Deloitte Access Economics

The economic impact of increasing Australian funds management exports

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Glossary

CD	Cobb-Douglas
CDES	Constant Differences of Elasticities
CES	Constant Elasticity of Substitution
CGE	Computable General Equilibrium
CRESH	Constant Ratios of Elasticities Substitution, Homothetic
DAE	Deloitte Access Economics
DAE-RGEM	Deloitte Access Economics Regional General Equilibrium Model
EBITDA	Earnings before Interest, Tax, Depreciation and Amortisation
FSC	Financial Services Council
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GNP	Gross National Product
GOS	Gross Operating Surplus
GSP	Gross State Product
IFSA	Investment and Financial Services Association
IT	Information Technology

Executive Summary

The export of funds management (FM) services has become an increasingly significant component of the Australian funds management sector in recent years. The sector now has $2.3 trillion in funds under management (FUM) with $79 billion being managed on behalf of overseas investors. Some of these funds are invested in Australian assets, while others are invested in a third country or in an Australian managed fund which holds overseas assets.

Increasing exports of funds management services would have notable flow-on effects to the economy, increasing gross domestic product (GDP) and jobs and adding to tax revenues. Furthermore, the increased supply of additional funds from abroad in effect would lower the cost of capital in Australia.

This report examines the potential magnitude of greater exports of funds management services, by modelling the economy-wide impacts over 10 years of 1) doubling FM exports; 2) reducing the cost of capital by 2 basis points and 3) increasing FM exports to the same level as Hong Kong (Table i).

Table i: Key results

	GDP	Tax Revenue	GOS	Employment
	($2012-13 million)			FTE
Doubling of FM exports	325.7	105.5	185	776
2 bps reduction in cost of capital	2,260.9	618.9	877	7,737
Hong Kong level of FUM	4,223.1	1,252.3	1,355	9,982

Source: Deloitte Access Economics

Based on estimated fee revenue of $442 million, the export of funds management services contributed $336 million in direct value added and $434 million in total value added to the Australian economy in 2012-13. FM exports also contributed 1,426 full-time equivalent jobs to the economy.

The export of funds management services also has an impact the amount of tax received by Australian governments. The analysis in this report provides some high level estimates of the potential impact of an increase in fee revenue for fund managers on revenue from income tax, corporate tax, Goods and Services Tax (GST) and payroll tax. As can be seen from the key results in Table i the overall impact on tax revenue is substantial.

The size of the potential gains to key economic measures indicates that there would be significant benefits to the Australian economy from increasing exports of fund management services.

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1 Background

The export of Australian funds management services has been an increasingly significant component of the Australian financial services sector in recent years.

Australian exports of funds management services can take a variety of forms including:

- foreign funds being invested by Australian funds managers in Australian assets;
- foreign funds being invested by Australian fund managers in a third country;
- foreign funds being invested in Australian funds which in turn hold overseas assets; and
- the provision of advice by Australian fund managers to foreign investors.

According to the ABS, in December 2013 the Australian managed funds industry has $2.29 trillion in assets under management, with $79.1 billion, or 3.5% of the total, consisting of funds managed by Australian investment managers on behalf of overseas investors (ABS 2013a, Cat. No. 5655.0).

A 2009 report to the Commonwealth Treasury entitled 'Australia as a Financial Centre: Building on our Strengths' (Australian Financial Centre Forum 2009) noted that while Australia had the largest amount of funds under management in the Asia-Pacific region and the fourth largest in the world, it has a relatively low level of funds management exports compared to the other leading global funds management hubs such as the United Kingdom, Hong Kong and Singapore.

The Global Funds Management Industry was estimated to be worth $US 118 trillion in 2012, with pension funds, mutual funds and insurance companies accounting for $US 87.2 trillion of this (TheCityUK 2013). The remainder consisted of funds held by sovereign wealth funds, private equity, hedge funds, exchange traded funds and private wealth funds.

These figures are broadly consistent with those provided by the Organisation for Economic Co-operation and Development (OECD) who estimate that pension funds, mutual funds and insurance companies in the OECD had total assets of $US 21.8 trillion, $US 30 trillion and $US24.5 trillion respectively (OECD 2013). As shown in Chart 1.1, the value of pension funds and insurance funds was estimated to be higher by The City UK than the OECD, which is consistent with the fact that the OECD represents only a subset of all economies. However, OECD estimates of the value of mutual funds are larger than that estimated by the City UK.

Chart 1.1: Estimates of conventional funds under management
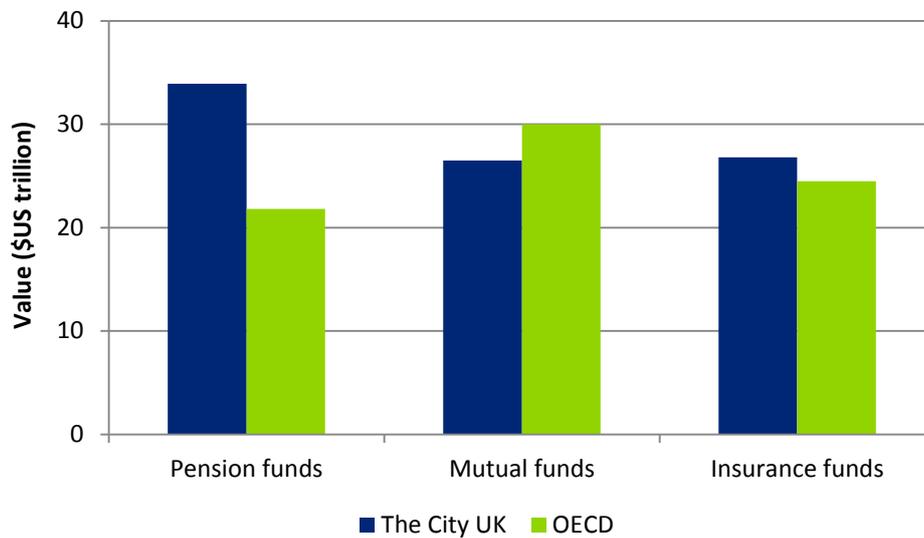
Source: The City UK 2013, OECD 2013.

While the export of Australian funds management services is currently relatively low in global terms (Australian Financial Centre Forum 2009), the sector plays an important role in the Australian economy. First, it provides a link to overseas, helping to make overseas investors aware of investment opportunities in Australia and highlighting the skills of the Australian financial services industry. Secondly, it provides a source of income and investment capital for Australia. Thirdly, it supports an industry in which Australia is likely to have a comparative advantage given our large and highly skilled financial sector and large superannuation asset base.

This report examines the current economic contribution of funds management exports to the Australian economy and economic impact of growing funds management exports over time. This analysis in this report differs from the previous report completed by Access Economics for the predecessor of the Financial Services Council (FSC), the Investment and Financial Services Association (IFSA) in 2007. The primary focus of the previous report was to examine policy options for growing Australian funds management exports, whereas the focus of this report is to estimate the current economic contribution of the sector and model the economic impact of growing the sector over time. This report does not examine specific policy options for growing funds management exports.

This report is structured as follows. Chapter 2 discusses the funds management sector in Australia and the potential size of the sector based on other leading funds management hubs. Chapter 3 examines the current economic contribution of funds management exports in Australia, while Chapter 4 discusses the economic impact of growing the sector over time based on the results of the Computable General Equilibrium (CGE) modelling. Finally, Chapter 5 examines the taxation implication of increasing funds management exports.

2 The export of funds management services in Australia

This chapter provides an overview of the export of fund management services in Australia. It examines the size of the funds management sector, the types of assets managed and the fee revenue associated with the management of overseas assets.

2.1   Funds management assets and asset classes

Assets of managed funds include assets of life insurance corporations, superannuation funds, public offer unit trusts, friendly societies and cash management trusts. Table 2.1 shows assets of managed funds in Australia in December 2013.

Table 2.1: Assets of managed funds ($ million)

Asset category	Assets invested through investment managers	Assets invested directly	Unconsolidated assets of managed funds
Life insurance corporations	163,212	110,478	273,690
Superannuation funds	711,262	990,765	1,702,027
Public offer unit trusts	120,383	157,475	277,858
Friendly societies & common funds	np	np	13,646
Cash management trusts	16,274	6,751	23,025
Total	**1,016,589**	**1,273,657**	**2,290,245**

Note: np indicates not available for publication

Source: ABS 2013a Cat. No. 5655.0, December 2013.

Superannuation funds make up a large proportion (74.3%) of the unconsolidated assets of managed funds followed by public unit trusts (12.1%) and life insurance corporations (12.0%). This proportion has increased steadily following the introduction of mandatory superannuation contributions in 1992. Approximately 42% of the assets invested in superannuation are through investment managers with 58% being invested directly. This compares to 59% being invested through investment managers for life insurance corporations and 43% for public unit trusts (ABS 2013a Cat. No. 5655.0).

Chart 2.1: Managed fund assets by type of asset
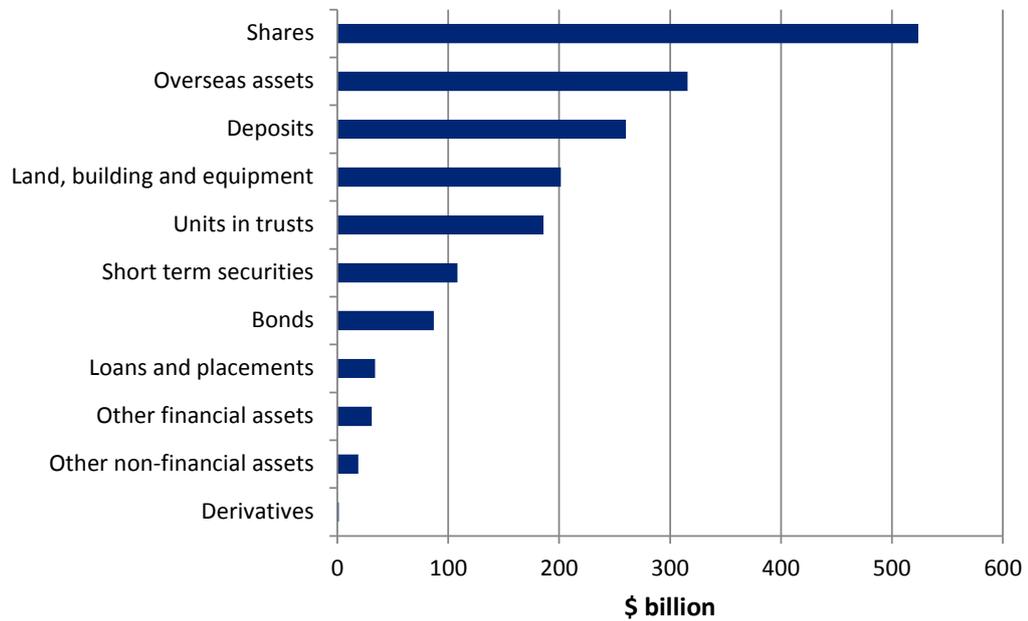
Source: ABS 2013a Cat. No. 5655.0, December 2013.

Shares are by far the largest asset class by type followed by overseas assets, deposits and then land (ABS 2013a Cat. No. 5655.0). The default option for most superannuation funds involves a high allocation to shares. Given that superannuation dominates the managed fund sector, this means that the managed funds sector accordingly has a relatively high allocation of shares.

The total value of funds managed on behalf of overseas investors has been increasing steadily over time as can be seen in Chart 2.2 below. Net inflows of funds have increased in recent years, although the effects of inflation, the exchange rate and developments in asset markets also influence the growth of total funds managed. Overall, since the low following the GFC in 2009, the compound annual growth rate (CAGR) in FUM has been 18.2%. Since regaining the pre-GFC high in March 2011, the CAGR has been 9.7%. Looking at just the past year, FUM grew by 5.3%.

Chart 2.2: Total funds managed on behalf of overseas investors
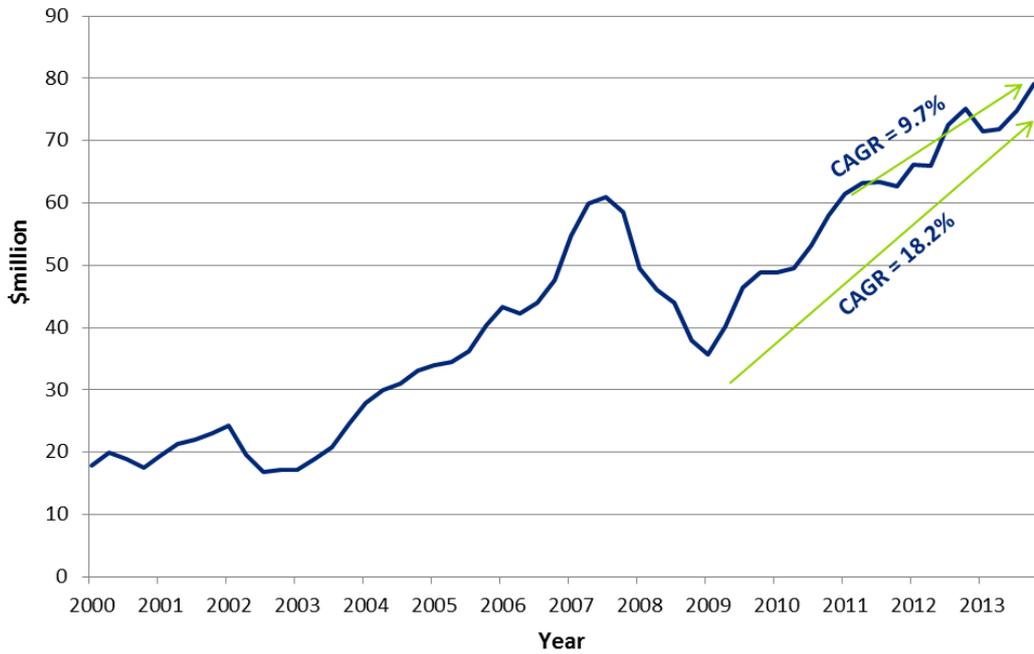
Source: ABS Cat. No. 5655.0, December 2013.

The value of funds managed on behalf of overseas investors as a proportion of total funds under management increased in July 1992 up until June 1998 and has increased slightly since then although the proportion has been relatively volatile (Chart 2.3).

Chart 2.3: FUM on behalf of overseas investors as a proportion of total FUM
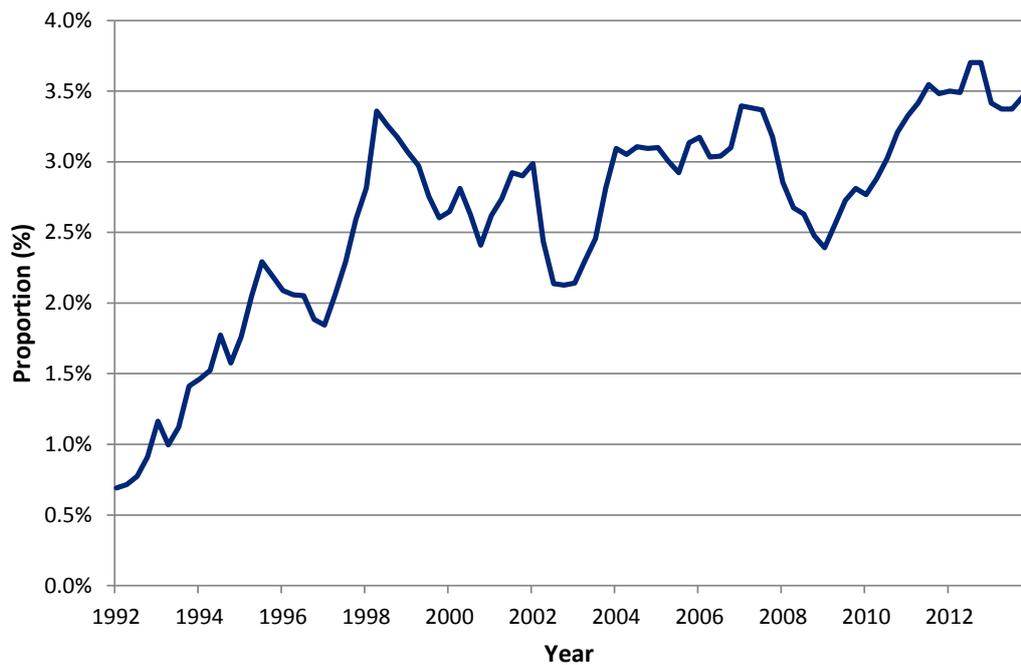
Source: ABC Cat. No. 5655.00, Deloitte Access Economics

A recent report into cross border fund flows also showed that there has been a significant increase in the flow of Managed Investment Trust funds since the start of 2010, with flows increasing at an average annual rate of 21.3% from January 2010 to the end of 2012 (FSC, The Trust Company 2013).

2.2   Potential size of the sector

Australia has a relatively low proportion of foreign sourced funds under management compared to other leading financial centres. According to the ABS (2013a), approximately 3.5% of total funds under management in Australia are sourced from offshore. IBISWorld exclude superannuation in their definition of funds management and estimate that 10.2% of all funds under management were sourced offshore as of March 2013. This compares to 80% in Singapore (Monetary Authority of Singapore 2013), 65% in Hong Kong (Hong Kong Securities and Futures Commission 2013) and 40% in the UK (Investment Management Association 2013), as illustrated in Chart 2.3.

Chart 2.4: Funds under management sourced offshore
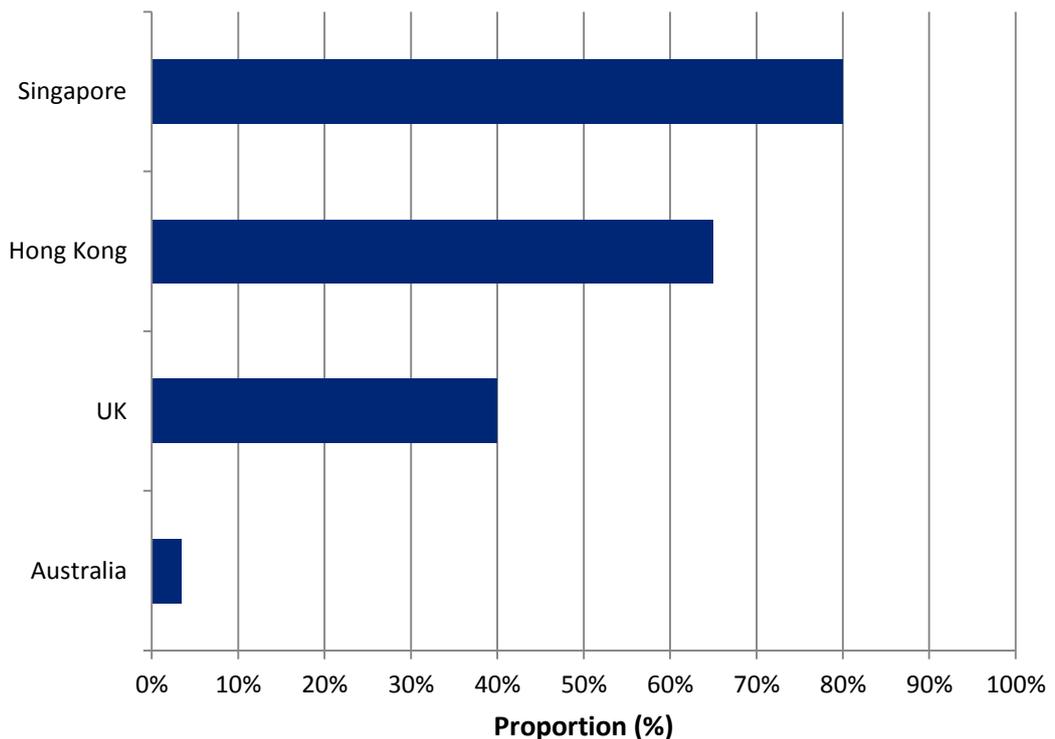
Source: ABC Cat. No. 5655.00, Monetary Authority of Singapore 2013, Hong Kong Securities and Futures Commission 2013, Investment Management Association 2013

The low percentage of overseas assets managed in Australia may to some extent be accounted for by the large pool of domestic superannuation savings. Put simply, the size of the superannuation pool as a proportion of total managed funds means that the relative proportion of overseas assets in terms of total managed funds is smaller than it would be in the absence of Australia's large pool of superannuation assets. However, as noted in the

'Australia as a Financial Centre' report (Australian Financial Centre Forum 2009), the total funds under management which are sourced from offshore ($79.1 billion) is low in absolute terms. There is significant scope for growth given Australia's competitive advantages of a highly skilled workforce, proximity to Asia, and economies of scale due to the existing superannuation system.

Looking at the broader measure of financial services, exports of financial services were $1.6 billion in 2012 (ABS 2013b, Cat. No. 5368.0). As a percentage of GDP this is 0.11% compared to 5.76% for Hong Kong (Hong Kong Census and Statistics Department 2014) and 5.58% for Singapore (Department of Statistics Singapore 2013, Ministry of Trade and Industry Singapore 2013). As Hong Kong and Singapore are service export focussed economies, this is somewhat to be expected, however, the large disparity is illustrative of the gains that can potentially be made in this area.

According to TheCityUK, the global fund management pool totalled $118 trillion in US dollars at the end of 2012. The US accounted for almost half of the total, followed by the UK with 8.3%, Japan with 7.5% and France with 2.8%. Using the US$118 trillion figure, and given that Australia had US$2.1 trillion in managed funds at the end of 2012 according to the ABS (ABS 2013a, Cat. No. 5655.0), this would equate to Australia accounting for approximately 1.8% of the global funds management industry. As TheCityUK and the ABS have different definitions of funds management, this figure may potentially underestimate the fund management industry's relative size but it provides a good indication as to the size of Australia's fund management industry relative to the rest of the world.

Looking at only mutual fund data, Australia has US$1.64 trillion in net assets, accounts for 5.70% of the global market and is ranked third in the world behind only the US and Luxembourg (Investment Company Institute 2014). A mutual fund is defined as a publicly offered, regulated, open-ended fund that buys a portfolio of securities selected by a professional investment adviser to meet a specified financial goal. Australia's strong position in this market is due to the mutual fund definition not including closed pension funds and insurance companies.

2.3 The fee revenue generated from funds management exports

From a national accounting perspective, Australia's export of funds management services is valued in terms of the fees that are received from managing those funds. Fund managers typically charge a base management fee and, in some cases, an additional performance fee which is paid when a fund manager outperforms a specified benchmark. As a result, total fees received can fluctuate depending on the level of returns. Fees as a proportion of funds under management are also likely to differ depending on:

- type of investor: fees are typically lower for mandates and institutional investors than retail investors; and
- asset classes: fees are typically low for investments in fixed interest products but higher for investment in equities, particularly international equities.

As a result of these factors, fee revenue as a proportion of funds under management differs considerably even across fund managers. To estimate fee revenue from funds

management exports as a proportion of industry revenue, information on fee revenue as a proportion of funds under management was obtained through industry consultations or information from the annual reports of the following fund managers: Perpetual Investments; BT Investment Management Limited; Magellan Financial Group; Platinum Asset Management; Macquarie Funds Group; Aberdeen Asset Management; Colonial First State Global Asset Management; NAB Wealth; AMP Capital; and GPT Group. Seven of these ten fund managers were identified as among the 20 largest investment managers with overseas sourced funds in 2008 (Australian Trade Commission 2010).

The weighted average fee revenue as a proportion of funds under management for these companies was 0.60%, although this figure ranged from below 0.4% to above 1%. The weighted average figure of 0.60% is broadly consistent with results from Mercer's Global Asset Manager Fee Survey (Mercer 2010). That survey found that the average fee across all asset classes and mandate sizes was 0.62%. The average fee for Australian assets in the survey was 0.47%, although Australian fund managers also typically manage international investments, for which the average fee was 0.70%.

The weighted average of 0.60% was based on all funds under management, including both funds from overseas and Australia. If funds sourced from overseas are more likely to come from institutional investors, the average fee revenue may be slightly lower for overseas funds. However, fund managers do generate some non-fee revenue from their activities and there is also likely to be some additional revenue associated with reporting and compliance for overseas investments. Based on the level of overseas funds under management in Australia in June 2013 ($74.1 billion),[1] applying the rate of 0.60% indicates that annual fee revenue for funds management exports would be equal to $442 million. The figure for June 2013 was used to ensure consistency with the financial period in which information on average fees and cost structures was available from fund managers' annual reports.

However, as noted above it is possible that the level of fee revenue as a proportion of overseas assets under management is higher or lower than this level. Based on the information provided by fund managers and the Mercer report (2010), it is likely that fee revenue is equal to at least 0.4% of overseas funds under management at most 1.0% of funds under management. Applying these figures to the level of overseas assets in June 2013 ($74.1 billion), suggests that a lower bound for fee revenues would be $296 million and an upper bound would be $741 million.

2.4   The benefits of funds management exports

This report examines the benefits of funds management exports to Australia by examining their current economic contribution and the economic impact of growing the funds management sector in Australia over time. There are also other broader benefits of increasing funds management exports such as improving international relations, increasing the exchange of ideas and knowledge internationally and improving Australia's ability to draw on a greater pool of funds for infrastructure investments.

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[1] This figure was obtained from the June 2013 release of the ABS 'Managed Funds, Australia' publication, Cat. No. 5655.0. This figure may be subject to revision in future releases by the ABS.

These broader benefits are undoubtedly important but are difficult to measure in quantitative terms. While this report focuses on the impact of growing funds management exports on the economy, the role of funds management exports in creating these broader benefits should also be recognised.

3 Economic contribution

An economic contribution study provides a snapshot of the contribution of an industry, in this case the export of funds management services, to economic measures (such as value added, exports, imports and employment). The contribution calculation refers to activity at a particular point in time. In this case, the 2012/13 financial year was used.[2]

Value added is the most appropriate measure of an industry's economic contribution to gross domestic product (GDP). Value added measures the value of goods and services created by the labour and capital deployed by that entity. The value of goods and services created is reflected in the income received by labour and capital, namely wages and gross operating surplus and as well as the payment of production taxes less subsidies.

This report estimates both the direct and indirect value added contributed by the export of funds management services. The *direct value added* captures the wages, salaries and bonuses paid to employees and gross operating surplus for the fund managers who manage overseas assets. If the direct value added for each industry in Australia was measured, then the total value added would be equal to GDP.

The *indirect value added* captures the value added that results from purchases of intermediate inputs as a result of the export of funds management services. For example, fund managers are likely to purchase inputs such as Information Technology (IT) equipment and services, stationary and office space. The value added created by these purchases reflects the industry's indirect economic contribution.

An industry's economic contribution can also be measured in terms of the estimated contribution of the industry to employment in terms of the number of direct and indirect full-time equivalent employees the industry supports.

3.1   Data sources

The economic contribution of the export of funds management services was estimated using a number of data sources. As noted in section 2.3, information on revenue from the exports of funds management services was based on an analysis of annual reports for nine listed fund managers (some of whom consisted of the fund management divisions of banks such as Colonial First State and Macquarie Funds Group) and industry consultations with both listed and unlisted managers who export fund management services. This information was used to derive a weighted average estimate of industry fee revenue as a proportion of funds under management of 0.6%.

Information from fund manager's annual reports was also used to estimate the value of gross operating surplus and wages as a proportion of total revenue for the surveyed firms. Gross operating surplus for the fund management arms of banks was generally obtained from segment reporting information in their financial reports. It was not possible to obtain

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[2] Not all fund managers had financial years ending on the 30th of June so each fund manager's relevant financial year was used.

a wages estimate for the fund management divisions of all the banks, as this was often only reported on a company wide basis. For this reason, the wages share as a proportion of total revenue was only estimated where information on wages in the funds management group was available.

Estimates of direct employment were based on the weighted average number of fund management full-time equivalent employees per million dollars in revenue for those companies who provided information on the number of fund management employees in their annual report.

3.2   Direct economic contribution

The direct value added by the export of funds management services consists of the labour income or wages and salaries paid to employees, the gross operating surplus generated and net production taxes less subsidies paid. Gross Operating Surplus (GOS) is measured by Earnings before Interest, Tax, Depreciation and Amortisation (EBITDA).

Table 3.1 shows that the direct value added by the export of funds management services was estimated to be $336 million in 2012-13, consisting of $156 million in labour income and $180 million in GOS. The sector was also estimated to support 844 full-time equivalent employees (FTEs).

Table 3.1: The direct economic contribution of fund management exports, 2012-13 ($m)

	Direct
Value added ($m)	336.0
Labour income	155.9
GOS	180.1
Employment (FTE)	844

Source: Deloitte Access Economics

Given that export of funds management services was estimated to generate $442 million in fee revenue in 2012-13, these figures indicate that the industry has a relatively high level of direct value added as a proportion of revenue. This indicates that the majority of revenue in the funds management sector goes either to wages or gross operating surplus in the fund management firms themselves and remains in Australia.

3.3   Indirect economic contribution

The intermediate inputs purchased by fund managers also generate flow-on effects in other sectors of the economy. For example, purchases of IT services will create demand for professionals in the IT industry. The size of this flow-on activity is dictated by the extent of linkages with other sectors in the economy.

Based on information provided in fund managers' annual reports, the export of fund management services was estimated to contribute to the purchase of $106 million in intermediate inputs, with the main areas of expenditure being administration, occupancy expenses, IT services, marketing and professional services.

The indirect value added by these purchases of intermediate inputs was estimated using the ABS Input-Output Tables for 2009-10 (2013d). Table 3.2 indicates that the purchase of intermediate inputs associated with the export of funds management services was estimated to contribute $98 million in indirect value added to the Australian economy in 2012-13, comprising $63 million in labour income and $35 million in gross operating surplus. The methodology for calculating the indirect economic contribution associated with the export of funds management services is provided in Appendix A.

Table 3.2: The indirect economic contribution of fund management exports, 2012-13 ($m)

	Indirect
Value added ($m)	98.4
Labour income	63.4
GOS	35.0
Employment (FTE)	582

Source: Deloitte Access Economics

3.4   Total economic contribution

The total economic contribution associated with the export of fund management services, the sum of both its direct and indirect economic contribution, is shown in Table 3.3. Overall, the export of funds management services contributes $434 million in value added to the Australian economy consisting of $219 million in labour income and $215 million in gross operating surplus.

In total, the export of fund management services is estimated to contribute to the employment of 1,426 individuals on a full-time equivalent basis, both directly and indirectly.

Table 3.3: The total economic contribution of fund management exports, 2012-13 ($m)

	Total
Value added ($m)	434.4
Labour income	219.3
GOS	215.1
Employment (FTE)	1,426

Source: Deloitte Access Economics

These figures indicate that a relatively high proportion of industry revenue contributes to value added in Australia, with 98% of industry revenue being converted to value added. The approach used to estimate these results has been based on using information from a selection of fund managers to estimate direct value added, and then using the ABS 2009-10 Input-Output tables to estimate the indirect value added by fund managers' purchases of intermediate inputs.

These results are consistent with estimated multipliers for the broader Auxiliary Finance and Insurance Services sector contained in the ABS 2009-10 Input-Output tables. The Auxiliary Finance and Insurance Services was estimated to have a total value added

multiplier of 0.98 (or 98% of industry revenue) and a total employment multiplier of 3.34 FTEs per million dollars in revenue, using the ABS 2009-10 Input-Output tables. The total employment multiplier estimated here is 3.23 FTEs per million dollars in revenue.

3.5   Sensitivity analysis

As noted in Chapter 2, there is a degree of uncertainty surrounding the level of fees received from the management of overseas assets by fund managers in Australia. Table 3.4 shows the estimated economic contribution of the industry where fees constitute 0.4% of funds under management (FUM), and where fees constitute 1% of FUM. In the case where fee revenue is equal to 0.4% of FUM, the total economic contribution of the export of fund management services is $291 million and the sector is estimated to support 955 FTEs. In the upper bound case where fee revenue is equal to 1.0% of FUM, the economic contribution is estimated to be $673 million and the sector is estimated to support 2,067 FTEs.

Table 3.4: The total economic contribution of fund management exports, 2012-13 ($m)

	Lower bound (0.4% of FUM)	Central case (0.6% of FUM)	Higher bound (1.0% of FUM)
Value added ($m)	291.1	434.4	673.4
Labour income	147.0	219.3	332.4
GOS	144.1	215.1	341.0
Employment (FTE)	955	1,426	2,067

Source: Deloitte Access Economics

4 CGE modelling

This Chapter examines the economic impact of an increase in fund management exports on the Australian economy over time.

4.1   Model structure

The impact of an increase in fund management exports was modelled using the Deloitte Access Economics- Regional General Equilibrium Model (DAE-RGEM) model, Deloitte Access Economics' in-house computable general equilibrium (CGE) model. This model represents Australia both as a collection of sub-regions and as a national economy that engages in international trade with foreign economies. Additional technical detail on the DAE-RGEM model is provided in Appendix B.

In order to analyse the economic impact using CGE models such as DAE-RGEM, economic "shocks" must be generated to dictate the profile that key variable follow in the analysis, in this case to stimulate the introduction of export revenue associated with fund managers managing a greater quantum of overseas assets.

Deloitte Access Economics was asked to model the impact of a doubling in the value received from Australia's current funds management exports. This forms the first scenario in the analysis.

A second indicative scenario was also modelled involving a 2 basis point reduction in the cost of capital in Australia. The concept behind this shock was that an increase in fund management exports would lead to more overseas assets being managed by Australian fund managers. Relative to overseas fund managers, Australian fund managers are likely to have better information about the relative risks of domestic investments and are likely to have a lower risk premium for domestic investments. This would result in more overseas assets being invested in Australia.

While it is difficult to assess how much this would reduce the cost of capital in Australia, to illustrate the magnitude of the potential impact of this shock, an indicative shock involving a 2 basis point reduction in the cost of capital was chosen.

A third and final scenario was modelled whereby Australia's overseas funds under management grew to be equal to that of Hong Kong in ten years. It was assumed that Hong Kong funds under management from overseas investors grew in line with forecast growth of Hong Kong's real GDP over the period.

The remainder of this chapter discusses how the shock has been modelled and the results of the analysis.

4.2 Inputs

The first scenario involves a doubling in the value of fees received from fund management exports in Australia. In modelling the shock, fund management exports were assumed to grow at a constant rate from 2014-15, doubling in value by 2019-20.

The second shock was modelled by assuming that there was an immediate two basis point reduction in the cost of capital in 2013-14. The reduction in the cost of capital was assumed to continue until 2029-30.

The final shock involved an increase in overseas funds under management to the projected level of Hong Kong in 2023-24. Hong Kong is a major financial services hub in Asia and this scenario would involve significant growth in funds management exports to approximately $6 billion. To give a realistic level of Hong Kong overseas funds under management by the end of the 10 year period, it was assumed that Hong Kong funds under management would grow in line with Hong Kong real GDP growth forecasts from the International Monetary Fund (IMF).

4.3 Outputs

Scenario 1 – a doubling of funds management export revenue

A doubling of annual funds management export revenue from $442 million to $884 million is expected to result in an increase in GDP of approximately $330 million by 2029/30. The annual increase in GDP picks up over the first six years as the shock is introduced and then stabilises at approximately $330 million per annum for the remainder of the forecast period (see Chart 4.1).

The increase in GDP is less than the additional funds management export revenues as the CGE model incorporates the crowding out effect on the capital and labour of other sectors as the finance sector grows. The impact on the economy is thus less than the increase in funds flowing into the country as a result of the growth in exports.

Chart 4.1: Projected increase in GDP ($AU 2012/13 million)
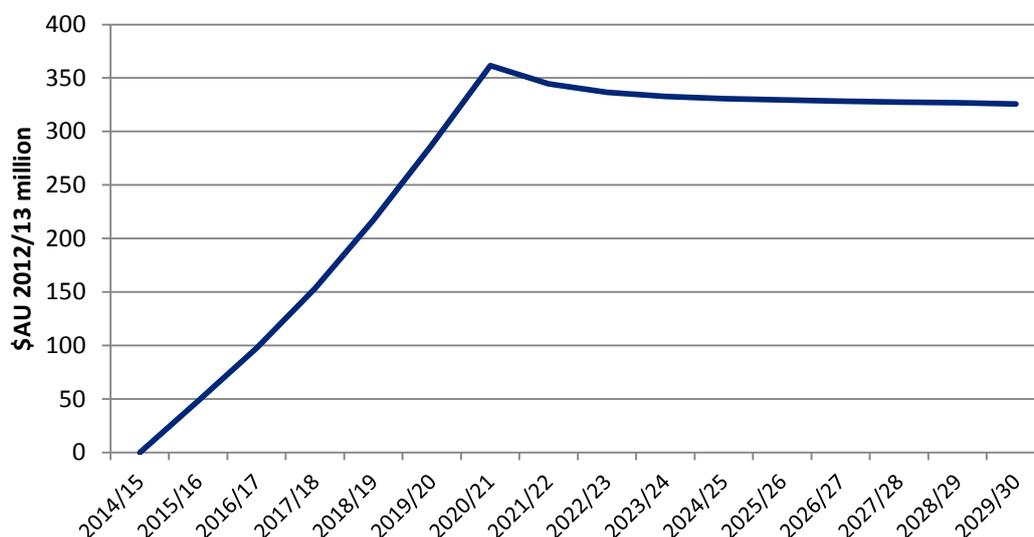
Source: Deloitte Access Economics

Gross National Product (GNP) is expected to increase by $351 million by 2029/30 as a result of the increase in exports. The increase in GNP is higher than the increase in GDP reflecting the additional net receipts from foreigners following the shock.

The increase in GDP grows sharply from 2014/15 through to 2020/21 as the doubling of funds management exports occurs. Due to the increased rate of return, investment increases over this period driving GDP growth. Once fee revenue stabilises at the new equilibrium, the level of investment subsides and the increase in GDP falls slightly. The new equilibrium leads to the increase in GDP stabilising through to the end of the forecast period in 2029/30.

The increase in the number of full time employees is estimated to peak at approximately 1,400 in 2020/21 with the finance sector expected to gain 1,500 employees. The additional employment in the finance sector is partially offset by a net reduction in employees in other sectors reflecting the crowding out effect in the labour market. The growth in employment is expected to peak in line with the growth in GDP and then taper off through to 2029/30. While employees from some sectors will shift to the funds management sector as it grows, other sectors which supply services to the funds management sector may also experience grow as a result of an increase in demand for intermediate inputs.

Table 4.1: Projected impact from doubling of funds management export revenue

	2015/16	2019/20	2024/25	2029/30
Increase in GDP ($m 2012/13)	48.2	287.5	330.8	325.7
Increase in GNP ($m 2012/13)	86.5	397.4	341.3	351.1
Total employment growth (FTE)	301	1,223	885	776

Source: Deloitte Access Economics

Scenario 2 – reduction in the cost of capital of 2 basis points

The impact of a 2 basis point reduction in the cost of capital on GDP was estimated to be approximately $2.3 billion by 2029/30. The positive impact on GDP is expected to be sustained over the forecast period as the risk level for Australian investments falls and more assets flow into Australia. The additional investment filters through the economy leading to a continued increase in production. Chart 4.2 shows the projected increase over the period and that the positive impact is expected to gradually reduce over time.

Chart 4.2: Projected increase in GDP ($AU 2012/13 million)
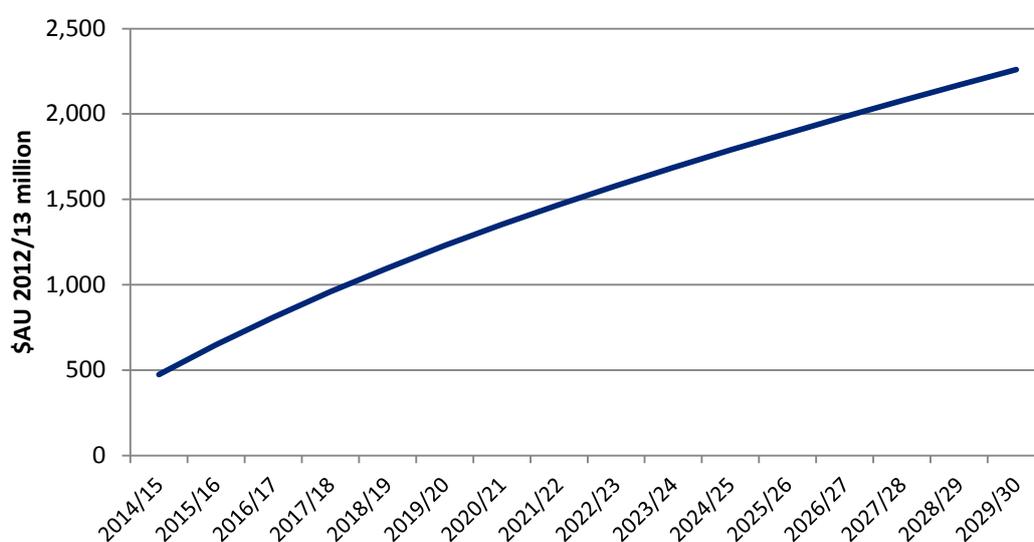
Source: Deloitte Access Economics

The shock is estimated to increase GNP by $991 million by the end of the forecast period, which is less than the estimated impact on GDP (see Table 4.2). This is to be expected as the increase in overseas funds invested in Australia would cause the net payments to foreigners to increase which would lower the level of GNP relative to GDP.

A reduction in the cost of capital is expected to have a positive impact on overall employment as a result of additional investment. Table 4.2 shows the estimated impact on employment associated with the shock. Employment is initially expected to increase by approximately 3,600 full time employees, with employment growth picking up to 7,700 over the forecast period.

Table 4.2: Projected impact from 2bps reduction in cost of capital

	2015/16	2019/20	2024/25	2029/30
Increase in GDP ($m 2012/13)	647.9	1,229.2	1,788.7	2,260.1
Increase in GNP ($m 2012/13)	641.1	798.0	919.9	990.5
Total employment growth (FTE)	3,894	5,055	6,402	7,737

Source: Deloitte Access Economics

As the cost of capital falls by 2 basis points, the level of investment increases. The capital stock is expected to increase over time as shown in Chart 4.3 as investment grows as a result of the lower cost of capital. According to the CGE model, the initial increase in investment is estimated to be $1.7 billion, with the increase tapering off slightly in subsequent years reaching $1.2 billion by the end of the forecast period.

Chart 4.3: Projected cumulative increase in capital stock as a result of a 2 bps shock
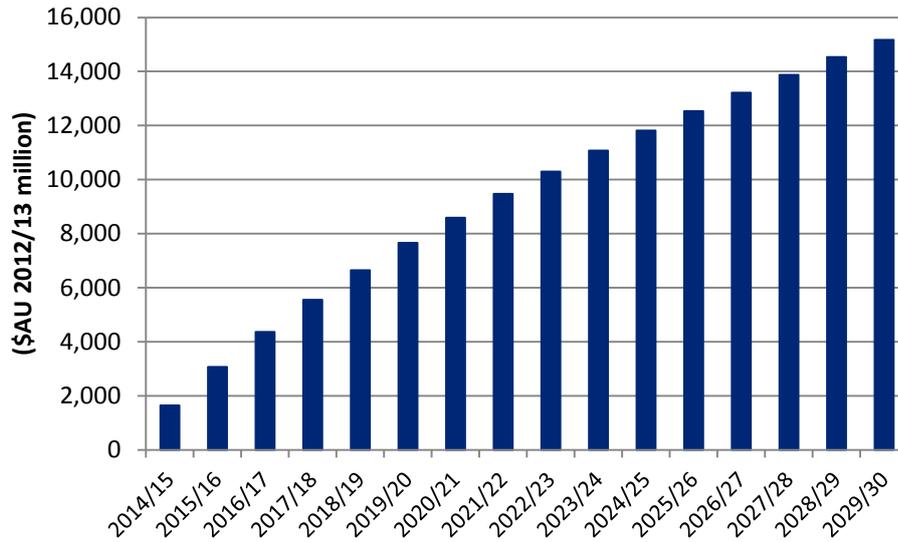
Source: Deloitte Access Economics

Scenario 3 – an increase in the level of funds under management to the projected level of Hong Kong

An increase in the level of overseas funds under management to the projected level of Hong Kong in 2023/24 and a resultant pickup in funds management exports would lead to an estimated increase in the level of GDP of $4.2 billion by 2029/30.

The growth rate of Australia's overseas funds under management is assumed to be constant over the 10 years. The compounding effects over the longer time horizon lead to the absolute growth in GDP picking up toward the end of the 10 year period where funds management export growth is modelled to occur. GDP then levels out to an increase of approximately $4.2 billion by the end of the forecast period.

Chart 4.4: Projected increase in GDP ($AU 2012/13 million)
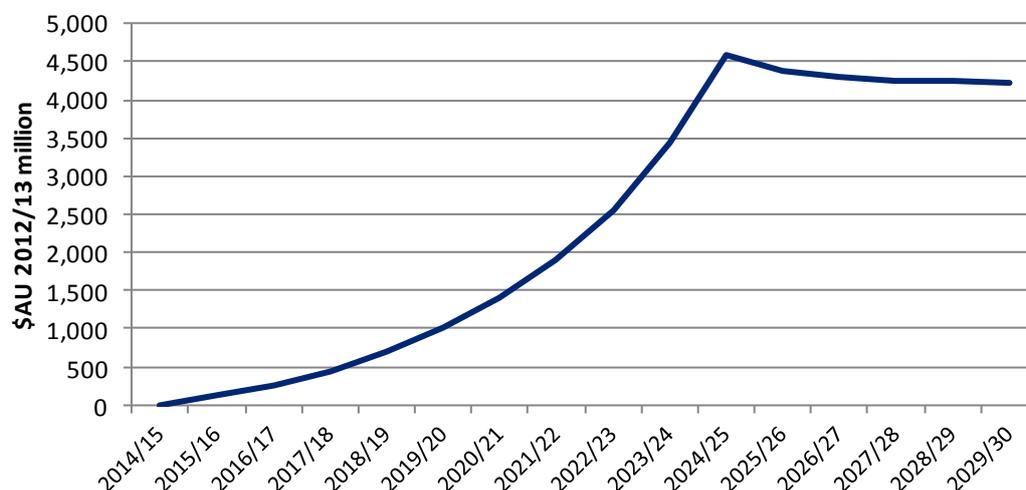
Source: Deloitte Access Economics

The pickup in GNP is more pronounced over the 10 year period when exports are growing, peaking in an increase of $6.2 billion in 2024/25, however this falls away to approximately the same increase in GDP by 2029/30 of $4.3 billion. The increase in GNP above the increase in GDP through to 2024/25 is similar to Scenario 1 in that the increase in exports creates additional net receipts from foreigners and a greater increase in GNP.

Table 4.3: Projected impact from increasing to level of Hong Kong

	2015/16	2019/20	2024/25	2029/30
Increase in GDP ($m 2012/13)	117.6	1,007.2	4,577.9	4,223.1
Increase in GNP ($m 2012/13)	211.2	1,448.7	6,199.8	4,346.1
Total employment growth (FTE)	733	4,475	16,926	9,982

Source: Deloitte Access Economics

Total employment growth is expected to peak by approximately 16,900 full time employees in 2024/25 as the level of investment rises to increase the capital stock to account for higher output as a result of the shock. The level of employment growth is lower by 2029/30 as investment falls back to normal levels and the capital stock levels off once the growth in exports is accounted for.

5 Taxation implications

The provision of funds management services by Australian companies impacts the amount of tax received by Australian governments in two main ways. First, the fees received by Australian fund managers from managing overseas assets impact the level of income tax, payroll tax and corporate tax revenue received. Secondly, if an increase in funds management exports leads to a greater quantum of funds being invested in Australian assets as a result of Australian fund managers greater awareness of domestic investment opportunities, this will increase the amount of tax revenue the Australian government received from investment income.

This section explores both of these mechanisms, although only attempts to quantify the first. In relation to the second, while an increase in funds management exports may lead to an increase in the quantum of funds invested domestically, it is difficult to quantify the extent of any increase and the asset classes into which the additional funds are likely to be directed.

If information about the relative risks of investments are known, under perfect capital markets an increase in funds managed in Australia would not lead to more funds being invested in Australian assets as an increase in funds being managed in Australia would not necessarily affect the relative risks and returns of Australian assets. However, it is possible that Australian fund managers may have information from which to assess the relative risks and expected returns associated with investments in Australian assets which could lead to more funds being invested in Australia, as modelled in scenario 2 in Chapter 4.

Section 5.1 below examines the ways in which additional fees provided to Australian fund managers is likely to impact tax revenue while section 5.1 discusses the potential impact of additional investments in Australian assets on tax revenue received. Section 5.3 examines the impact of increasing exports of funds management services on tax revenue based on the scenarios considered in Chapter 4.

5.1   Tax on investment fees received by Australian fund managers

In general, fees received by fund managers would lead to an increase in income and payroll tax (as a result of any increase in total wages paid to employees) and an increase in corporate tax on any additional profits that result from the additional fee revenue. No GST is payable for services supplied to non-residents.

Since the marginal cost of managing additional assets is likely to be relatively low, a large part of the additional fee revenue is likely to contribute to returns to capital and labour for established operators. However, it is possible that growth in funds management exports may lead to the entry of some new fund managers.

This section briefly outlines how increases in investment fees are likely to impact tax revenue for different types of fund managers in Australia.

Asset consultants

Asset consultants provide general investment advice to foreign residents but do not actually invest funds on their behalf. Fee income from general advice would be subject to corporate tax at a rate of 30% on any profits made and wages paid to asset consultants would be subject to income tax and payroll tax provided the organisation exceeds the relevant payroll tax threshold.

Investments in Australian pooled investment vehicles

If funds from overseas are invested wholly in Australian assets, the investment fees received by fund managers would be subject to Australian tax. As noted above, fund managers would pay corporate tax at a rate of 30%, while wages and salaries paid to employees would be taxed at personal income tax rates. Payroll tax would also be payable. It is understood that the main entities receiving foreign funds are corporate entities.

Investments made by Australian fund managers in offshore assets

In the case of funds invested offshore, there is likely to be a sharing of fee income between local and foreign asset managers depending on whether asset management functions are undertaken onshore or offshore. For example, if overseas advisors are responsible for undertaking asset management for a particular investment, then only the administration fees will remain in Australia. In this instance, corporate tax will only be payable on the administrative component of the investment fee.

Operating a mandate

In cases where an overseas funds manager provides a mandate so that an Australian funds manager is provided with a pool of funds to invest, investment fees tend to be limited to asset management fees. All of these asset management fees would be subject to Australian tax.

An overseas fund manager with an Australian sales office

In the case of an overseas fund manager who obtains overseas funds through an Australian sales office and then invests these in overseas assets, the majority of investment fees are likely to be captured overseas. Australian tax would be payable on the component of the total fee that remains in Australia.

In practice, it is difficult to assess how a given increase in funds management is likely to be distributed across the different types of fund managers.

5.2   Tax on foreign funds invested in Australia

If an increase in funds management exports lead to a net increase in the amount of foreign assets invested in Australia, this will result in an increase in Australian tax revenue due to the investment income generated by these assets.

Figure 5.1 provides an overview of how different foreign investments are taxed in Australia. If foreign funds are invested in tangible property assets such as infrastructure or shopping

centres, the tax payable on these investments is 15% based on the current withholding tax rate for property. Investments in shares where the investment constitutes an interest of less than 10% would be untaxed in the case of franked dividends and taxed at 30% for unfranked dividends (FSC 2011). Unfranked dividends are taxed at 15% for residents of treaty countries. Ownership of domestic shares involving an interest greater than 10% may be taxed at different rates depending on relevant tax treaties. In cases where it is connected to domestic property it would be taxed at a rate of 15%. Interest income which is Australian sourced is taxed at a rate of 10% (FSC 2011).

Figure 5.1: Overview of how foreign investments are taxed
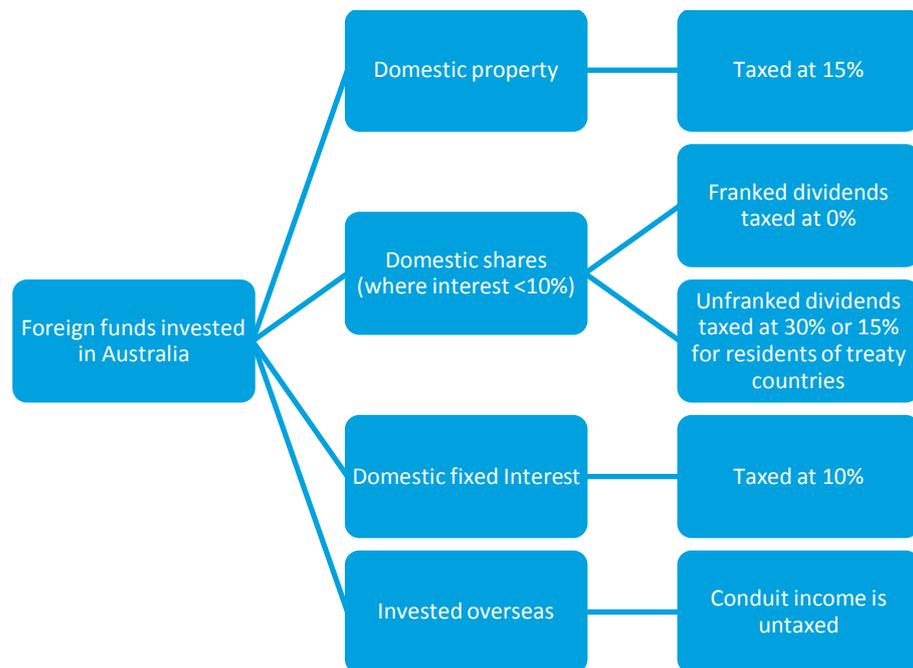
Finally, conduit income, namely where funds are channelled through Australia to be invested overseas, theoretically should be untaxed, although there are some circumstances where tax might be paid on conduit income.

5.3   Tax implications of each scenarios

This section discusses the tax implications of the three scenarios for increasing funds management exports in Australia. As noted above, this section focuses on quantify the impact of increases in fee income on tax revenue rather than the impact of any increase in foreign holdings of Australian assets.

The first round effect of increasing funds management export fees on tax revenue is the impact on income tax, payroll tax and corporate tax for the funds management sector itself, as discussed in section 5.1 above.

However, there is also a second round effect as both increases in economic activity lead to increased activity for industries supplying inputs to the funds management sector and resources are redirected from other sectors of the economy to the funds management

sector. This impacts the amount of income tax, payroll tax and corporate tax paid by other industries in the Australian economy.

The use of a CGE modelling framework allows us to capture these second round effects. For each scenario, the estimated impact on wages and gross operating surplus was extracted from the CGE model. This was then used to estimate the impact of increasing funds management exports under each scenario on income, payroll and corporate tax.

Table 5.1 shows how the tax calculations were derived for each tax type.

Table 5.1: Tax calculations

Tax type	Calculation
Income tax	% changes in labour income estimated in CGE model x Current income tax revenue ($164 billion) x Progressivity factor (1.5) x Ratio of wages and salaries to taxable income (0.79)
Payroll tax	% changes in labour income estimated in CGE model x Current wages in the Australian economy ($674.5 billion) x Average payroll tax rate for the financial services industry (4.1%)
Corporate tax	% change in gross operating surplus x Current corporate tax revenue ($69 billion)
Goods and Services Tax	% change in consumption x Current GST revenue ($50.2 billion).

Source: Hockey J. and Cormann, M. 2013, 'Mid-year Economic and Fiscal Outlook 2013-14'.

In the case of income tax, the estimated percentage change in labour income from the CGE model was multiplied by estimated income tax revenue in Australia in 2013-14 (Mid-year Economic and Fiscal Outlook 2013-14) by a progressivity factor and the ratio of wages and salaries to taxable income (ATO Taxation Statistics 2010-11). Box 5.1 below discusses how this progressivity factor was defined. The ratio of wages and salaries to taxable income is used to account for the fact that a 1% increase in wages does not equate to a 1% increase in taxable income as taxable income includes income from other sources such as investment income.

To estimate payroll tax, the estimated percentage change in labour income from the CGE model was multiplied by an estimate of total wages in the Australian economy by a payroll tax rate of 4.1%. The estimate of total wages and salaries was derived by multiplying average weekly earnings (ABS 2013e) by the total number of employed persons in Australia (ABS 2013f). The payroll tax rate of 4.1% was based on the average payroll tax in the financial and insurance services sector (ABS 2012). This assumption is slightly conservative given that the financial and insurance services sector has a higher than average rate of payroll tax and thus if workers move from other sectors, the increase in net payroll tax is likely to be slightly larger. Moreover, the vast majority of fund managers receiving overseas assets are likely to exceed the payroll tax threshold, although this is complicated by current arrangement which reduce payroll tax for new employees in some states.

To estimate corporate tax, the estimated percentage change in gross operating surplus was multiplied by estimated corporate tax revenue in Australia in 2013-14 (Mid-year Economic

and Fiscal Outlook 2013-14). This is not a perfect measure given the impact of various deduction and past losses on corporate tax payable but is likely to provide a reasonable high-level estimate of the impact on corporate tax revenue.

To estimate the impact on GST, the percentage change in consumption was multiplied by the estimate Goods and Services tax revenue which was $50.248 billion in 2013-14 (Mid-year Economic and Fiscal Outlook 2013-14).

To estimate the total impact on Commonwealth tax revenue, estimates of the impact on superannuation tax revenue, customs and excise duties and other taxes were also included. The value of baseline tax revenue was assumed to grow over time based on the model's baseline growth in GOS, labour income, consumption and GDP.

Box 5.1: Calculating the progressivity factor

The progressivity factor takes account of the fact that in a progressive tax system, marginal tax rates are typically higher than average tax rates so that a 1% across the board increase in taxable income leads to a more than 1% increase in income tax revenue. To precisely estimate the degree of progressivity in the tax system it is necessary to have information on the taxable income of all taxpayers, which is provided to the ATO.

In the absence of this administrative data, Deloitte Access Economics sought to derive a high-level estimate of the progressivity factor using the following data sources:

-   information on the number of tax payers in each tax bracket from the ATO Taxation Statistics (assuming that the income of those in each bracket on average is equal to the midpoint of that tax bracket); and

-   Census data from 2011 on personal income levels (assuming that the income of individuals in each Census personal income band is on average equal to the midpoint of that band).

Using the ATO Tax Statistics in 2010-11 (and the marginal tax rates prevailing in 2010-11), the progressivity factor was estimated to be 1.53. Using the 2011 Census data on personal income for employed persons, the estimated progressivity factor was 1.56. Given that both these methods are not exact as they do not capture the precise distribution of taxable incomes, the progressivity factor was conservatively assumed to be 1.5 for the purpose of estimating the impact of an increase in taxable incomes on income tax revenues.

Scenario 1 – a doubling in the export of funds management services

The estimated taxation implications of a doubling of the export of funds management services are shown in Table 5.2. These estimates should be seen as indicative only as they are based on a relatively simplified treatment of tax and both economic conditions and taxation policy settings are likely to change over time.

Total Commonwealth tax receipts are estimated to increase by $113 million in 2019-20, before levelling off to $98 million in 2029-30. State payroll taxes are estimated to increase by $10 million in 2019-20, before levelling off to $8 million by 2029-30.

Table 5.2: Taxation implications of a doubling in export revenue ($2012-13 million)

	2015-16	2019-20	2024-25	2029-30
Income tax	15.3	68.7	55.2	53.7
Corporate tax	3.2	18.8	21.1	21.6
GST	2.9	13.4	11.6	12.0
Other	2.7	12.2	10.4	10.6
Commonwealth tax receipts	**24.1**	**113.1**	**98.3**	**97.9**
Payroll tax (state tax)	2.2	9.8	7.9	7.6

Source: Deloitte Access Economics

Scenario 2 – reduction in the cost of capital of 2 basis points

The estimated taxation implications of a 2 basis point (bp) reduction in the cost of capital are shown in Table 5.3. Again, these estimates should be seen as indicative only as they are based on a relatively simple modelling approach and both economic conditions and taxation policy settings are likely to change over time.

Total Commonwealth tax receipts are estimated to increase by $390 million in 2019-20, rising to $587 million in 2029-30. State payroll taxes are estimated to increase by $29 million in 2019-20 and by $32 million by 2029-30.

Table 5.3: Tax implications of a 2 bp reduction in the cost of capital ($ 2012-13 million)

	2015-16	2019-20	2024-25	2029-30
Income tax	186.6	238.0	295.1	349.5
Corporate tax	34.9	70.0	103.0	130.2
GST	33.7	42.6	50.0	54.9
Other	31.1	39.3	46.7	52.2
Commonwealth tax receipts	**286.3**	**389.9**	**494.7**	**586.7**
Payroll tax (state tax)	25.8	29.3	31.4	32.1

Source: Deloitte Access Economics

Scenario 3 – an increase in funds under management to the projected level of Hong Kong

The estimated taxation implications of increasing the level of funds under management to the project level of Hong Kong are shown in Table 5.4.

Total Commonwealth tax receipts are estimated to increase steadily, rising to be $1.7 billion above the baseline in 2024-25, before stabilising to $1.2 billion above the baseline in 2029-30. State payroll taxes are estimated to increase by $109 million above the baseline in 2024-25, before stabilising to be $61 million above the baseline in 2029-30.

Table 5.4: Tax implications of increasing FUM to Hong Kong levels ($ 2012-13 million)

	2015-16	2019-20	2024-25	2029-30
Income tax	37.0	245.6	1,028.1	669.2
Corporate tax	7.6	63.1	286.9	252.8
GST	7.1	47.7	201.7	142.1
Other	6.5	43.3	182.6	126.8
Commonwealth tax receipts	**58.1**	**399.7**	**1,699.3**	**1,190.9**
Payroll tax (state tax)	5.1	30.2	109.3	61.4

Source: Deloitte Access Economics

6 Conclusions

While relatively small in comparison to leading global funds management centres, the export of funds management services by Australia has grown in recent years. This report estimates that the sector contributed $434 million to the Australian economy in 2012-13 and supported more than 1,400 full-time equivalent employees, both directly and indirectly.

The potential economic impact of growing the sector was also examined, with a doubling in the value of funds management exports estimated to lead to an increase in GDP of $362 million at its peak in 2020-21 before levelling off to $326 million by 2029-30. It was also estimated to lead to an increase of more than 1,400 extra jobs in 2020-21 and more than 700 jobs in 2029-30. Future growth of the sector is also likely to provide increased tax revenue for both State and Federal governments with a doubling of funds management exports estimated to increase Commonwealth tax revenue by $113 million in 2019-20 and increase State payroll tax revenue by $10 million.

If the level of funds management exports were to grow more rapidly such that they reached the levels of fund management exports in Hong Kong by 2023-24, this would have a considerably larger impact on the economy. This scenario was estimated to lead to a $4.2 billion increase in GDP above baseline levels in 2029-30, and support almost 10,000 additional full-time equivalent jobs. It would also lead to an estimated extra $1.2 billion in Commonwealth tax receipts and an additional $61 million in state payroll taxes.

The size of these potential economic gains indicate that there would be significant benefits to the Australian economy from increasing exports of fund management services. Given these findings, there would be value to be gained from examining whether the international competitiveness of Australian funds managers are being hindered by current regulatory settings.

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Appendix A: Economic contribution

Economic contribution studies are intended to quantify measures such as value added, exports, imports and employment associated with a given industry or firm, in an historical reference year. The economic contribution is a measure of the value of production by a firm or industry.

Value added

Value added is the most appropriate measure of an industry's economic contribution to gross domestic product (GDP) at the national level, or gross state product (GSP) at the state level.

The value added of each industry in the value chain can be added without the risk of double counting across industries caused by including the value added by other industries earlier in the production chain.

Other measures, such as total revenue or total exports, may be easier to estimate than value added but they 'double count'. That is, they overstate the contribution of a company to economic activity because they include, for example, the value added by external firms supplying inputs or the value added by other industries.

Measuring the economic contribution

There are several commonly used measures of economic activity, each of which describes a different aspect of an industry's economic contribution:

- **Value added** measures the value of output (i.e. goods and services) generated by the entity's factors of production (i.e. labour and capital) as measured in the income to those factors of production. The sum of value added across all entities in the economy equals gross domestic product. Given the relationship to GDP, the value added measure can be thought of as the increased contribution to welfare.

  Value added is the sum of:

  - Gross operating surplus (GOS) – GOS represents the value of income generated by the entity's direct capital inputs, generally measured as the earnings before interest, tax, depreciation and amortisation (EBITDA).

  - Tax on production less subsidy provided for production – This generally includes company taxes and taxes on employment. Note: Given the returns to capital before tax (EBITDA) are calculated, company tax is not included or this would double count that tax.

  - Labour income is a subcomponent of value added. It represents the value of output generated by the entity's direct labour inputs, as measured by the income to labour.

- **Gross output** measures the total value of the goods and services supplied by the entity. This is a broader measure than value added because it is an addition to the value added generated by the entity. It also includes the value of intermediate inputs used by the entity that flow from value added generated by other entities.

- **Employment** is a fundamentally different measure of activity from those above. It measures the number of workers employed by the entity, rather than the value of the workers' output.

Figure A.1 shows the accounting framework used to evaluate economic activity, along with the components that make up gross output. Gross output is the sum of value added and the value of intermediate inputs. Value added can be calculated directly by adding the payments to the primary factors of production, labour (i.e. salaries) and capital (i.e. gross operating surplus (GOS), or profit), as well as production taxes less subsidies. The value of intermediate inputs can also be calculated directly by adding up expenses related to non-primary factor inputs.

Figure A.1: Economic activity accounting framework
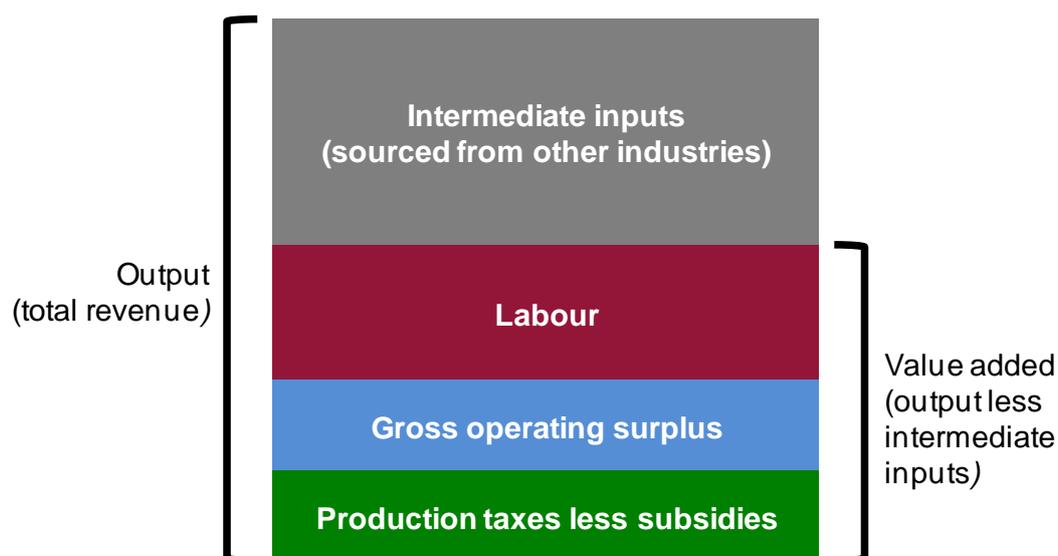
Direct and indirect contributions

The **direct** economic contribution is a representation of the flow of income to labour and capital associated with the export of fund management services.

The **indirect** contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by the export of funds management services. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using Australian Bureau of Statistics input-output tables that report the inputs and outputs of specific sectors of the economy (ABS 2013d).

The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

Limitations of economic contribution studies

While describing the geographic origin of production inputs may be a guide to a industry's linkages with the local economy, it should be recognised that these are the type of normal industry linkages that characterise all economic activities.

Unless there is significant unused capacity in the economy (such as unemployed labour) there is only a weak relationship between a firm's economic contribution as measured by value added (or other static aggregates) and the welfare or living standard of the community. Indeed, the use of labour and capital by demand created from the industry comes at an opportunity cost as it may reduce the amount of resources available to spend on other economic activities.

This is not to say that the economic contribution, including employment, is not important. As stated by the Productivity Commission in the context of Australia's gambling industries:[3]

> *Value added, trade and job creation arguments need to be considered in the context of the economy as a whole … income from trade uses real resources, which could have been employed to generate benefits elsewhere. These arguments do not mean that jobs, trade and activity are unimportant in an economy. To the contrary they are critical to people's well-being. However, any particular industry's contribution to these benefits is much smaller than might at first be thought, because substitute industries could produce similar, though not equal gains.*

In a fundamental sense, economic contribution studies are simply historical accounting exercises. No 'what-if', or counterfactual inferences – such as 'what would happen to living standards if the firm disappeared?' – should be drawn from them.

The analysis – as discussed in the report – relies on a national input-output table modelling framework and there are some limitations in this modelling framework. The analysis assumes that goods and services provided to the sector are produced by factors of production that are located completely within the state or region defined and that income flows do not leak to other states.

The IO framework and the derivation of the multipliers also assume that the relevant economic activity takes place within an unconstrained environment. That is, an increase in economic activity in one area of the economy does not increase prices and subsequently crowd out economic activity in another area of the economy. As a result, the modelled total and indirect contribution can be regarded as an upper-bound estimate of the contribution made by the supply of intermediate inputs.

Similarly, the IO framework does not account for further flow-on benefits as captured in a more dynamic modelling environment like the CGE model.

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[3] Productivity Commission (1999), *Australia's Gambling Industries*, Report No. 10, AusInfo, Canberra (page 4.19).

Input-output analysis

Input-output tables are required to account for the intermediate flows between sectors. These tables measure the direct economic activity of every sector in the economy at the national level. Importantly, these tables allow intermediate inputs to be further broken down by source. These detailed intermediate flows can be used to derive the total change in economic activity associated with a given direct change in activity for a given sector.

A widely used measure of the spill-over of activity from one sector to another is captured by the ratio of the total to direct change in economic activity. The resulting estimate is typically referred to as 'the multiplier'. A multiplier greater than one implies some indirect activity, with higher multipliers indicating relatively larger indirect and total activity flowing from a given level of direct activity.

The input-output matrix used for Australia is derived from the Australian Bureau of Statistics 2009–10 Input-Output Tables (2013d). The industry classification used for input-output tables is based on ANZSIC, with 114 sectors in the modelling framework.

Appendix B: CGE modelling

The Deloitte Access Economics – Regional General Equilibrium Model (DAE-RGEM) is a large scale, dynamic, multi-region, multi-commodity computable general equilibrium model of the world economy. The model allows policy analysis in a single, robust, integrated economic framework. This model projects changes in macroeconomic aggregates such as GDP, employment, export volumes, investment and private consumption. At the sectoral level, detailed results such as output, exports, imports and employment are also produced.

The model is based upon a set of key underlying relationships between the various components of the model, each which represent a different group of agents in the economy. These relationships are solved simultaneously, and so there is no logical start or end point for describing how the model actually works.

Figure A.1 shows the key components of the model for an individual region. The components include a representative household, producers, investors and international (or linkages with the other regions in the model, including other Australian States and foreign regions). Below is a description of each component of the model and key linkages between components. Some additional, somewhat technical, detail is also provided.

Figure B.1: Key components of DAE-RGEM
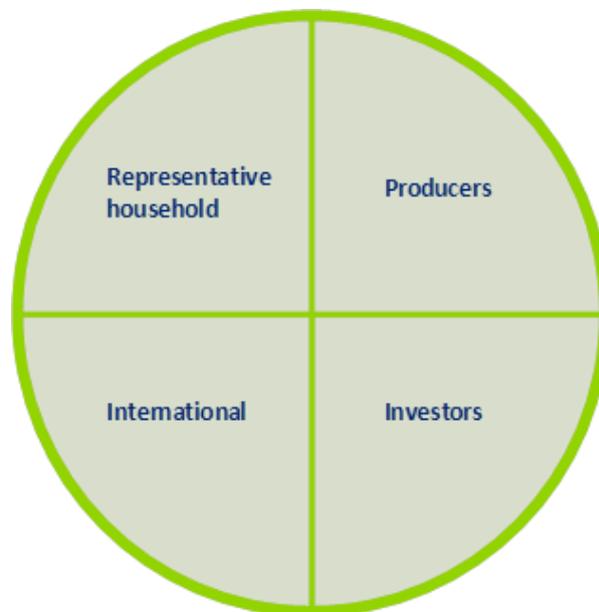
DAE-RGEM is based on a substantial body of accepted microeconomic theory. Key assumptions underpinning the model are:

- The model contains a 'regional consumer' that receives all income from factor payments (labour, capital, land and natural resources), taxes and net foreign income from borrowing (lending).

- Income is allocated across household consumption, government consumption and savings so as to maximise a Cobb-Douglas (C-D) utility function.

- Household consumption for composite goods is determined by minimising expenditure via a CDE (Constant Differences of Elasticities) expenditure function. For most regions, households can source consumption goods only from domestic and imported sources. In the Australian regions, households can also source goods from interstate. In all cases, the choice of commodities by source is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.

- Government consumption for composite goods, and goods from different sources (domestic, imported and interstate), is determined by maximising utility via a C-D utility function.

- All savings generated in each region are used to purchase bonds whose price movements reflect movements in the price of creating capital.

- Producers supply goods by combining aggregate intermediate inputs and primary factors in fixed proportions (the Leontief assumption). Composite intermediate inputs are also combined in fixed proportions, whereas individual primary factors are combined using a CES production function.

- Producers are cost minimisers, and in doing so, choose between domestic, imported and interstate intermediate inputs via a CRESH production function.

- The model contains a more detailed treatment of the electricity sector that is based on the 'technology bundle' approach for general equilibrium modelling developed by ABARE (1996).

- The supply of labour is positively influenced by movements in the real wage rate governed by an elasticity of supply.

- Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. A global investor ranks countries as investment destinations based on two factors: global investment and rates of return in a given region compared with global rates of return. Once the aggregate investment has been determined for Australia, aggregate investment in each Australian sub-region is determined by an Australian investor based on: Australian investment and rates of return in a given sub-region compared with the national rate of return.

- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.

- Prices are determined via market-clearing conditions that require sectoral output (supply) to equal the amount sold (demand) to final users (households and government), intermediate users (firms and investors), foreigners (international exports), and other Australian regions (interstate exports).

- For internationally-traded goods (imports and exports), the Armington assumption is applied whereby the same goods produced in different countries are treated as imperfect substitutes. But, in relative terms, imported goods from different regions are treated as closer substitutes than domestically-produced goods and imported composites. Goods traded interstate within the Australian regions are assumed to be closer substitutes again.

- The model accounts for greenhouse gas emissions from fossil fuel combustion. Taxes can be applied to emissions, which are converted to good-specific sales taxes that impact on demand. Emission quotas can be set by region and these can be traded, at a

value equal to the carbon tax avoided, where a region's emissions fall below or exceed their quota.

Households

Each region in the model has a so-called representative household that receives and spends all income. The representative household allocates income across three different expenditure areas: private household consumption; government consumption; and savings.

Going clockwise around Figure B.1, the representative household interacts with producers in two ways. First, in allocating expenditure across household and government consumption, this sustains demand for production. Second, the representative household owns and receives all income from factor payments (labour, capital, land and natural resources) as well as net taxes. Factors of production are used by producers as inputs into production along with intermediate inputs. The level of production, as well as supply of factors, determines the amount of income generated in each region.

The representative household's relationship with investors is through the supply of investable funds – savings. The relationship between the representative household and the international sector is twofold. First, importers compete with domestic producers in consumption markets. Second, other regions in the model can lend (borrow) money from each other.

- The representative household allocates income across three different expenditure areas – private household consumption; government consumption; and savings – to maximise a Cobb-Douglas utility function.

- Private household consumption on composite goods is determined by minimising a CDE (Constant Differences of Elasticities) expenditure function. Private household consumption on composite goods from different sources is determined is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.

- Government consumption on composite goods, and composite goods from different sources, is determined by maximising a Cobb-Douglas utility function.

- All savings generated in each region is used to purchase bonds whose price movements reflect movements in the price of generating capital.

Producers

Apart from selling goods and services to households and government, producers sell products to each other (intermediate usage) and to investors. Intermediate usage is where one producer supplies inputs to another's production. For example, coal producers supply inputs to the electricity sector.

Capital is an input into production. Investors react to the conditions facing producers in a region to determine the amount of investment. Generally, increases in production are accompanied by increased investment. In addition, the production of machinery, construction of buildings and the like that forms the basis of a region's capital stock, is undertaken by producers. In other words, investment demand adds to household and government expenditure from the representative household, to determine the demand for goods and services in a region.

Producers interact with international markets in two main ways. First, they compete with producers in overseas regions for export markets, as well as in their own region. Second, they use inputs from overseas in their production.

- Sectoral output equals the amount demanded by consumers (households and government) and intermediate users (firms and investors) as well as exports.

- Intermediate inputs are assumed to be combined in fixed proportions at the composite level. As mentioned above, the exception to this is the electricity sector that is able to substitute different technologies (brown coal, black coal, oil, gas, hydropower and other renewables) using the 'technology bundle' approach developed by ABARE (1996).

- To minimise costs, producers substitute between domestic and imported intermediate inputs is governed by the Armington assumption as well as between primary factors of production (through a CES aggregator). Substitution between skilled and unskilled labour is also allowed (again via a CES function).

- The supply of labour is positively influenced by movements in the wage rate governed by an elasticity of supply is (assumed to be 0.2). This implies that changes influencing the demand for labour, positively or negatively, will impact both the level of employment and the wage rate. This is a typical labour market specification for a dynamic model such as DAE-RGEM. There are other labour market 'settings' that can be used. First, the labour market could take on long-run characteristics with aggregate employment being fixed and any changes to labour demand changes being absorbed through movements in the wage rate. Second, the labour market could take on short-run characteristics with fixed wages and flexible employment levels.

Investors

Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. The global investor ranks countries as investment destination based on two factors: current economic growth and rates of return in a given region compared with global rates of return.

- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.

International

Each of the components outlined above operate, simultaneously, in each region of the model. That is, for any simulation the model forecasts changes to trade and investment flows within, and between, regions subject to optimising behaviour by producers, consumers and investors. Of course, this implies some global conditions that must be met, such as global exports and global imports, are the same and that global debt repayment equals global debt receipts each year.

Limitation of our work

General use restriction

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