide personal tax relief or increased welfare payments to compensate for the additional GST burden on consumers.

Each taxation policy scenario estimates the direct and indirect effect on the Australian economy of implementing the taxation reform policy. This report presents the results of the three scenarios, highlighting the national impacts in terms of key economic parameters, including GDP, consumption, and industry employment and output.

3. Economic impacts of a GST-funded reduction in the company tax rate

This section examines the impact of reducing the Australian statutory company tax rate from 30 per cent to 22 per cent in isolation (Scenario 1). This is then extended by combining the company tax reduction with a higher GST and a broader base (Scenario 2). The final scenario (Scenario 3) is the same as Scenario 2 but it also includes a government budget neutral tax package where the company tax and GST changes are combined with a reduction in personal income tax.

Company income taxes in Australia have been estimated to have a high economic cost compared to most other taxes (Cao et. al., 2015). This is because company tax falls on investment, which is a highly mobile tax base because of the worldwide competition for investment funds. The application of Australian company tax drives up the pre-tax rates of return that foreign investors require to invest in Australia compared to other countries. Reducing company tax lowers this required rate of return, thus lowering the cost of capital, increasing capital usage and investment.

In contrast, the GST has been estimated to have a relatively low economic cost as it applies to a broader and less mobile base (Cao et. al., 2015). Thus, a switch from a less efficient tax (company tax) to a more efficient tax (GST) should benefit the economy by raising revenue in a less-distorting manner.

Scenario 1: Reduce the company tax rate to 22 per cent

For this study, KPMG has started by examining the impacts of a company tax reduction in isolation. In this scenario, the impacts of a reduction in company tax will have a negative impact on the government budget. The impacts of this have not been measured in this scenario.

Typically, to maintain budget neutrality when the rate of company income tax is reduced would require either an increase in tax revenue from other taxes, or a reduction in government spending. These policies would also have economic impacts that would need to be modelled in order to estimate the full impact of a policy change. Therefore, this scenario isolates the benefits of a reduction in company tax in terms of stimulating investment and jobs *before* taking into account the costs to the government budget of reduced tax revenue collections or the impact of alternative revenue raising measures. This is useful as a first step, so that the impact of company tax can be understood more fully.

Scenario 2: 22 per cent company tax and a 15 per cent broad-based GST

In addition to the reduction in the company tax rate modelled in Scenario 1, Scenario 2 uses an increased GST (coverage and rate) to fund the loss in taxation revenue from the reduced company tax rate. The increased GST will raise more revenue than is lost from the company tax reduction.

The reduction in company tax is expected to be more than offset by the increase in GST collections. Thus, this scenario isolates the benefits of a reduction in company tax and an increase in GST *before* taking into account the benefits to the government budget of increased tax revenue collections or the impact of reducing other revenue raising measures – this is useful as second step in understanding the potential impacts of a company tax / GST reform. Excess tax revenue can then be used to compensate lower income earners for higher consumption expenditures and this scenario provides an indication of the size of the potential compensation package.

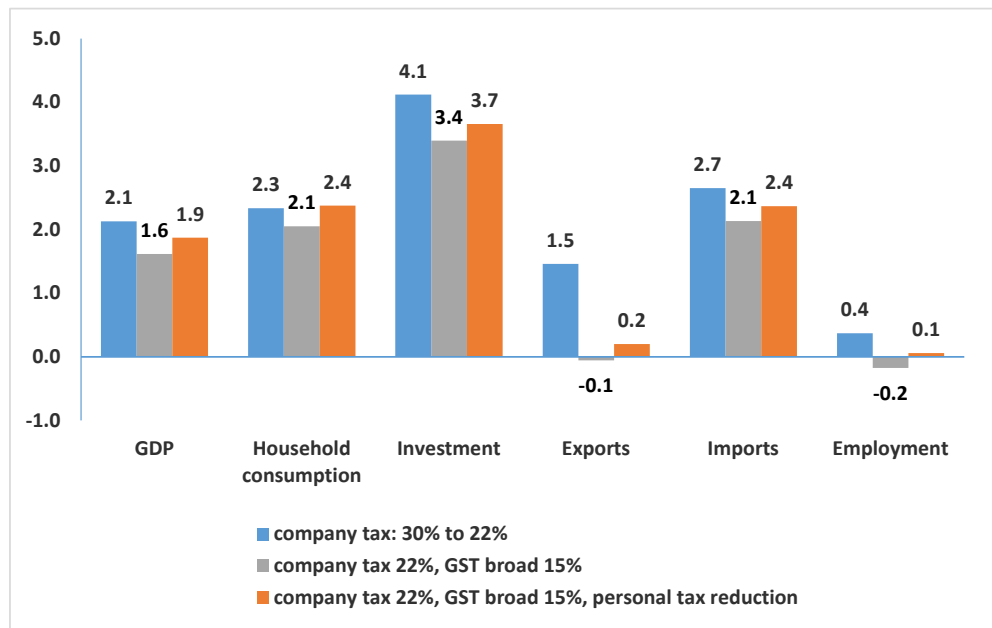
Scenario 3: 22 per cent company tax and a 15 per cent broad-based GST

In contrast to the first two scenarios, Scenario 3 provides the result of a complete tax reform package. The increased GST will raise more revenue than is lost from the company tax reduction. Thus, in addition to the reduction in the company tax rate and the increased GST (coverage and rate), this scenario returns any additional taxation revenue or government savings to households through the personal income tax and welfare system.

3.1. Macroeconomic impacts

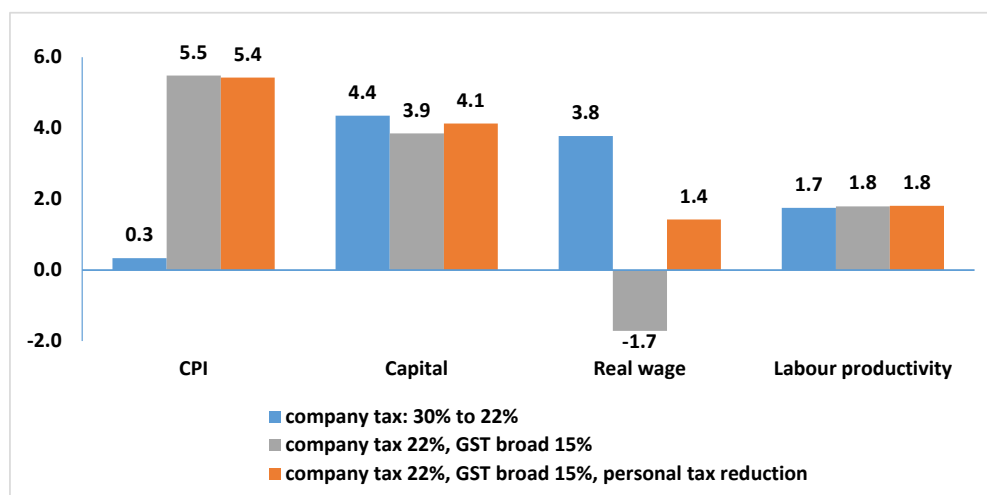
Reducing company tax from 30 to 22 per cent raises the after-tax rate of return for capital owners at the initial pre-tax rate of return. But as Australia is a small open economy, the after-tax rate of return is assumed to be set globally due perfect capital mobility, so there is an increase in foreign- and domestically-financed investment to maintain the after-tax rate of return. The increased investment reduces the pre-tax rate of return on capital, which is equivalent to a fall in the cost of capital for Australian producers. A lower cost of capital means a fall in the price of capital relative to labour, which further induces firms to increase investment and their use of capital relative to labour. Figures 2 and 3 present the results of this tax change.

Figure 2: Economy-wide impacts (% change, deviation from baseline)



Source: KPMG estimates

Figure 3: Effects on the CPI, capital, real wages and labour productivity (% change, deviation from baseline)



Source: KPMG estimates

Investment rises by 4.1 per cent and capital rises by 4.4 per cent. As employment is less elastic in supply relative to capital in the long run, it rises by only 0.4 per cent. Thus, the capital-labour ratio increases and this makes workers more productive by increasing the amount of capital per worker. This is reflected in an increase in the marginal product of labour (or labour productivity) by 1.7 per cent and the real wage rate by 3.8 per cent. Higher capital and labour usage mean that industry output rises and annual GDP is higher by 2.1 per cent in the long run.

Increased industry output is also reflected in higher exports as the lower company tax rate reduces domestic production costs relative to Australia's trading partners; exports are higher by 1.5 per cent. Increased output also benefits consumers by increasing payments to capital and labour, and therefore incomes. Payments to capital and labour rise due to a volume effect (increased capital and labour usage) and a price effect (higher wage rates). In aggregate, these effects cause household disposable income to rise by 4.2 per cent but real household income rises by only 3.9 per cent as the CPI is now higher. Households respond to the increase in real income by increasing saving more than consumption as the saving rate rises. The household saving rate rises as, in the long run, households must saving more to repay foreigners for the increased investment in Australia. Thus, household consumption rises by 2.3 per cent in the long run.

Figures 2 and 3 also show the effects of combining a higher GST and broader GST base with a cut in company tax. This has the general effect of reducing the increase in GDP from 2.1 per cent to 1.6 per cent. An expanded GST significantly increases the CPI response, from 0.3 per cent in Scenario 1 to 5.5 per cent in Scenario 2. This fully offsets the improvement in competitiveness due to a lower company tax, and thus exports fall slightly by 0.1 per cent in Scenario 2 compared to a 1.5 per cent increase in Scenario 1. Thus, capital usage and investment rise by less in Scenario 2 compared to Scenario 1: capital usage now rises by 3.9 per cent viz. 4.4 per cent, and investment now rises by 3.4 per cent viz. 4.1 per cent. In sum, these less positive effects on industry output mean that employment falls slightly in Scenario 2 by 0.2 per cent. Although the capital-labour ratio and labour productivity rise by slightly more in Scenario 2 compared to Scenario 1, the much higher CPI response causes the real wage rate to fall by 1.7 per cent viz. a 3.8 per cent rise previously.

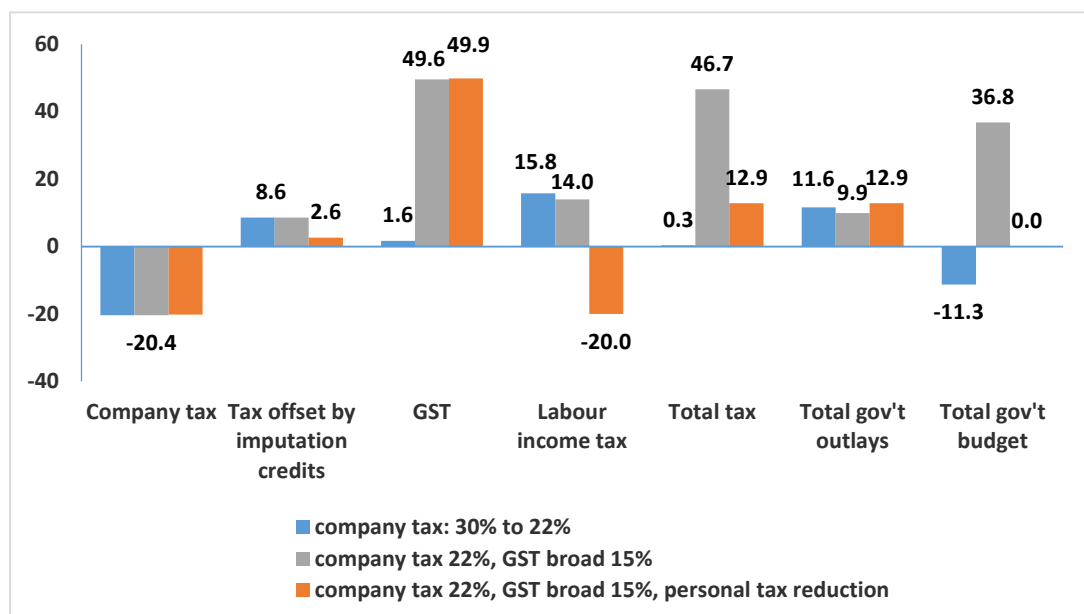
As industry output and GDP increase by less in Scenario 2 compared Scenario 1, consumers benefit less from the tax changes because payments to capital and labour rise by less; household consumption now rises by 2.1 per cent viz. 2.3 per cent previously.

Scenario 3 keeps the government budget at its original balance by returning extra revenue to households in the form of a personal income tax cut and increased welfare payments. This causes a large positive first-round effect on household disposable income leading household consumption to rise by 2.4 per cent, which exceeds the rise observed in Scenarios 1 and 2. This effect on household consumption in Scenario 3 means that all other effects are more favourable compared to Scenario 2. Thus, capital usage, investment and exports are higher in Scenario 3 compared to Scenario 2. Similarly, employment and the real wage rate are higher in Scenario 3 compared to Scenario 2.

3.2. Government budget impacts

Figure 4 reports the effects on the government budget in the three scenarios. Lowering the company income tax rate is expected to cost the government over \$20 billion in tax revenue in 2014-15 terms. This is offset to some extent (\$8.6 billion) by an increase in taxation collected at the personal income tax level as the company tax reduction also reduces the imputation credits available to domestic investors. Further, employees benefit from increased activity in the economy associated with the increase in capital. The rise in wages mean personal tax collections also increase (+\$15 billion). These effects mean that the overall effect on tax revenue is close to zero (\$0.3 billion). Despite this, total government outlays rise by \$11.6 billion. This is due to the positive effect of the company tax reduction on nominal wage rates; this has two effects: it increases the cost of labour for the government, and it increases government welfare payments via current indexation arrangements. Thus, the government budget worsens by \$11.3 billion in 2014-14 terms.

Figure 4: Annual average government budget impacts (\$ billion, 2014-15, deviation from baseline)



Source: KPMG estimates

Scenario 2 causes total tax revenue to rise by over \$46 billion. This is almost the same as the extra GST revenue collected due to the broader GST base and higher GST rate (\$49.6 billion), the difference being mainly due to lower personal income tax collections. Total government outlays rise by slightly less in Scenario 2 compared to Scenario 1 (\$9.9 billion) due to the smaller rise in the nominal wage rate, which means that the cost of labour for the government and welfare payments increase by less than in Scenario 1. The net effect on the government budget is an increase of \$36.8 billion. This amount approximately represents the size of the personal income tax cut given in Scenario 3.

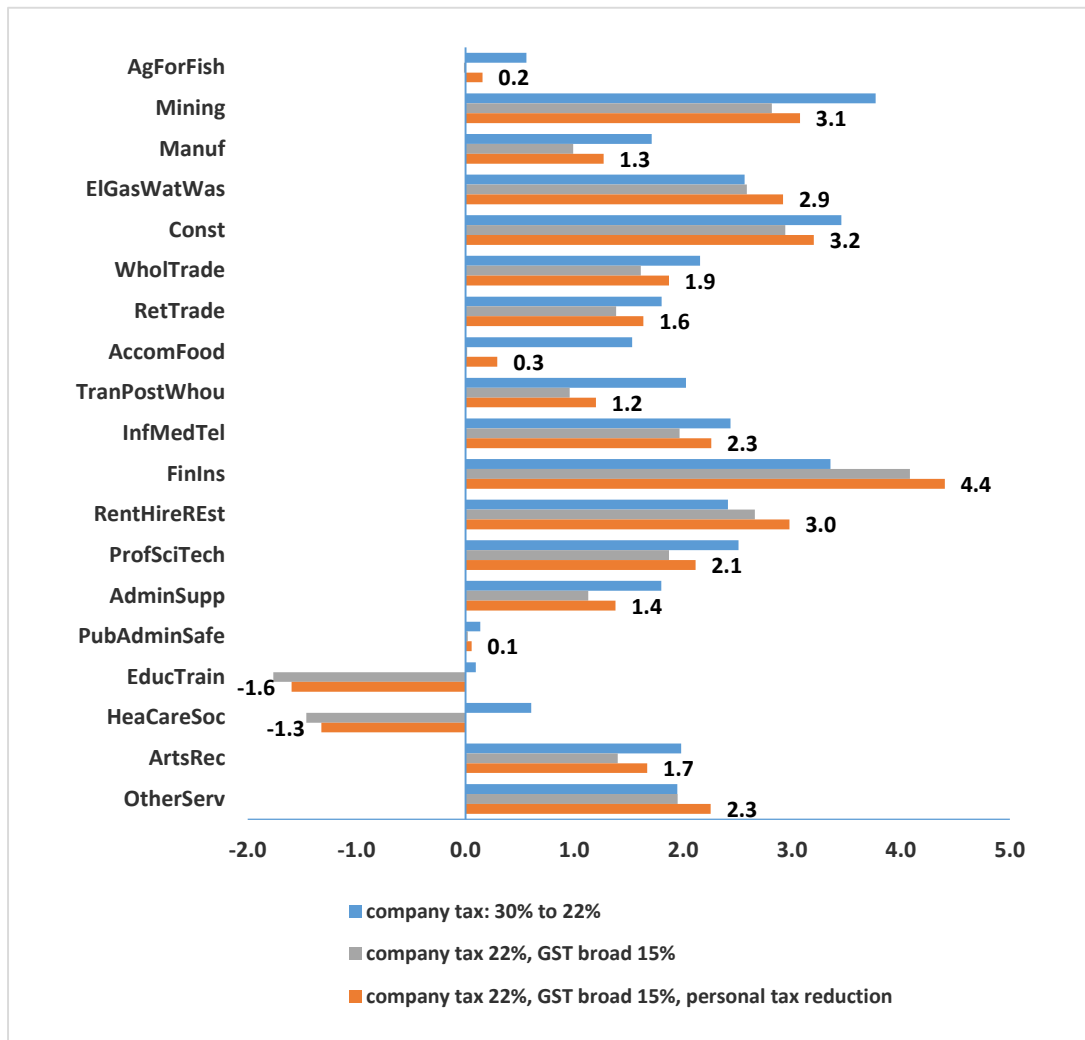
3.3. Industry impacts

Figure 5 presents the effects of each scenario on industry output. There is a general pattern of higher output in all three scenarios. This is consistent with the earlier discussion explaining the increased capital usage and GDP in all three scenarios.

Consistent with this explanation, industries with higher capital shares benefit the most from the tax changes in each scenario, e.g., mining, utilities and finance. Most service industries benefit from the general expansion in the size of the economy.

Education and health are two industries that are significantly affected in a negative way in Scenarios 2 and 3. Note that the GST rate on these services rises from 0 per cent to 15 per cent in Scenarios 2 and 3. Thus, broadening the GST base and raising the rate to include health and education significantly increases the relative price of these services and reduces demand. It was noted earlier that the effect on employment of the GST changes are to cause the employment effect in Scenario 1 to move from an increase of 0.4 per cent to a fall of 0.2 per cent. One of the main reasons for this is the negative effect on health and education output of the GST changes. This is because both health and education are labour intensive and are large employers in the economy.

Figure 5: Industry output (% change, deviation from baseline)



Source: KPMG estimates

3.4. Household impacts

Different households are likely to experience different impacts on their incomes and expenditure under a tax package that reduces company tax and increases the GST.

- On the income side, all household groups benefit from improved efficiency in the economy – with both after tax incomes and existing welfare payments higher than under the current tax regime (changes in welfare payments are tied to the change in the nominal wage rates).
- On the expenditure side, the extended GST tends to have a proportionally higher impact on household costs for lower income quintiles than higher income quintiles. Although, in absolute terms, higher income households face a larger dollar increase in the cost of their spending.

In Scenario 3, the government budget is kept at its original balance by returning extra GST revenue¹ to households in the form of personal income tax cuts and increased welfare payments. As part of this policy, the personal income tax system could be used to also redistribute this extra revenue, for example, towards lower income households.

Note that the lowest income quintile would gain very little from a redistribution of revenues purely through personal tax cuts, as these households have little interaction with the tax system. To assist these households with the additional costs associated with a higher GST on their consumption, this analysis first redistributes some of the additional GST revenue to this group through annual support payments. The remainder is then distributed across all taxpayers through adjustments to the personal income tax system.

The income groups in this analysis are based on the Australian Bureau of Statistics (ABS) equally sized household income quintiles.² The redistribution applied in this analysis is shown in Table 1 and has been designed in line with the following FSC compensation criteria:

1. the tax scales of the package are indexed;
2. lower income households are adequately compensated; and
3. there is some flattening of marginal tax rates across income tax brackets.

Table 1: Change in real (after-tax) incomes by household income quintile³ (percentage and \$ deviation from baseline, 2014-15)

	current (2014/15)	2014/15- company tax 22%, GST broad 15%, personal tax reduction
Tax free bracket (Tax bracket 1)	18,200	21,000
Tax rate - on income between tax bracket 1 and 2	19.0%	15.0%
Tax bracket 2	37,000	39,007
Tax rate - on income between tax bracket 2 and 3	32.5%	30.5%
Tax bracket 3	80,000	84,340
Tax rate - on income between tax bracket 2 and 3	37.0%	33.7%
Tax bracket 4	180,000	189,764
Tax rate - on income above tax bracket 4	45.0%	45.0%

Source: KPMG estimates

The changes in the tax brackets above are predominately due to the indexation of these brackets to changes in the CPI. The exception is the tax-free bracket, which is increased further to reduce the personal income

¹ That is, beyond the GST revenue needed to fund the company tax reduction.

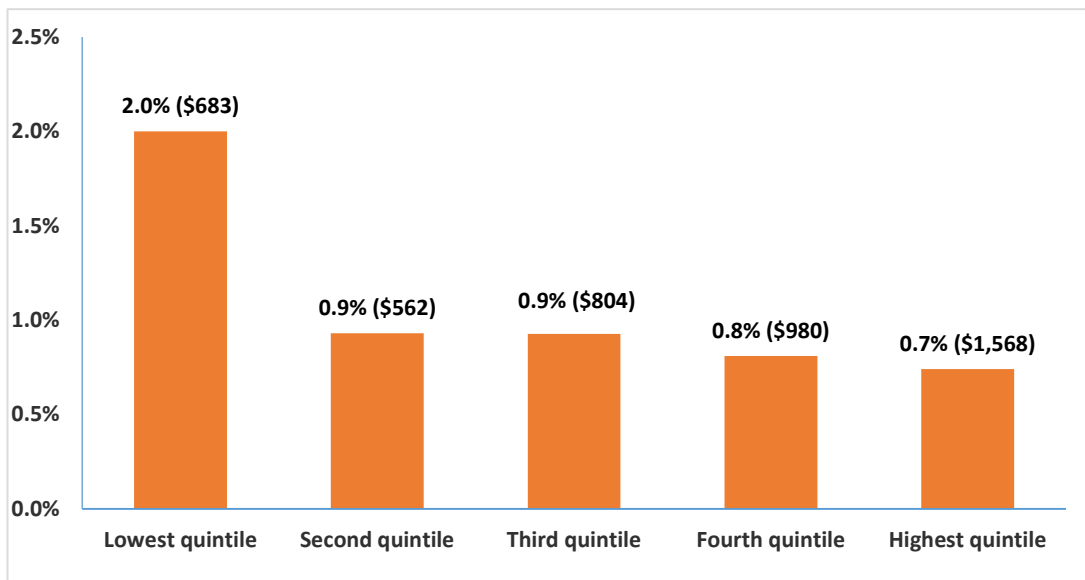
² In the ABS household groups, households are ranked from lowest to highest on the basis of their household income.

³ The data indicates, and thus the analysis assumes, that lower income households tend to have one income earner, while the higher income houses have two income earners, on average.

tax burden as part of the tax policy change. The tax rates have also been reduced across the brackets as a way of returning the additional tax revenues (collected from the increased GST) to households.

Figure 6 gives an indication of how a redistribution such as this – using both the personal income tax system and welfare payments - might look.

Figure 6: Change in real (after-tax) incomes by household income quintile⁴ (percentage and \$ deviation from baseline, 2014-15)



Source: KPMG estimates

Note: Household income includes all current receipts (monetary or in kind) received by the household and which are available for, or intended to support, current consumption. This income includes receipts from: wages and salaries and other receipts from employment; profit/loss from unincorporated business; net investment income (interest, rents, dividends, royalties), government pensions and allowances; and private transfers (e.g. superannuation, workers' compensation, child support).

Figure 7 shows how the tax policies (including these additional personal income tax cuts and support payments) might flow through to an overall impact on the wellbeing of different groups in the economy. The overall impact on real incomes takes into account the impact of the taxation policy on each group's current expenditure bundle and composition of income.

Under the distribution shown in Figure 7, each household group faces an improvement in their real income, with this illustrative distribution designed to provide the lower income groups with a higher percentage gain in real incomes. (Note that this pattern is different when looking in absolute or dollar terms). As these illustrative results show, while using the tax and welfare system to redistribute the additional GST revenues goes some way towards sharing the benefits of the reform, further analysis of the redistribution methods would be required to design a comprehensive compensation package.

⁴ The data indicates, and thus the analysis assumes, that lower income households tend to have one income earner, while the higher income households have two income earners, on average.

References

- ABS (Australian Bureau of Statistics) (2011), *Household Income and Income Distribution, Australia - Detailed tables, 2009-10*, Cat. no. 6523.0, ABS, Canberra.
- ABS (2013), *Australian National Accounts: Input-Output Tables, 2009-10*, Cat. no. 5209.0.55.001, ABS, Canberra.
- ABS (Australian Bureau of Statistics) (2015), *Government Finance Statistics, Australia, 2013-14*, Cat. no. 5512.0, ABS, Canberra.
- Cao, L., Hosking, A., Kouparitsas, M., Mullaly, D., Rimmer, X., Shi, Q., Stark, W. and Wende, S. (2015), *Understanding the economy-wide efficiency and incidence of major Australian taxes*, Treasury Working Paper 2015-01, April.
- Dixon, P.B., Parmenter, B.R., Sutton, J. and Vincent, D.P. (1982), *ORANI: A Multisectoral Model of the Australian Economy*, North-Holland, Amsterdam.
- Dixon, P.B. and Rimmer, M.T. (2002), *Dynamic, General Equilibrium Modelling for Forecasting and Policy: A Practical Guide and Documentation of MONASH*, North-Holland, Amsterdam.
- Hanoch, G. (1971), 'CRESH production functions', *Econometrica*, vol. 39, September, pp. 695–712.
- Stone, R. (1954), 'Linear Expenditure Systems and demand analysis: an application to the pattern of British demand', *The Economic Journal*, vol. LXIV, pp. 511–27.

Appendix 1: Modelling approach

This report analyses the effect on the Australian economy of the tax reform package using KPMG-CGE: KPMG'S in-house computable general equilibrium model. This analytical framework allows us to estimate the direct and indirect effects on the Australian economy of implementing the tax reform package.

General features

KPMG-CGE is a multi-sectoral model of the Australian economy that has been specifically designed for policy analysis. KPMG-CGE belongs to the computable general equilibrium (CGE) class of models exemplified by the world-leading ORANI (Dixon et. al., 1982) and MONASH (Dixon and Rimmer, 2002) models created at the Centre of Policy Studies. KPMG-CGE builds on the ORANI and MONASH traditions by incorporating a number of theoretical and empirical advancements. We briefly describe these features below.

KPMG-CGE has a flexible simulation design: it can be run in comparative-static or dynamic mode. For this report, the model has been applied in comparative-static form. KPMG-CGE distinguishes 114 sectors and commodities, based on the 2009/10 input-output tables published by the Australian Bureau of Statistics (ABS, 2013). Primary factors are distinguished by 114 types of capital (one type per industry), nine occupations, two types of land, and natural resource endowments (one per industry).

A representative firm in each sector produces a single commodity. Commodities are distinguished between those destined for export markets and those destined for domestic sales.

Production technology is represented by nested CRESH functions (Hanoch, 1971) allowing a high degree of flexibility in the parameterisation of substitution and technology parameters. Energy goods are treated separately to other intermediate goods and services in production, and are complementary to primary factors.

The supply of labour is determined by a labour-leisure trade-off that allows workers in each occupation to respond to changes in after-tax wage rates thus determining the hours of work they offer to the labour market. The overall supply of labour is normalised on working-age population.

Household consumption decisions are determined by a LES function (Stone, 1954) that distinguishes between subsistence (necessity) and discretionary (luxury) consumption. Total household spending moves with household disposable income.

KPMG-CGE includes detailed government fiscal accounts including the accumulation of public assets and liabilities; these are based on the ABS'S Government Finance Statistics (ABS, 2105). On the revenue side, detailed modelling of over 20 direct and indirect taxes and income from government enterprises is included. On the expenditure side, government consumption, investment and payments of various types of transfers (such as pensions and unemployment benefits) are modelled.

Investment behaviour is industry specific and is positively related to the expected rate of return on capital. This rate takes into account company taxation and a variety of capital allowances, including the structure of the imputation system.

Foreign asset and liability accumulation is explicitly modelled, as are the cross-border income flows they generate and that contribute to the evolution of the current account. Along with other foreign income flows like labour payments and unrequited transfers, KPMG-CGE takes account of primary and secondary income flows in Australia'S current account; these are particularly important for Australia as they typically comprise the significant share of the balance on the current account.

The treatment of taxes

Personal income tax

Two categories of personal income taxes (PIT) are specified in KPMG-CGE. Households pay taxes on labour income and on franked dividends. Labour income taxes consist of taxes on regular labour income and taxes on fringe benefits. Taxes on regular labour income are distinguished by industry and by occupation. The labour income tax rates vary by occupation and are positively related to the level of skill. Taxes on fringe benefits apply only to the three higher skilled occupations: Managers and administrators, Professionals, and Associate professionals.

Dividend imputation is specified by comparing the PIT rate with the company income tax (CIT) rate adjusted for foreign ownership of the capital stock. If the PIT rate exceeds the adjusted CIT rate, the domestic capital owner (i.e., the household) pays extra PIT on franked dividends. If the PIT rate is less than the adjusted CIT rate, the capital owner receives franking credits that reduce the PIT rate paid. The taxation of dividends is differentiated by industry and by capital owner. The model identifies four types of capital owners: domestic corporations, foreign corporations, superannuation funds and 'closely-held' enterprises. Distinguishing different categories of capital owners is important as tax rates vary by capital owner. The share of company profits paid as dividends also varies across capital owners and determines the size of the base for dividend imputation.

Company income tax

Company income tax (CIT) is defined across industries and capital owner. The CIT rate varies across these dimensions. The CIT rate is highest for domestic corporations and foreign corporations, lower for 'closely-held' enterprises, and lowest for superannuation funds. In all cases, the CIT base is company profit.

Goods and services tax

The goods and services tax (GST) for each commodity is specified as the product of the statutory GST rate (10 per cent), the coverage rate, and the value of expenditure in purchaser's prices.⁵ The coverage rate reflects the degree to which a commodity is subject to the GST. Although the model distinguishes 114 commodities, there is insufficient detail to seamlessly reflect GST exemptions for certain items. For example, fresh food is exempt from the GST, but food commodities that include some processed and some fresh food will show a coverage rate of less than one. The GST mainly falls on household consumption. Nevertheless, Australian Bureau of Statistics (ABS) input-output data for 2009/10 (upon which the model data is based) shows GST applied to investment, and to a lesser extent intermediate inputs and exports.

Macroeconomic closure

Total household consumption is assumed to be a function of household disposable income and the average propensity to consume. In the long-run closure, the average propensity to consume is endogenous and the ratio of the current account balance and GNP is exogenous. This imposes a current account constraint on the household behaviour in the long run. Total real investment is the sum of industry demands for investment; these are positively related to the after-tax rate of return. Total real government consumption is held at baseline levels.

Typically, the nominal exchange rate is chosen as the numeraire. Note that this variable encompasses no economic behaviour; that is, there is no money or monetary policy in the model. Nevertheless, the real exchange rate (i.e., the ratio of domestic prices to foreign prices in a common currency) is endogenous because export prices are an endogenous function of export volumes.

⁵ Expenditure at purchaser's prices includes basic values, the value of margins, and non-GST sales taxes.

Contact us

Brendan Rynne
Partner, KPMG Economics
+61 3 9288 5780
bjrynne@kpmg.com.au

George Verikios
Associate Director, KPMG
+61 7 3233 3282
gverikios@kpmg.com.au

Nick Kallinikios
Partner, KPMG Tax
+61 3 9288 6714
nkallinikios@kpmg.com.au

Jodie Patron
Associate Director, KPMG
+61 2 6248 1063
jpatron@kpmg.com.au

www.kpmg.com.au