www.TheCIE.com.au

Economic Modelling for the Australia–India FTA Feasibility Study
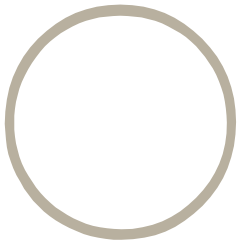
The Centre for International Economics is a private economic research agency that provides professional, independent and timely analysis of international and domestic events and policies.

The CIE's professional staff arrange, undertake and publish commissioned economic research and analysis for industry, corporations, governments, international agencies and individuals. Its focus is on international events and policies that affect us all.

The CIE is fully self-supporting and is funded by its commissioned studies, economic consultations provided and sales of publications.

The CIE is based in Canberra and has an office in Sydney.

Contents

Executive summary

The Australian and Indian Governments have announced that a joint feasibility study will be undertaken into the merits of a bilateral free trade agreement. As part of the feasibility study, economic modelling is to be undertaken to quantify the possible economic impacts of a trade and investment agreement between Australia and India.

This report provides an independent assessment of the possible economic impacts.

Barriers to merchandise trade

- The average applied Australian tariff in 2008 is a low 3.2, with nearly 52 per cent of tariff lines being duty free. The highest tariff during 2008 is 17.5 per cent (levied on some apparel and textile products). Australia has bound nearly 97 per cent of its tariff lines in the WTO, with the average bound tariff rate being 10 per cent.

- The average applied tariff in India during 2008 is a relatively higher 17.6 per cent, with nearly 3.7 per cent of tariff lines being duty free. The average tariff masks some substantial variation in tariff rates. For example, during 2008 over 400 tariff lines had a tariff equal to or in excess of 100 per cent. India has bound over 75 per cent of its tariffs in the WTO, with the average bound tariff rate being 48.6 per cent.

- India applies its MFN tariff rate to Australian imports, while Australia applies its developing country tariff rate to Indian imports. Hence Australia already affords India some tariff concessions relative to imports from an MFN country.

Barriers to services trade

- Barriers to services trade are nationalistic treatments that hinder or prevent market entry and price competition between 'foreign' and domestic service providers.

- Service barriers can comprise things such as restrictions on FDI, restrictions on the recognition of professional qualifications, residency/local presence obligations and limitations on the scope of activities that can be undertaken by foreigners.

- It is considered that there is little in the way of barriers to consumption abroad (such as barriers to Australians taking holidays in India, or to Indian students studying in Australia). Barriers to services delivered via commercial presence (Mode 3 delivery under the WTO's General Agreement on Trade in Services) are

typically barriers to foreign direct investment, and as such were dealt with when estimating the impact of investment liberalisation (see below).

- This leaves barriers to services delivered via cross border supply and movement of persons (such as professionals travelling temporarily to the economy into which they are delivering their services). While service barriers will be of a 'behind the border' and regulatory nature, the effect thereof will be similar to a tariff applied to merchandise imports — the service barriers will act to increase the cost of those service imports and reduce competition in the local market.

- Drawing on published research, the tariff equivalents of barriers to services typically delivered via cross border trade and movement of persons — water transport, communications and professional services — were found to range between 0–10 per cent.

Barriers to investment

- Estimates of barriers to foreign direct investment (FDI) in the service sectors are available for 29 OECD countries and 46 other (largely developing) countries. On a scale of 0 (no restrictions) to 1 (totally restricted), Australia's investment environment is accredited with a 'score' of 0.32, while India is scored at 0.50. These ratings were used for the purpose of modelling the impact of investment liberalisation. They do not, however, capture informal barriers to investment, which can be significant.

- While FDI is important to Australia and of growing importance to India, bilateral FDI between Australia and India is currently modest. India is the destination for a small share (0.03 per cent) of Australia's outward FDI stock, with the value of Australia's FDI stock in India being valued at A$106 million in 2006. Australia is the destination for 0.80 per cent of India's outward FDI stock, with the value of India's FDI stock in Australia estimated to be around A$133 million in 2006.

- Comprehensive liberalisation of bilateral FDI is estimated to see India's stock of investment in Australia increasing by A$291 million, while Australian investment in India is estimated to increase by some A$228 million.

- Despite large barriers to FDI being removed, the estimated changes in the FDI stocks are quite small, reflecting the small underlying bilateral FDI base. Continued economic development in India and greater future integration of the two economies could see investment liberalisation having a much larger impact on bilateral FDI flows than that estimated here.

Macroeconomic impacts of bilateral trade and investment liberalisation

- Given the uncertainty with respect to the pace and scope of (any) liberalisation, it has been assumed for the purpose of modelling that the bilateral trade and investment liberalisation will be comprehensive in scope with all barriers being

removed immediately on commencement of the agreement, assumed to occur on 1 January 2010.

▪ As can be seen from chart 1, an Australia–India Free Trade Agreement is estimated to have a beneficial impact on the GDP of both economies. By 2020, 10 years after the FTA has come into force, Australia's GDP is estimated to be 0.23 per cent higher than otherwise, and 0.15 per cent higher in the case of India.

▪ The fact that Australia benefits relatively more from the FTA reflects the trading relationship and magnitude of trade barriers — India has higher trade barriers than Australia, and India is currently a more important trading partner to Australia than Australia is to India. Removal of high trade barriers in a market that is the destination for 5.3 per cent of Australia's exports provides Australia with relatively greater gains than does removal of already low Australian barriers in a market that is the destination for 0.5 per cent of India's exports.

▪ While Australia is estimated to benefit relatively more than India from the FTA, India benefits more in absolute terms. Over the period 2010–30, Australia is estimated to gain A$43 billion in real GDP in (2008) net present value terms, versus India's real GDP gain of A$46 billion.

1 **Estimated impact of the FTA on real GDP**
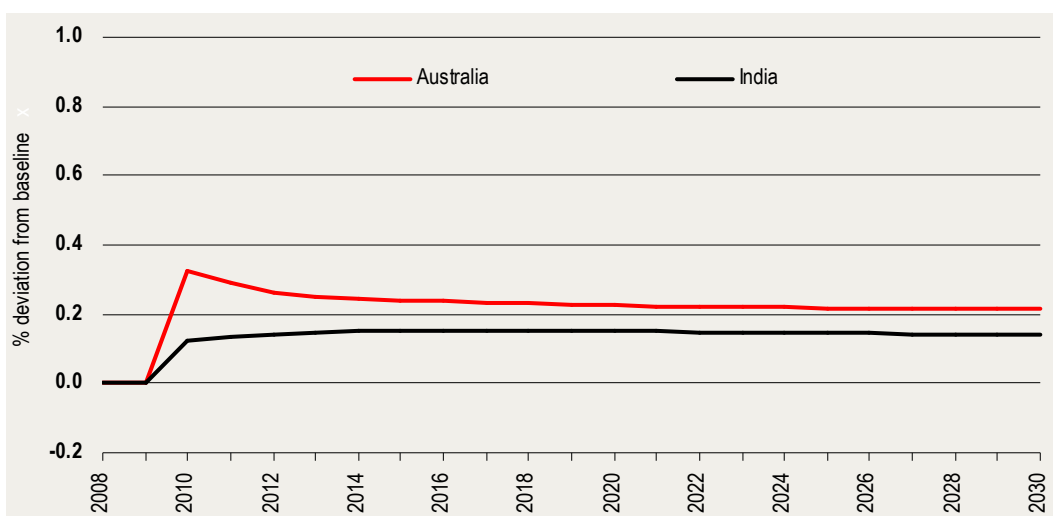
Data source: CIEG-Cubed modelling simulation.

Sectoral impacts of the bilateral trade and investment liberalisation

▪ 70 per cent of Australian sectors and 68 per cent of Indian sectors are expected to experience an increase in output under the FTA.

▪ Dynamic productivity gains, arising from greater import competition, learning by doing in export markets and greater foreign investment, are a key factor in seeing such a high proportion of sectors benefiting under the FTA. Indeed, Australian sectors are estimated to have experienced a productivity gain of 0.13 per cent by 2020 on average, versus 0.17 per cent in the case of the average Indian sector.

About this report

The Australian and Indian Governments have announced that a joint feasibility study will be undertaken to assess the merits of a bilateral free trade agreement (FTA). Economic modelling of the proposed FTA, in conjunction with qualitative analysis, will help to inform officials of both countries as to the potential costs and benefits of a bilateral trade agreement. In doing so, the Australia–India FTA Feasibility Study will provide guidance on the next steps to be taken.

This report provides an independent assessment of the economic impacts of an Australia–India free trade agreement. The global economic model CIEG-Cubed was used to quantify the economic impacts of the FTA. This study forms part of the larger Joint FTA Feasibility Study.

The economic modelling component of the Australia–India FTA Feasibility Study was produced by specialist consultants from the Centre for International Economics. Experts from India's Research and Information System for Developing Countries (RIS) also provided input to the economic modelling. Team members comprised:

- Lee Davis, Associate Director (CIE)
- Kevin Hanslow, Quantitative Analyst (CIE)
- Dr Rajesh Mehta, Senior Fellow (RIS).

The assistance of Dr Andy Stoeckel (CIE) in peer reviewing the report is gratefully acknowledged.

This report was commissioned by the Australian Department of Foreign Affairs and Trade, and was managed and overseen by its Australia–India FTA Study Taskforce.

1   *Barriers to trade*

A trade and investment agreement between Australia and India will likely entail, amongst other things, liberalisation of merchandise and service trade. Such liberalisation will allow Indian producers greater access to the Australia market whilst at the same time it will improve the competitive position of Australia

producers in one of the world's most populous and fastest growing countries. The magnitude of any bilateral trade liberalisation carried out under a trade and investment agreement needs to be kept in perspective — in the main, Australia already has a very open trading environment while India has been pursuing trade liberalisation as part of a wider program of economic reform.

The current barriers to bilateral merchandise and service trade are discussed below.

Tariff barriers to merchandise trade

The Australia tariff schedule identifies 6256 tariff lines (identified at the 8-digit Harmonised System (HS) level). In 2008, nearly 52 per cent of these lines were duty free, with the vast majority of the remaining 48 per cent being levied with an ad valorem tariff. There is a small number of tariff lines (17, or 0.3 per cent of all tariff lines) that are levied with either a tariff rate quota (5 lines) or combination tariff/specific duty (12 lines).

The Indian tariff schedule identifies 12 552 tariff lines (at the 8-digit HS level). In 2008 nearly 3.7 per cent of these tariff lines were duty free, 87.8 per cent attracted an ad valorem duty, with the reaming 8.5 per cent of tariff lines attracting the maximum of a specific duty or ad valorem tariff. Chart 1.1 shows the distribution of tariffs applied in Australia and India on imports from the other country.

Note that India applies its most favoured nation (MFN) rate to Australian imports, while Australia applies its developing country tariff rates to Indian imports. Hence as a developing country, Australia already affords India some tariff concessions relative to those levied on imports from a MFN country. Tariff concessions are in the order of 1–5 percentage points lower than the standard MFN rate and are granted on 13 per cent of tariff lines. It is typically manufactured products — chemicals, metal and metal products, other mineral products, wood and paper products, machinery etc — that receive the tariff concessions. The notable exceptions are imports of textiles, apparel and motor vehicles and parts, for which developing countries receive little in the way of tariff concessions.

1.1   **Distribution of applied tariffs** 2008
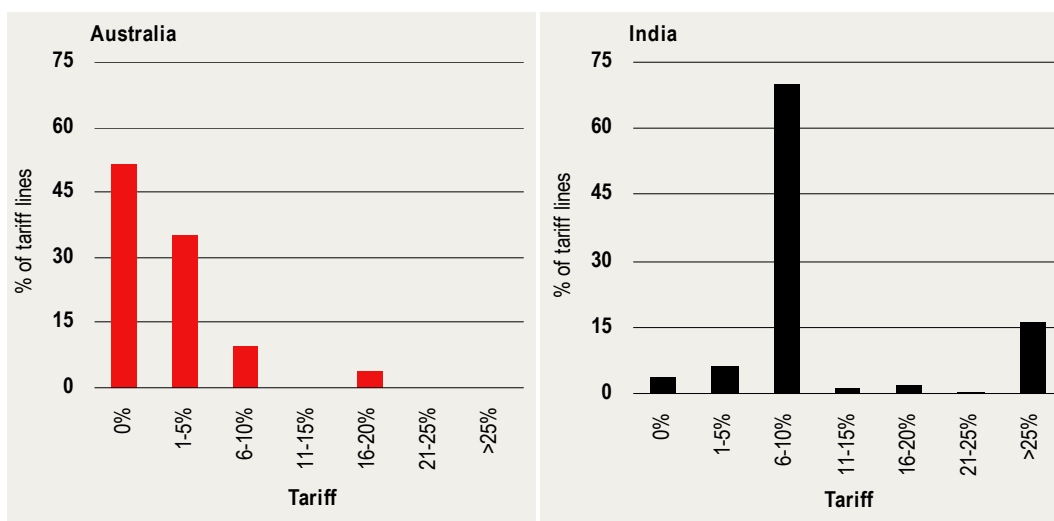
Data source: CIE calculations based on Australia and Indian tariff schedules.

Across all tariff lines in the Australian and Indian tariff schedules, the average (unweighted) 2008 tariff rate levied on imports from the other country was estimated to be 3.2 per cent in Australia and 17.6 per cent in India.

Australia has bound nearly 97 per cent of its tariff lines in the World Trade Organization, with the average bound rate being 10 per cent.[1] With a bound versus applied tariff gap of 6.6 percentage points, Australia could potentially raise its applied tariffs by a substantial margin. This could act as a source of uncertainty with respect to the applied tariff. India has bound over 75 per cent of its tariffs in the WTO, with the average bound tariff being 48.6 per cent.[2] Hence when compared with the average applied tariff of 17.6 per cent, India has the ability to substantially raise its applied tariffs and still remain within its bound tariff rates. The ability to raise its tariffs by such a margin — 31 percentage points on average — represents a large source of tariff uncertainty for exporters to India, as there is no legal impediment to India raising its applied tariffs to 48.6 per cent (on average). Indeed, in its latest Trade Policy Review of India, the WTO notes that:

> During the period under review, the [Indian] authorities have raised tariffs substantially on 27 agricultural products…[3]

It is important to note that the average (applied) tariffs, especially in the case of India, mask substantial variation in rates. For example, the maximum ad valorem tariff rate in Australia during 2008 was 17.5 per cent (some apparel and textile products) while in India 412 tariff lines had a tariff equal to or in excess of 100 per cent.

---

[1] WTO Secretariat 2007, *2007 Trade Policy Review of Australia*, WTO, pp. 31 and 33.

[2] WTO Secretariat 2007, *2007 Trade Policy Review of India*, WTO, pp. 33 and 38.

[3] *Ibid*, page 33.

Tariffs levied on imports from Australia and India

Applied tariff barriers to bilateral merchandise trade are reported in table 1.2. Note that these are the tariffs that exist in 2008, and are not necessarily the tariffs that would be removed (or reduced) under any agreement. For example, Australia has committed to future unilateral tariff reductions; hence some of the tariffs identified in table 1.2 are scheduled to fall regardless of whether Australia and India enter into a trade and investment agreement.[4]

1.2 Applied tariff barriers to bilateral merchandise trade 2008

Sector	Aus. tariff	Indian tariff	Sector	Aus. tariff	Indian tariff
	Per cent	Per cent		Per cent	Per cent
Paddy rice	0.0	80.0	Dairy products	0.7	33.8
Wheat	0.0	37.5	Processed rice	0.0	72.5
Cereal grains nec	0.0	20.5	Sugar	0.0	42.5
Vegetables, fruit, nuts	0.6	33.5	Food products nec	1.5	32.4
Oil seeds	0.5	33.0	Beverage and tobacco	2.1	87.8
Sugar cane, sugar beet	0.0	30.0	Textiles	7.0	39.2
Plant-based fibers	0.0	13.6	Wearing apparel	13.4	27.7
Crops nec	0.1	38.9	Leather products	5.1	10.0
Bovine cattle and sheep	0.0	22.6	Wood products	2.8	9.9
Animal products nec	0.3	23.0	Paper goods, publishing	2.7	9.6
Raw milk	0.0	0.0	Petroleum, coal products	0.0	9.5
Wool, silk-worm cocoons	0.7	7.8	Chemical, rubber, plastic	2.1	9.1
Forestry	0.0	19.2	Mineral products nec	3.0	8.9
Fishing	0.0	28.5	Ferrous metals	1.8	10.0
Coal	0.0	6.2	Metals nec	1.0	5.9
Oil	0.0	7.5	Metal products	4.2	9.8
Gas	0.0	5.0	Motor vehicles and parts	4.9	33.2
Minerals nec	0.4	4.9	Transport equipment nec	2.3	20.5
Bovine meat products	0.0	28.2	Electronic equipment	1.1	4.2
Meat products nec	0.6	33.9	Machinery nec	2.6	7.3
Vegetable oils and fats	1.3	55.1	Manufactures nec	2.2	10.0

Source: CIE calculations based on Australia and Indian tariff schedules, World Trade Atlas import quantities and values, and announced unilateral tariff reductions.

The tariffs to be liberalised under any agreement will therefore depend not only on what is negotiated, but also on the tariffs prevailing at that time.

As already noted, the Australia tariff schedule contains a very small number of tariff lines that are subjected to a tariff rate quota (the Cheese and Curd Quota Scheme) or

---

4 The Australian Government has made commitments to unilaterally lower tariffs on imports of textiles, clothing and footwear, and passenger motor vehicles and parts. The next rounds of TCF reductions are to occur in 2010 and 2015, by which time all TCF tariffs will be at 5 per cent. PMV tariff reductions are next occurring in 2010, when PMV tariffs will be reduced to 5 per cent. It should be noted, however, that the Australian Government has recently commissioned reviews into Australia's commitment to unilaterally lower PMV and TCF tariffs.

a combination tariff/specific duty. The ad valorem equivalent (AVE) of these tariff lines have been calculated and included in the tariffs identified in chart 1.1 and table 1.2.[5]

For the five Australian tariff lines subjected to a TRQ, the applicable tariff is a specific duty, where the duty levied depends on whether imports are within the 11 500 annual quota (A$0.096/kg) or out of quota (A$1.220/kg).[6] The AVE of the five TRQs was determined by deriving, in a partial equilibrium framework, the quantity of imports that would have been demanded in Australia in the absence of the out-of-quota tariffs. The quota and (theoretical) quantity consumed in the absence of the TRQ were then used as weights to derive a weighted average of the in-quota and out-of-quota tariffs. The average tariff rate for the five tariff lines subjected to a TRQ was calculated to be 3.8 per cent.

For four tariff lines, Australia applies the smaller of an ad valorem tariff (5 per cent) or a specific duty (A$0.45/kg). The AVE of the specific duties was determined and then compared with the tariff to determine which rate applied. In all cases the minimum tariff (5 per cent) was found to apply. Finally, for eight tariff lines dealing with the importation of used motor vehicles, Australia levies an ad valorem tariff (currently 10 per cent) and a specific duty of A$12 000 per vehicle. However, the specific duty component of the duty is exempted if the vehicle is a specialist or vintage car, and it is understood that the A$12 000 specific duty is rarely applied.[7] Given this, it is assumed that only the ad valorem component of the duty applies.

The key complexity concerning the Indian tariff schedule is the use of specific duties. Two tariff lines are subjected to a specific duty, while 1069 lines attract the maximum of a specific duty or an ad valorem tariff. The average AVE of the specific duty tariff lines was calculated to be 67 per cent.

The WTO notes that India also provides a large number of tariff exemptions on imported production inputs for certain sectors depending on the use of the import. Tariff exemptions can see the effective applied tariff being lower than the tariff reported in the tariff schedule. For example, the WTO reports that the simple average tariff in the 2006-07 Indian tariff schedule (excluding AVEs) was 15.6 per cent, versus

---

[5] Estimating the AVE of specific duties can be problematic as the tariff equivalence will change over time as the price at which the product enters Australia changes (due to, for example, exchange rate movements or cost saving efficiency gains). The AVE of specific duties has been calculated using the average unit import price over the last three years to derive the tariff equivalence of the specific duty.

[6] Note that the quota only applies to cheese and curd imports from countries that Australia does not have a trade agreement with. Hence cheese and curd imports from New Zealand, PNG, South Pacific Forum Island Countries, Singapore, Thailand and the United States are not covered by the quota.

[7] Of course, the fact that the A$12 000 specific duty is rarely applied might imply that for non specialist/vintage used cars, the specific duty is prohibitive.

15.1 per cent if exemptions that clearly relate to a specific tariff line are taken into account.[8] However, as tariff exemption typically depends on industrial use, it has not been possible to consider/include the tariff exemptions in the analysis undertaken here.

Both Australia and India levy tariffs on the container, insurance and freight (cif) value of imports.

Barriers to services trade

The service sectors account for around 70 per cent of Australian GDP and 55 per cent of Indian GDP, with trends suggesting these proportions will increase.[9] International trade in services is also well established with Australia service exports exceeding A$48 billion in 2007, and Indian service exports approaching A$109 billion (2007 estimate).[10] In 2007 Australia had an A$2 billion trade surplus in services while India had A$60 billion service trade surplus.

International trade in services can occur via four modes, these being:

1. cross border supply, where a Australia individual or firm offers their services to customers outside of Australia (for example, a Australia insurance firm who sells insurance to consumers residing in India);

2. consumption abroad, where an individual or firm provides services to an international visitor (for example, tourism services provided within Australia to visiting Indian tourists);

3. commercial presence, where an Australia service provider sets up operations in a foreign country (for example, an Australia bank opening a branch in India); and

4. movement of natural persons, where an individual or firm offers their services while in the destination country (for example, a lecturer teaching in India while employed by a Australia university).

Barriers to services trade involve restrictions on market access and national treatment that hinder or prevent market entry and price competition between 'foreign' service

---

8   WTO Secretariat 2007, *2007 Trade Policy Review of India*, WTO, pp. 40–42.

9   Data sourced from World Bank World Development Indicators, on line database. Note that these GDP shares exclude the 'quasi' service sectors of construction and electricity, water and gas.

10 Department of Foreign Affairs and Trade 2007, *Trade in Services Australia 2006*, Market Information and Analysis Section, DFAT, June 2007, page 30; and Department of Foreign Affairs and Trade 2007, *The APEC Region: Trade and Investment 2007*, Market Information and Analysis Section, DFAT, September 2007, page 132 (US$ figures converted into AUD). Indian service trade figures for 2007 have been estimated, based on known service trade figures for 2005 (reported in *Trade in Services Australia 2006*) and extrapolated according to reported 5 year trend growth figures.

providers and domestic providers. Barriers to services trade may include one or more of:

- restrictions on foreign direct investment (FDI);
- licensing requirements on management;
- restrictions on the recognition of professional qualifications;
- restrictions on the acquisition of land;
- restrictions on the promotion of products and services;
- nationality/citizenship requirements;
- residency/local presence obligations;
- requirements for joint ventures to be formed with domestic producers; and
- limitations on the scope of activities that can be undertaken.

There is very little in the way of notable/sizeable barriers to bilateral services trade via consumption abroad. For example, there is little in the way of barriers to Australians taking holidays in India, or to Indian students studying in Australia.[11] Given the already open education and tourism markets, barriers to services exported via mode 2 are not considered further.

Barriers to services delivered via commercial presence are typically barriers to FDI. Negotiating bilateral FDI liberalisation can therefore have the same end result as negotiating liberalisation of services delivered via commercial presence (and vice-versa). This issue is considered in chapter 2.

This leaves barriers to services delivered via cross border supply and movement of persons (such as professionals travelling temporarily to the economy into which they are delivering their services). While service barriers will be of a 'behind the border' and regulatory nature, the effect thereof will be similar to a tariff applied to merchandise imports — the service barriers will act to increase the cost of those imports and reduce competition in the local market.

Ultimately, the impact of a reduction in barriers to services trade between Australia and India will depend on:

- the level of existing restriction — treatment that hinders/prevents trade and price competition between foreign service providers and domestic providers; and

---

[11] It should be appreciated that while there might not be barriers to, for example, an Indian student obtaining an Australian tertiary university, there may be barriers to that now foreign trained student practising in India. This latter barrier is better understood as a barrier to the movement of natural persons (mode 4) and not a barrier to consumption abroad (mode 2) per se.

▪ the potential for market penetration — whether service providers in the partner country have a comparative advantage in supplying services in the sector through to the ability to take advantage of a reduction in barriers to services trade.

Therefore, even if restrictions in a particular sector are extremely high, if the partner country is not in a position to further penetrate that sector, then gains from services trade (and/or investment) liberalisation will be limited.

Barriers to cross border supply and movement of persons

In theory, services such as banking and insurance could be provided across borders. For example, there are no barriers in Australia preventing Australians taking a loan from an Indian bank, or being insured by an Indian insurer. However, logistical considerations mean that such trade is highly improbable. Historically, cross border supply is limited to services such as telecommunications and (maritime and air) transport. However, advancements in ICT and other technology have meant that cross border supply is now both feasible and important for many sectors such as professional services, financial services and education.

A tariff equivalence of barriers to services delivered via cross border supply or movement of persons has been estimated drawing on research undertaken by the Australian Productivity Commission.[12] This research saw frequency indexes being constructed for service restrictions, with the associated price and cost impact thereof being determined econometrically.

The estimated tariff equivalence of barriers to services delivered via cross border supply or movement of persons are reported in table 1.3. Although frequency indexes have been calculated for the majority of service industries, some industries do not have associated price impact estimates. For these industries, the barrier impact was estimated by one of two approaches. The first approach saw an average relationship being established between the index and price impact across (a minimum of) 15 countries, and then application of that price–index relationship to the service industry of interest (for which a frequency index existed). Alternatively, the barrier impact was estimated by taking a ratio of frequency indexes for the industry of interest to a benchmark service industry, and then multiplying that ratio by the known cost impact for the benchmark industry.

---

[12] See Doove, S., O. Gabbitas, D. Nguyen-Hong, and J. Owen, 2001, *Price effects of regulation: International air transport, telecommunications, and electricity supply*, Productivity Commission, Staff research paper, AusInfo, Canberra, October; Nguyen-Hong, D., and R. Wells, 2003, *Restrictions on trade in education services: Some basic indexes*, Productivity Commission, Staff working paper, AusInfo, Canberra, October; Nguyen-Hong, D., 2000, *Restrictions on trade in professional services*, Productivity Commission, Staff research paper, AusInfo, August; and Kalirajan, K., 2000, *Restrictions on trade in distribution services*, Productivity Commission, Staff working paper, AusInfo, Canberra, August.

Barriers to cross border supply or movement of natural persons typically take the form of barriers that impact on the price, demand for or availability of foreign services provided from abroad, or restrictions on the nationality of professionals who can provide services. For example:

- Australia requires that at least 80 per cent of all (analogue) free-to-air television programming between the hours of 6:00 am and midnight be of Australian origin, thereby potentially reducing the demand for foreign television material;

- legal services in India can only be provided by natural persons who are citizens of India and who are on the advocates roll in the state where the service is to be provided (advocate eligibility requires a candidate to be a citizen of India or a country that allows Indian nationals to practise on a reciprocal basis, hold a degree in law from a university recognised by the Bar Council of India, and be at least 21 year of age); and

- foreign doctors and nurses are not allowed to practise in India (except for charitable purposes), yet foreign trained Indian doctors can practise in India after being registered.

Note that only those barriers that can be addressed bilaterally are considered for modelling purposes. This raises the issue of air transport services (passenger and freight movements). Australia has an Air Services Agreement in force with India. Air transport services could, in theory, be liberalised within an FTA. However, in reality most FTAs do not address liberalisation of air transport services. For example, in reviewing 12 major free trade agreements that have taken place around the world, Ochiai found that most agreements do not go beyond commitments imposed by the WTO's General Agreement on Trade in Services.[13] Air transport services between Australia and India have therefore not been addressed in the modelling.

1.3   Barriers to services trade via modes 1 and 4

Sector	Australia	India
	Per cent	Per cent
Maritime transport	5.2	7.2
Telecommunications	0.0	23.2
Other business services[a]	2.1	1.2

a Includes professional services such as accountancy, architecture, engineering and legal services.
Source: CIE calculations/estimates based on Productivity Commission research.

Trade liberalisation and dynamic productivity

Examination of the performance of economic models leads to the observation that they typically tend to under predict the gains resulting from trade liberalisation. The

---

13 Ochiai, R., P. Dee, and C. Findlay, 2007, *Services in free trade agreements*, RIETI Discussion paper series 07-E-015, www.rieti.go.jp/jp/publications/dp/07e015.pdf accessed 11 April, 2007.

current thinking is that economic models typically under predict the gains associated with trade liberalisation due to ignoring effects related to productivity linkages, pro-competitive effects and investment dynamics. These effects have been termed the 'dynamic productivity' effects of trade liberalisation. Research into dynamic productivity is increasing, the latest research (by the IMF) suggesting that reform of product markets, including trade liberalisation, is one factor that helps to explain Australia's strong productivity performance since the early 1990s.[14]

It is generally accepted that countries can achieve allocative efficiency gains through trade liberalisation. Allocative gains — arising through the (re)allocation of resources to the efficient sectors of the economy — represent the traditional theory on the benefits from trade liberalisation. Consequently, it is these gains that are typically estimated and reported.

However, trade reform also sees an increase in import competition, thereby encouraging domestic producers to pursue productivity gains, either though the use of better technology and business practices, or through innovation and/or quicker adoption of new ideas. Improved domestic efficiency and liberalisation of other countries' trade barriers will improve the competitive position of exporters, and greater exports may also be associated with productivity gains. There can be learning by exporting where the experience and knowledge gained in export markets can be translated into productivity gains.[15] Exporting may also allow producers to expand output and exploit economies of scale, thereby lowering average production costs.[16]

Finally, a 'more efficient' economy will likely open the way for new foreign investment opportunities leading to transfer of technical know-how and capital accumulation, which can in turn stimulate productivity growth and lead to higher economic growth.

Ignoring the relationship between trade and investment liberalisation and dynamic productivity gains may therefore see an understatement of gains from trade liberalisation. Following the approach of Itakura, Hertel and Reimer (2003), dynamic productivity gains arising from increased imports, exports and foreign direct investment due to Australia and India undertaking bilateral trade and investment liberalisation have been included in the economic modelling, specifically:

▪ increases in imports — productivity gain is a function of the percentage change in relative prices of imports and local production and the ability of firms to absorb a

---

[14] See Tressel, T., 2008, *Does Technological Diffusion Explain Australia's Productivity Performance?*, IMF Working Paper, WP/08/4.

[15] Aw, B.A., Chung, S. and Roberts, M.J. 2000, 'Productivity and Turnover in the Export Market: Micro-level Evidence from the Republic of India and Taiwan (China)', *The World Bank Economic Review*, 14(1), pp. 65–90.

[16] Itakura, K., Hertel, T.W. and Reimer, J.J. 2003, *The Contribution of Productivity Linkages to the General Equilibrium Analysis of Free Trade Agreements*, GTAP Working Paper 23, March 2003.

reduction in mark-ups (prices) in order to maintain output (the elasticity of domestic price mark-up with respect to foreign prices, assumed to be 0.2);

- increases in exports — exporters are assumed to be 8 per cent more efficient than domestically orientated firms, hence if the change in output exported exceeds the change in output sold domestically, productivity of the sector rises (productivity gain depends on relative changes in output exported/sold domestically and share of output exported/used domestically); and

- increases in foreign direct investment — a 1 per cent increase in sector FDI sees a 1.4 per cent increase in sector productivity.

2   *Investment liberalisation*

Investment liberalisation is playing an increasingly important role in negotiations aimed at international integration. Bilateral trade and investment liberalisation between Australia and India may see removal of some barriers to bilateral investment. This chapter assesses the current barriers to investment in Australia and India, identifies areas where barriers may be removed and provides a basis for modelling the impact of these changes on investment flows and the economy.

Current barriers to investment

Barriers to investment can come in a number of forms and are typically spread unevenly across industries. The Australian Productivity Commission, OECD and UNCTAD have explored quantification of barriers to foreign direct investment (FDI).[17] Australia's investment barriers are spread relatively evenly across limits on foreign ownership, investment screening requirements and operational freedom, while Indian barriers are mainly limits on foreign ownership. Chart 2.1 shows barriers to FDI in the service sectors for various economies. It should be noted that chart 2.1 reflects barriers to FDI as reported to the OECD by the assessed countries themselves. Hence there could be 'informal' impediments to FDI not captured in the figures, which anecdotal evidence suggests could be high in India.

FDI barrier data is available for 29 OECD countries and 52 other (largely developing) countries. In terms of the OECD countries, the OECD rates Australia as having the second most restrictive investment environment for services. Of the 52 other economies, India is estimated to have the 45th most restrictive FDI environment.

Australia's investment barriers

Several firms and industries in Australia are considered to be strategic or in some way sensitive. As a result, there are established policies and regulations that protect these firms and industries in particular ways. Reflecting these sensitivities, Australia

---

17 For example, see Hardin, A. and L. Holmes 2002, 'Measuring and Modelling Barriers to FDI', in Bora, B. (ed.) *Foreign Direct Investment: Research Issues*, Routledge, London; Golub, S. 2003, 'Measures of Restrictions on Inward Foreign Direct Investment for OECD Countries', *OECD Economic Studies* No. 36, 2003/1; and UNCTAD 2006, 'Measuring Restrictions on FDI in Services in Developing Countries and Transition Economies', UNCTAD/ITE/IIA/2006/1, United Nations, Switzerland.

2.1 **FDI restrictions in regional economies**[a] Service sectors

Restriction index

1.0
0.8
0.6
0.4
0.2
0.0

■ Equity ■ Screening ■ Operational

Japan, Korea, EU(22), United States, New Zealand, Australia, China, India, Thailand, Indonesia, Philippines
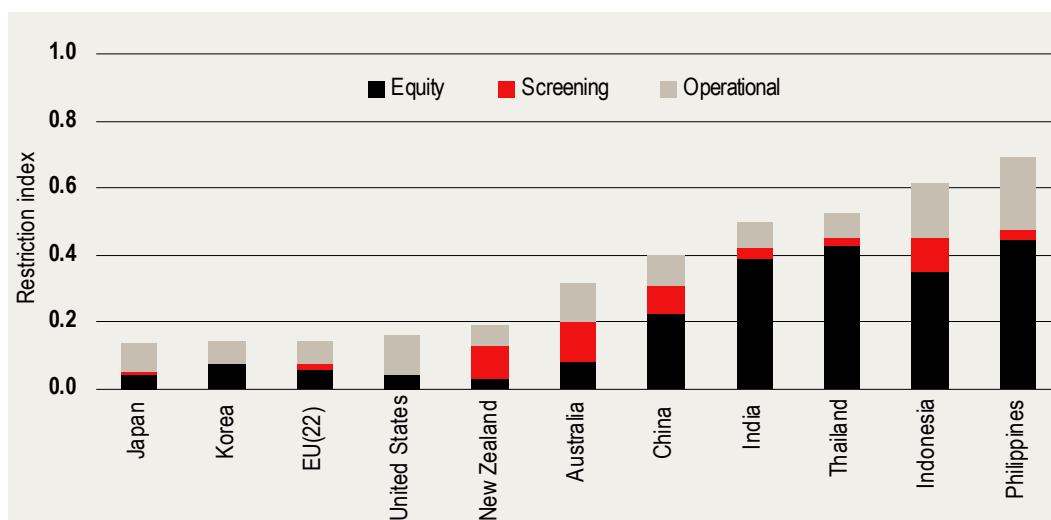
[a] The indicator ranges from 0 (no restrictions) to 1 (totally restricted).

Data source: Stephen Golub personal communication 13 March 2007, unpublished data (data underlying paper OECD 2006, *OECD's Regulatory Restrictiveness Index: Revision and Extension to More Countries*, OECD ECO/WKP(2006)53, OECD, Paris) and UNCTAD, personal communication 29 June 2006, unpublished data (data underlying paper UNCTAD 2006, *Measuring Restrictions on FDI in Services in Developing Countries and Transition Economies*, UNCTAD/ITE/IIA/2006/1, United Nations, Switzerland).

has relatively high FDI restrictions, especially when compared with other high income OECD countries. Restrictions range from limits on foreign ownership in certain sectors to modest screening procedures for a wide range of investment proposals. Across all service sectors, it is estimated by the OECD that 26 per cent of Australia's restrictions on FDI result from limits on foreign ownership, 37 per cent from screening requirements and 36 per cent from limits to operational freedom.

Restrictions that result in a more binding barrier to entry are those that apply to investments in sensitive sectors. Australia maintains specific limits on, or requirements relating to, foreign investment in:

▪ newspapers;

▪ broadcasting;

▪ Telstra;

▪ Commonwealth Serum Laboratories (CSL);

▪ Qantas Airways Ltd and other Australian international airlines;

▪ federal leased airports;

▪ urban land; and

▪ shipping.

Notification to the Foreign Investment Review Board (FIRB) and possible objection procedures for foreign investment include those for:

▪ investments by foreign persons in existing Australian businesses in the media sector including direct (that is, non-portfolio) investment irrespective of size and portfolio investments of 5 per cent or more;

- investments by foreign persons in existing Australian businesses of $50 million or more in:
    - the telecommunications sector;
    - the transport sector, including airports, port facilities, rail infrastructure, international and domestic aviation and shipping services provided either within or to and from Australia;
    - the manufacture or supply of training, human resources or military goods, equipment or technology to the Australian or other defence forces;
    - the manufacture or supply of goods, equipment or technologies able to be used for a military purpose;
    - the development, manufacture or supply of, or provision of services relating to, encryption and security technologies and communication systems; and
    - the extraction of (or where rights to extract are held) uranium or plutonium, or the operation of nuclear facilities;
- direct investments by foreign governments or their agencies, or companies with a greater than 15 per cent direct or indirect holding by a foreign government or agency, or otherwise regarded as controlled by a foreign government, irrespective of size; and
- acquisitions of interests in Australian urban land (with the exception of acquisitions of interests in developed commercial real estate).

India's investment barriers

From chart 2.1 it can be seen that there is a notable increase in the magnitude of barriers to FDI (in the service sectors) between OECD and developing regional economies, with limits on foreign ownership being particularly prevalent in the latter. In the case of India, limits on foreign ownership account for 78 per cent of estimated FDI barriers (in the service sectors), screening requirements account for 7 per cent of barriers, and operational restrictions for 15 per cent of barriers.

The Indian economy has being growing at around 6 per cent per annum since the early 1990s, with the government aiming for annual growth of 8–10 per cent over the longer term.[18] Recognising that a rapidly growing and modernising economy needs to be underpinned by efficient infrastructure (energy, communications etc) and a modern services sector, the Indian Government has been liberalising its foreign investment regime. For example, the Indian oil and gas (exploration, production and marketing) and electricity (generation, transmission and distribution) sectors are open to full foreign ownership.

---

[18] WTO Secretariat 2007, *2007 Trade Policy Review of India*, WTO, page 1.

Liberalisation has seen most sectors of the Indian economy being open to some FDI, although FDI is still prohibited or severely restricted in certain politically sensitive sectors. The United States Trade Representative also reports that while 100 per cent equity is possible in theory, regulatory hurdles mean that in practice 100 per cent foreign ownership is often unobtainable.[19] The increase/removal in FDI equity restrictions has been associated with a large increase in FDI inflows, which increased from US$237 million in 1990 to US$16.8 billion in 2006.[20] While US$16.8 billion is a large figure, it is equivalent to only 1.9 per cent of India's GDP in 2006, indicating that more can be done in terms of liberalising India's FDI environment. (The comparable 2006 FDI inflow figure for Australia was 3.1 per cent of GDP.)

Despite the almost two decades of investment liberalisation, India still maintains some explicit barriers to FDI, most notably:

- a total prohibition of FDI in agriculture, retail trading (in other than single brand outlets), the legal service sector, gambling, atomic energy, railways and real estate;

- FDI in the insurance sector is limited to 26 per cent (of a firm's paid up capital);

- FDI in the private banking sector is limited to 74 per cent of the capital of the private bank, and a requirement for Reserve Bank of India to approve ownership of 5 per cent or more of an Indian private bank. Foreign banks are allowed to establish wholly-owned subsidiaries, but must divest their ownership stake down to 26 per cent, foreign banks are also subjected to direct lending and asset allocation requirements;

- foreign equity restrictions in audiovisual services, ranging between complete prohibition of FDI (in FM radio broadcasting) to a 49 per cent FDI limit (in direct to home broadcasting and cable operators);

- FDI in the telecommunications sector is limited to 74 per cent for fixed line, cellular national and international long distance calls service (investment in excess of 49 per cent needs to be approved by the Foreign Investment Promotion Board), and the majority of directors on the Board must be resident Indian citizens; and

- foreign ownership of internet service providers is limited to 74 per cent.

Australia–India bilateral investment liberalisation

This study is an ex ante analysis of the possible gains of trade and investment liberalisation between Australia and India. As such, the extent and patterns of the trade and investment liberalisation that would occur under any future liberalisation

---

[19] United States Trade Representative 2008, *2008 National Trade Estimate on Foreign Trade barriers − India*, USTR.

[20] India's FDI inflow statistics taken from the UNCTAD Foreign Direct Investment Database (online).

is unknown. The sectoral patterns of investment barriers for Australia and India give some guidance as to areas where the largest investment liberalisation could occur (outlined in chart 2.2).

Recent trade and investment agreements entered into by Australia and India might provide some insight into the likely pattern and extent of investment liberalisation between Australia and India.

A major element of Australia's investment liberalisation under the recently (January 2005) commenced Australia–United States Free Trade Agreement was the increase in the notification limit for foreign investment from the United States. Instead of foreign investment greater than A$50 million needing to notify the Foreign Investment Review Board, this threshold was raised to A$800 million (to be indexed over time). This was an across the board change in non-sensitive sectors. As screening requirements represent Australia's largest source of OECD identified FDI restrictions (refer back to chart 2.1), the changes under AUSFTA should see Australian restrictions on FDI sourced from the United States being substantially reduced.

The Indian Government has signed Bilateral Investment Promotion & Protection Agreements (BIPAs) with 63 countries, 50 of which have already entered into force. A BIPA was ratified with Australia on 4 May 2000. The BIPAs address the 'standard' areas of nationalistic treatment of foreign investment; MFN treatment for foreign investment and investors; free repatriation/transfer of returns on investment; recourse to domestic disputes resolution and international arbitration for investor-state and state-state disputes; nationalisation/expropriation only in public interest and on a non-discriminatory basis etc.

2.2 **FDI barriers in Australia and India** Service sectors
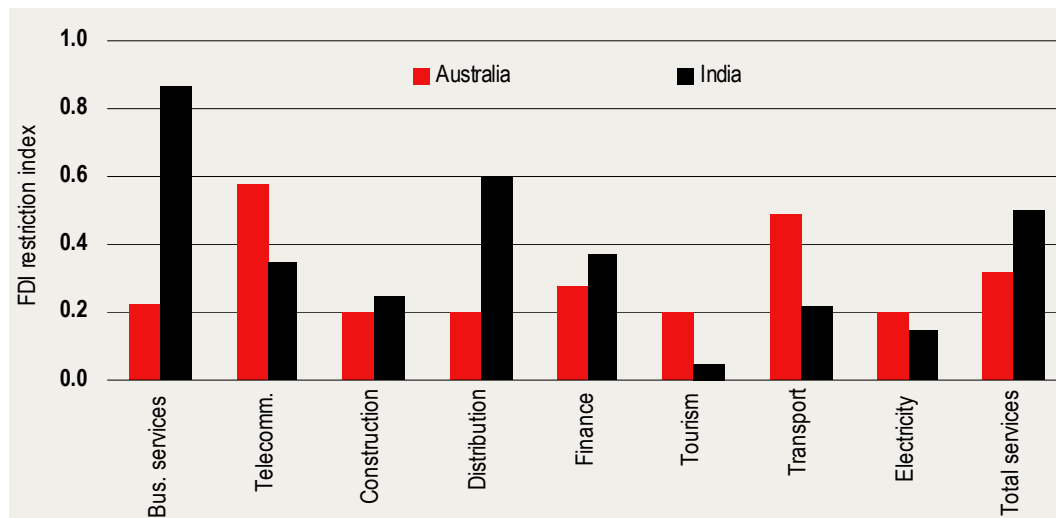
Data source: Golub personal communication 13 March 2007, unpublished data (data underlying OECD 2006, *OECD's Regulatory Restrictiveness Index: Revision and Extension to More Economies*, OECD ECO/WKP(2006)53, OECD, Paris).

What are the effects of investment liberalisation?

Lowering investment barriers can have a number of impacts.

1. Increasing the allocative efficiency of investment. That is, investment can move to areas where it has the highest marginal product of capital or can generate the greatest value of production. This can happen by reducing discrepancies in the marginal product of capital between different countries. Alternatively, it can happen if investment is attached to particular skills and technology, in which case these attributes are allocated more efficiently. Improvements in allocative efficiency can drive up productivity.

2. Lowering the cost of investment through increasing the pool of available funds. A reduction in investment barriers may effectively increase the supply of funds for Australia and Indian investment and therefore lower the cost of obtaining those funds. Note that there could also be increase in the demand for funds through the impacts noted above.

3. Lowering the transaction costs of investment barriers. For instance, the requirement to notify the Foreign Investment Review Board in Australia of a proposed foreign investment imposes a (small) transactions cost on that investment.

Note that like import competition, the potential for investment to move between countries can lead to benefits without any change in investment flows. That is, removing investment restrictions may increase contestability.

Quantifying the impact of investment liberalisation

Quantifying the impact of investment liberalisation on investment and welfare is not an easy task. Empirical work has found wide estimates of the impact of trade and investment agreements on investment (see box 2.3). This reflects a number of factors.

▪ Isolating the impact of any investment liberalisation from the numerous other events going on in the economy is inherently difficult.

▪ Quantifying the size of the liberalisation is difficult. Because each liberalisation is different, as are countries' starting positions, the most robust work would need to quantify the differences in the extent and patterns of liberalisation between different agreements. There has only been limited research into quantifying investment barriers, and little to quantify the extent of investment agreements on these barriers.

▪ There may be many other aspects of the economies that mitigate or enhance the impact of investment liberalisation. For instance, the structure and size of the economies and savings patterns could all be important.

2.3 Empirical estimates of the relationship between investment barriers and investment

The literature has not been able to precisely estimate the impact of trade and investment liberalisation on FDI, but some broad conclusions have emerged:

- agreements tend to lead to large increases in FDI flows to the developing country and moderate increases to developed countries (Mexico and NAFTA);

- free trade agreements typically have some impact on FDI flows; and

- investment liberalisation can lead to extra impacts on FDI flows, beyond that arising from trade liberalisation.

Despite the difficulties of empirical work, the literature gives us a broad handle on the magnitude of the impact of trade and investment liberalisation on FDI flows. These estimates range from little impact (for straight investment treaties), to a 25 per cent increase in FDI inflows in Mexico following NAFTA.

Estimates include:

- an investment and trade liberalisation agreement is associated with a 26 per cent increase in FDI stock, based on a number of liberalisation agreements;[21]

- NAFTA was associated with a 0.6 to 1.6 per cent increase in FDI inflows for the US, Canada and Mexico;[22]

- NAFTA was associated with a 25.4 per cent increase in FDI inflows to Mexico[23] and

- bilateral investment treaties have little effect on FDI.[24]

The literature also suggests that in agreements between developed and developing countries, it is the developing country that experiences the larger FDI change.[25]

Other strands of evidence also point to the potential for increases in FDI to follow trade and investment liberalisation agreements. For example, it is found that investment promotion agencies can increase FDI.[26] In many respects a trade and liberalisation agreement can play a similar role through the dissemination of information.

---

[21] Yeyati, Levy E., Stein, E. and Daude, C. 2002, 'The FTAA and the location of FD*I*', Paper prepared for the IDB-Harvard Conference on the FTAA in Punta del Este, Uruguay, December 7.

[22] MacDermott, R. 2004, 'NAFTA and Foreign Direct Investment', mimeo, Western Illinois University.

[23] Sanchez, M. and Karp, N. 2000, 'NAFTA's economic affects on Mexico', Grupo Financiero Bancomer draft paper.

Current direct investment between Australia and India

Current bilateral FDI flows between Australia and India are modest at best.

Inward FDI is quite considerable for Australia with an FDI stock to GDP ratio of 32 per cent.[27] However, India is not an important source of FDI for Australia, with just 0.04 per cent of Australia's inward FDI stock in 2006 estimated to come from India (see left hand panel of chart 2.4). This FDI stock is slightly more important from India's perspective, making up nearly 0.8 per cent of India's total outward FDI stock in 2006. It is estimated that the stock of Indian FDI in Australia was estimated to be worth around A$130 million in 2006.[28]

India is the destination for a likewise small share (0.03 per cent) of Australia's outward FDI stock in 2006. From India's perspective, the inward FDI stock from Australia is marginally more important, accounting for 0.15 per cent of India's total FDI stock in 2006 (see right hand panel of chart 2.4). In 2006, the Australian FDI stock in India was valued at A$102 million.

Total FDI in India is not currently as important as is the case for Australia — India's FDI to GDP ratio is currently 5.6 per cent, versus 32 per cent in the case of Australia. However, FDI is rapidly increasing in India of late. Over the period 1996 to 2006, the stock of FDI in India grew at the average annual rate of 20 per cent (versus nearly 8 per cent in Australia). As of 2006, the inward FDI stock of Australia was US$246 billion versus nearly US$51 billion in India (see chart 2.5).

[24] Hallward-Driemeier M. 2003, 'Do Bilateral Investment Treaties Attract FDI? Only a bit…and they could bite', World Bank, *Development Economics Research Group* paper.

[25] Blomstrom, M. and Kokko, A. 1997, 'How foreign investment affects host countries', World Bank *Policy Research Working Paper* No. 1745.

[26] Morisset, J. and Andrews Johnson, K. 2004, 'The effectiveness of promotion agencies at attracting foreign direct investment', Foreign Investment Advisory Service, *Occasional Paper* No.16

[27] Note that FDI is a stock and GNP is a flow.

[28] For reasons of confidentiality, the ABS does not identify the Indian stock of FDI in Australia. However, the ABS does identify the total stock of Indian investment in Australian (A$608 in 2006). Total Indian investment in Australia has been broken down into the component investment parts — foreign direct, portfolio and other investment — by assuming that Indian investment in Australia has the same profile as global investment in Australia. In 2006, nearly 22 per cent of total global foreign investment in Australia was FDI. A$608 million multiplied by 22 per cent sees an estimated Indian FDI stock in Australia of around $130 million.

2.4   **Bilateral Australia–India FDI**

Indian FDI in Australia

Australian FDI in India
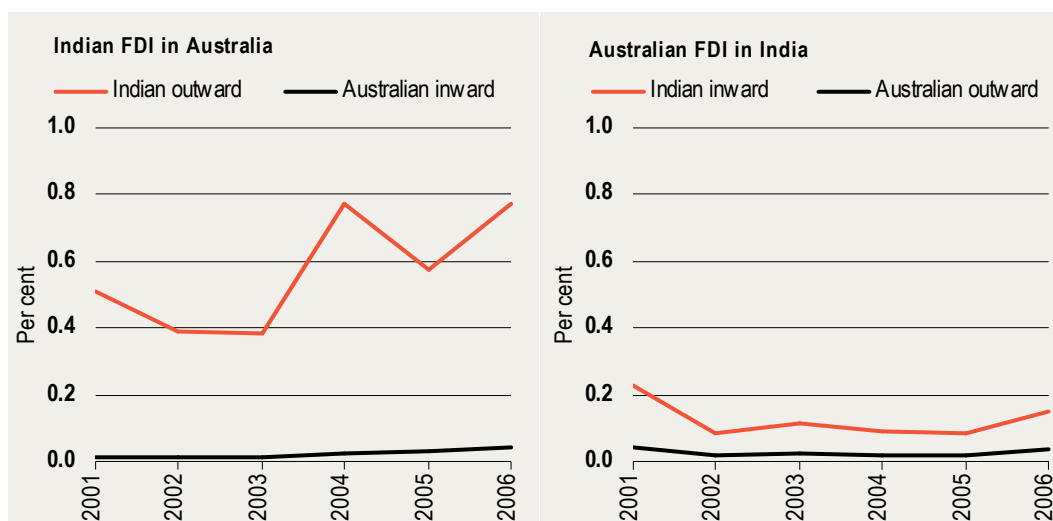
Data source: ABS 5352.0 (various years), UNCTAD Foreign Direct Investment Database (online) and CIE calculations.

2.5   **FDI stocks in Australia and India**

FDI stock (inward position)

FDI stock as a share of nominal GDP
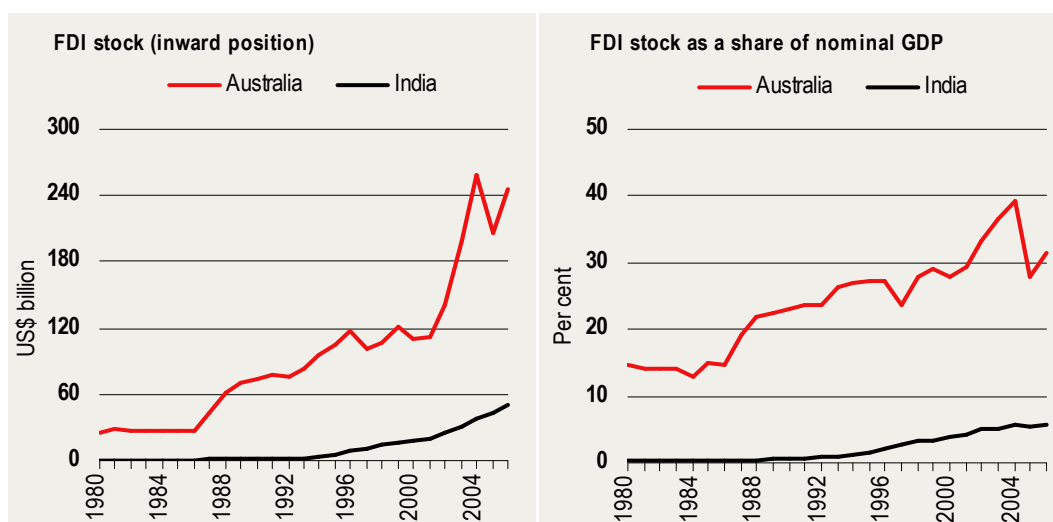
Data source: UNCTAD Foreign Direct Investment Database (online) and World Bank World Development Indicators Database (online).

Modelling Australia–India investment liberalisation

The methodology used in modelling the impact of investment liberalisation considers two effects of investment liberalisation.

1.   An increase in foreign investment following liberalisation.

2.   An increase in dynamic productivity through FDI churn and improved capital allocation, and the transfer of skills, know-how and technology associated with that FDI.

Table 2.6 shows the key assumptions made in the modelling of investment liberalisation.

2.6 **Assumptions used to condition the analysis**

Area	*Assumption*
Reduction in investment barriers	All barriers to bilateral FDI are removed.
Increase in FDI stock from reduction in investment barriers	From India to Australia: 218 per cent based on upper panel of chart 2.7 From Australia to India: 224 per cent based on lower panel of chart 2.7
Sectoral pattern of investment change due to lowering of investment barriers	Modelled according to capital intensive nature of sectors.
Timing of increase in investment	Modelled according to capital depreciation.

Source: CIE.

Increase in investment

As is to be expected, there is a broad relationship between investment barriers and the level of inward investment. As can be seen in chart 2.7, and typically speaking, the stock of FDI is greater the lower the investment barriers. This is to be expected.

FDI depends on numerous factors, including macroeconomic and political stability, market opportunities, high quality infrastructure, supplier access and the presence of a skilled work force. (Note that there are other factors that are important in determining the FDI stock, chief amongst which is a country's domestic saving and investment patterns.) Hence even if a country has no investment barriers, the FDI inward stock will be low if the country's performance in these other areas is lacking. Generally speaking, high income countries typically have good track records in these other areas. Removal of investment barriers will therefore likely be associated with a larger increase in FDI in high income countries than in say non-OECD countries (which have other impediments to FDI).

As this is an ex ante analysis of liberalisation between Australia and India, there is little precise information on the extent and patterns of investment liberalisation. A number of assumptions are made to quantify the impact of investment liberalisation, and the magnitude of impacts is conditional on these assumptions.

For the purpose of the economic modelling, and not wanting to second guess what might be achieved in any Australia–India negotiations, it has been assumed that both Australia and India remove all barriers to FDI originating in the other country.

Running regressions of the ratio of inward FDI stock (in the service sectors) to GDP (from the service sectors) against investment barriers (in the service sectors) allows a relationship between reduction in investment barriers and FDI stock to be established (see chart 2.7 for relationship). The relationship shows that removal of all of Australia's investment barriers would increase the inward FDI stock to GDP ratio

by 218 per cent if the liberalisation occurred on a multilateral basis.[29] For India, the increase in the inward FDI stock is estimated to be 224 per cent (once again, if the liberalisation was comprehensive and multilateral in nature).

2.7 **Investment barriers and FDI** Service sectors
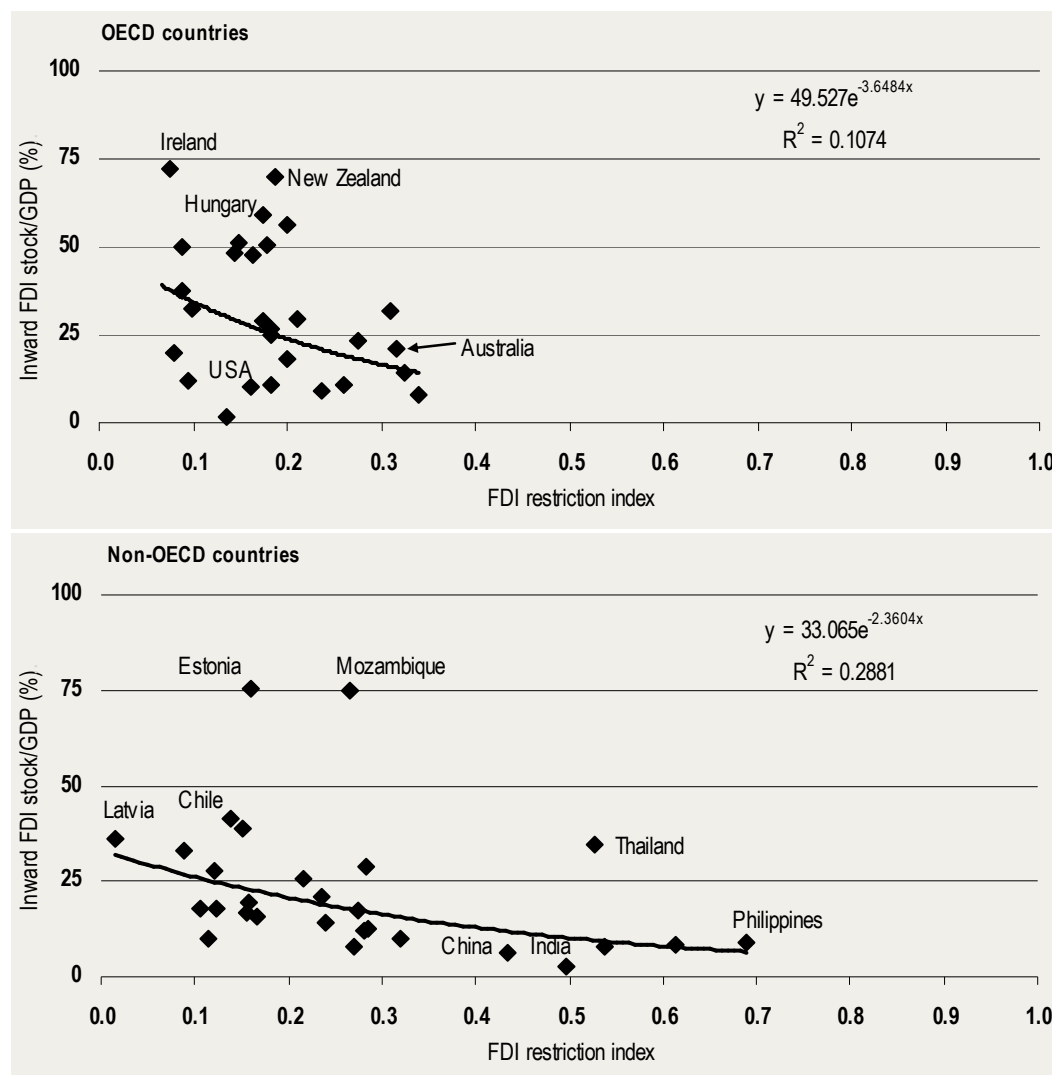
Data source: Stephen Golub personal communication 13 March 2007, unpublished data; UNCTAD personal communication 29 June 2006, unpublished data; World Bank World Development Indicators online database; OECD 2007, *OECD In Figures: 2007 Edition*, OECD, Paris; and CIE calculations.

Trade and investment liberalisation between Australia and India would be bilateral in nature. India accounts for roughly 0.04 per cent of Australia's inward FDI stock, so a 218 per cent increase in this share suggests a total increase in Australia's inward FDI stock of 0.09 per cent (equivalent to A$291 million). Using the same approach,

---

[29] Note that the calculated increase in FDI stock should, strictly speaking, occur only in the service sectors (as only barriers for FDI in these sectors have been quantified). However, in the absence of data pertaining to the other sectors, it is assumed that an equal FDI increase occurs in other sectors of the economy.

the increase in India's inward FDI stock is estimated to be 0.34 per cent (around A$228 million). While Australia and India have quite high barriers to FDI, the estimated change in each country's FDI stock following investment liberalisation is quite small. This reflects a 'low base problem' — Australia and India are not important destinations for FDI originating in the other country. Hence even though large barriers to investment are being removed, the estimated change in FDI stocks is quite small by virtue of the small underlying bilateral FDI base. Continued economic development in India and greater future integration of the two economies could see investment liberalisation having a much larger impact on bilateral FDI flows than that estimated here.

The case for downgrading the effect of bilateral investment liberalisation to reflect the share sourced from the other country is not as clear-cut as it first appears. Under an Australia–India agreement, it is likely that capital from other countries could flow through India and into Australia, and likewise through Australia and into India. That is, unlike for goods flows, country of origin restrictions are very difficult to enforce for capital flows. However, in this case, India should already be able to move capital through other countries that have agreements with Australia, such as the United States, Singapore and Thailand. Because the importance of these factors is not well understood, the increase in the inward FDI stock associated with investment liberalisation is kept at 0.09 per cent for Australia and 0.34 per cent for India.

The impact of lowering investment barriers will not occur instantly, as assets are not easily moveable between activities. For instance, while new capital is able to move almost costlessly, capital already invested in plant or machinery is typically unable to be transferred to another use. Instead, investment patterns change as the plant, machinery etc depreciates and is not replaced. This is endogenously accounted for within the CIEG-Cubed global economic model.

The increase in FDI captures only the impact of investment liberalisation. Foreign investment would also increase in response to trade liberalisation and increases in dynamic productivity, and overall improvements to the investment climate (such as streamlining regulation, infrastructure improvements, greater government transparency and improved governance, and so on). Furthermore, the exogenous increases in investment will drive greater dynamic productivity gains and hence see further increases in investment in response to the improved productivity.

The investment liberalisation that has been modelled assumes the total liberalisation of bilateral FDI flows. In the event that any investment liberalisation is smaller than that modelled, there will be likewise smaller effects on foreign investment flows.

3   Assessing the economic impacts of liberalisation

In negotiating bilateral trade and investment liberalisation, Australia and India must decide on the rate at which trade and investment barriers are removed and the range of goods, services and sectors subject to trade and investment liberalisation. The pace and scope of liberalisation will be key factors in determining the magnitude of any economic gains arising from the liberalisation.

As yet, neither Australia nor India has tabled, as a starting point for future negotiation, a program of trade and investment liberalisation. Hence at this point in time we are not in a position to know what the pace and scope of trade and investment liberalisation under any resulting agreement may be. A range of modelling simulations have therefore been conducted.

Before discussing the trade liberalisation scenarios investigated, the model used to evaluate the economic impacts is briefly discussed.

The economic model used

The CIEG-Cubed global economic model has been used to estimate the impacts of Australia and India entering into a bilateral trade and investment agreement.

CIEG-Cubed is the most appropriate global economic model currently available with which to analyse the welfare implications of a trade and investment agreement. The advantages of using CIEG-Cubed include:

- identification of trade flows between countries/regions;
- identification of investment flows between countries/regions;
- incorporates an integrated financial sector (comprising money, bonds, interest rates, lending, borrowing, expectations, financial flows, and wealth);
- it is a fully dynamic model that can capture the time path of adjustment for each of the economies/regions modelled;
- consumers and producers are allowed to borrow and lend money over time, with decision influenced by the return on capital versus other assets;
- inclusion of adjustment costs and expectations; and

- identification of up to 57 sectors of production and 87 countries.[30]

The GTAP6 database underlies the CIEG-Cubed model. However, GTAP6 pertains to year 2001. In order to make the modelling results as realistic as possible, trade flows with major trading partners, trade barriers and the structure of the Australian and Indian economies have been updated with the latest statistics (typically year 2006). To keep the modelling tractable, 57 sectors of production and 9 regions are identified.[31]

While CIEG-Cubed is the best available global economic model, it must be appreciated that the CIEG-Cubed model, like all computable general equilibrium models, are not perfect. By definition, economic models are a simplification of reality and rely on numerous assumptions about economic parameters, behaviour and relationships. As such, modelling results should only be used to infer the outcome of trade liberalisation (positive or negative) and the magnitude of such impacts (small or large). It would be inappropriate to, for example, report modelling results to the 3rd decimal point and claim that as the unambiguous impact of any bilateral trade reforms. The qualitative and geopolitical considerations will therefore also be important in deciding whether or not Australia and India should more fully consider negotiating a trade agreement.

The baseline

To estimate the potential economic impacts of trade and investment liberalisation between Australia and India, an appropriate counterfactual (the 'baseline') needs to be established. The baseline represents the business-as-usual scenario — that is, what we can expect to happen in the absence of trade and investment liberalisation between Australia and India.

The baseline needs to encompass views about the future structure of the economy and include other (relevant) policy decisions, such as scheduled tariff reductions resulting from previous commitments made elsewhere (for example, WTO commitments and unilateral reductions). It would not be appropriate to, for example, remove Australia tariffs on clothing imports from India under the trade agreement and attribute all resultant outcomes as a impact of the bilateral liberalisation when

---

[30] More details on the APG model (the predecessor of CIEG-Cubed) can be found at www.msgpl.com.au and in McKibbin W.J. and Vines, D. (2000), "Modelling Reality: The Need for Both Intertemporal Optimization and Stickiness in models for Policymaking", *Oxford Review of economic Policy*, vol. 16, no. 4; and McKibbin W. and Wilcoxen P. (1998), "The Theoretical and Empirical Structure of the G-Cubed Model", *Economic Modelling*, 16, 1, pp. 123–148.

[31] The 9 regions identified in the modelling comprise Australia, India, ASEAN, China, Japan, EU(25), New Zealand, the United States and the Rest of the World.

some of those impacts would be realised anyway as Australia has already announced unilateral reductions in clothing tariffs.

A key consideration in developing the baseline concerns the structure of the Australia and Indian economies in the future. In developing the baseline, it has been assumed that:

- the Australian and Indian economies meet IMF medium term forecasts for major macroeconomic indicators;

- Australia meets its unilateral tariff liberalisation commitments as already specified/announced (as of June 2008);

- as Australia's tariff reduction paths to meet the APEC Bogor commitment of complete unilateral trade liberalisation by 2010 for developed country members is voluntary and unknown, any such liberalisation has been overlooked;

- Australia meets its phased bilateral trade liberalisation commitments as negotiated in its commenced trade agreement with the United States;

- no bilateral trade liberalisation results from other trade agreements currently being negotiated/under consideration by Australia (with ASEAN, China, Gulf states, India, Japan, Korea and Malaysia) and India (with ASEAN, the EU and Japan); and

- as a large and important trading partner of both Australia and India, China's unilateral merchandise trade liberalisation — a condition of its WTO accession — is incorporated into the baseline.

The WTO reports that India maintains price support measures for major agricultural (field) crops.[32] This sees, amongst other measures, minimum support prices (MSPs) being set by the government. If prices fall below the specified MSP, the government intervenes in the market and procures the crops at the MSP. The government also maintains a Market Intervention Scheme (MIS) for products not covered by the MSP. When the price falls below the cost of production for MIS products, the government steps in and purchases the product at a specified market intervention price. The aim of the various market intervention schemes is reportedly to safeguard the interests of Indian farmers.

A trade and investment agreement with Australia may see the price of agricultural products imported from Australia falling. Cheaper Australian imports may see greater demand placed on India's various price support measures. If this does indeed occur, and if India has to raise taxes in order to meet the now greater cost of the price support measures, then maintaining the price support measures in the context of a trade agreement may have an adverse impact on Indian GDP.

As we are not in a position to know how India intends to deal with trade liberalisation and domestic price support measures, or indeed even whether

---

[32] WTO Secretariat 2007, *2007 Trade Policy Review of India*, WTO, pp. 108–114.

agriculture will be liberalised, the issue of India's price support measures has had to be overlooked. We do note, however, that it is likely that the beneficial impacts of trade liberalisation on India's GDP will be lower than estimated if these price support measures are maintained.

Bilateral liberalisation undertaken by Australia and India

Results from the liberalisation simulation(s) are compared with the baseline, with the difference being attributable to the bilateral trade and investment liberalisation between Australia and India. Model results are typically presented as a percentage change from the baseline outcome and are presented for each year until 2030.

Australia and India have a range of liberalisation implementation scenarios at their disposal. For example, trade barriers could either be completely or partially eliminated; removed immediately or phased out over 5 or 10 years; goods, services and investment could be covered, or just goods; and so on. Furthermore, both countries need not adopt the same trade liberalisation schedule.

Given the uncertainty with respect to the pace and scope of (any) liberalisation, and not wanting to 'second guess' (any) trade negotiations, it has been assumed that the bilateral trade and investment liberalisation will be comprehensive in scope with barriers being removed immediately on commencement of the agreement. This main modelling simulation is supplemented by two 'what if' type simulations. The various modelling simulations are detailed below.

1. Australia and India enter into a bilateral trade agreement, with trade barriers (identified in chapter 1) and investment barriers (chapter 2) being completely removed on the commencement of the trade and investment agreement, which is assumed to be 1 January 2010.

2. Phased trade and investment liberalisation — trade and investment liberalisation is assumed to commence on 1 January 2010, with barriers being removed over:

    – 5 years

    – 10 years.

Results for simulation 1 can be found in chapters 4 (macroeconomic) and 5 (sectoral) impacts). Key results for simulations 2 are reported in chapter 6.

4 Macroeconomic effects of the liberalisation

Bilateral trade and investment liberalisation between Australia and India would have implications for growth, trade and investment flows in both countries. Being a fully dynamic model that integrates goods and financial markets with a sophisticated treatment of assets and financial variables, the CIEG-Cubed model is well placed to explore the implications of the liberalisation for the macroeconomy. The implications for the macroeconomic variables of (real) gross domestic product, welfare, exports and imports, investment, current account, and the exchange rate as well as the effects on employment and real wages are reported for both countries until year 2030.

This chapter reports the macroeconomic impacts on Australia and India of comprehensive and overnight trade and investment liberalisation, assumed to occur on 1 January 2010 when the bilateral agreement enters into force.

Before turning to the modelling results, the size of any gains from trade will be primarily determined by several factors, namely:

- the size of barriers to trade and investment:
    - the average Australian tariff in 2010 is estimated to be 2.6 per cent;
    - the average Indian tariff in 2010 is estimated to be 17.6 per cent;
- the contribution of exports and imports to GDP; and
- the extent and composition of bilateral trade between the countries:
    - 5.3 per cent of Australia's merchandise and service trade exports go to India, while India is the source of 0.8 per cent of Australia's imports;
    - 0.4 per cent of India's exports go to Australia, while Australia is the source of 2.3 per cent of India's imports; and
    - hence India is a more important trading partner to Australia than Australia is to India.

Given the above facts, we would expect Australia to benefit relatively more from the trade and investment agreement than India.

Macroeconomic effects — Australia

The macroeconomic effects of trade and investment liberalisation under the overnight and comprehensive liberalisation scenario are reported in chart set 4.1. For Australia, the trade and investment liberalisation is projected to bring about a positive economywide impact. Both output and welfare are projected to increase above baseline levels as a result of the liberalisation. The rise in real GDP peaks at nearly 0.33 per cent above baseline in the year after liberalisation commences (2010). The rise in real (private household) consumption — the preferred welfare measure — reaches nearly 0.4 per cent above baseline also in 2010 before falling back to around 0.3 per cent above baseline and remaining relatively constant thereafter.

4.1 **Macroeconomic effects for Australia**
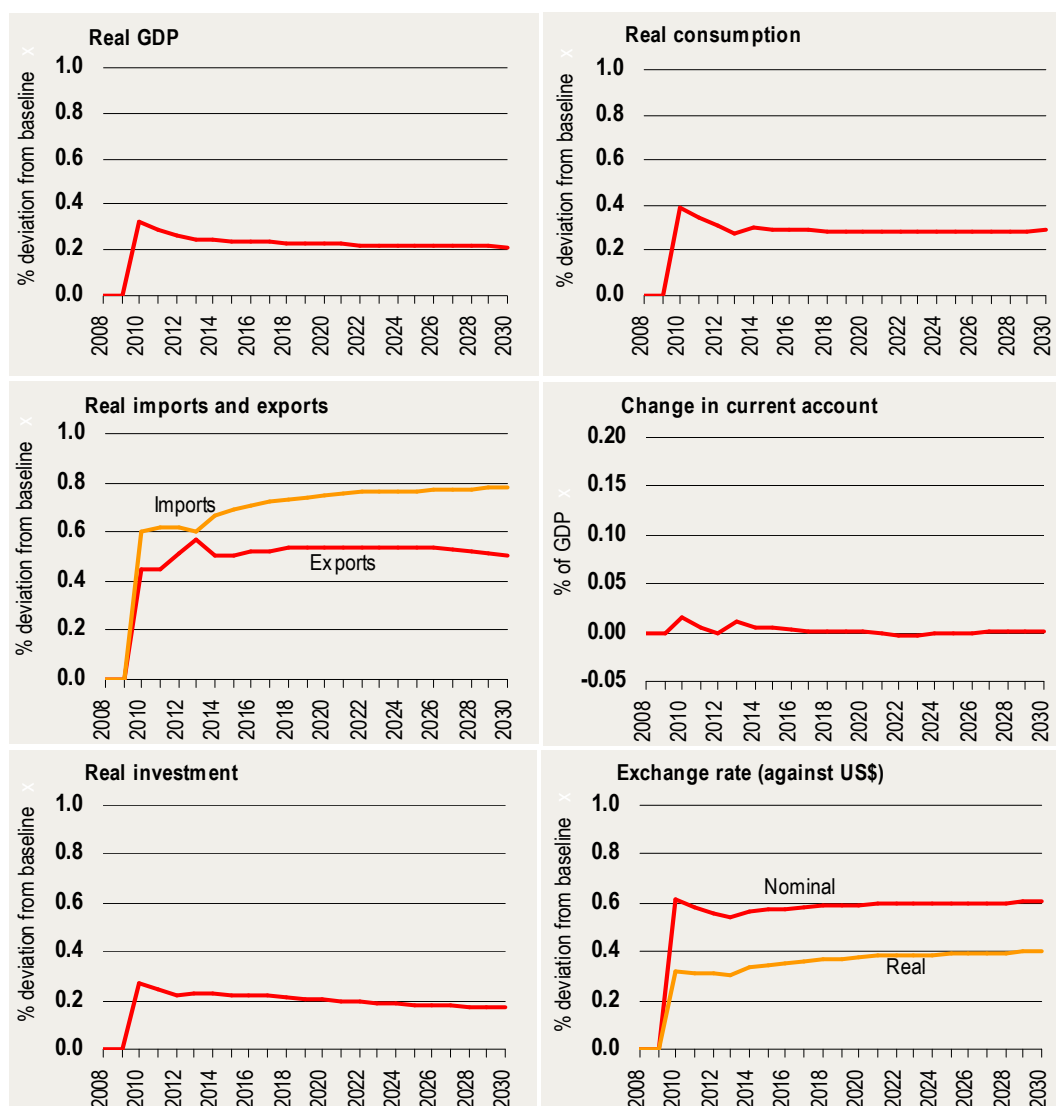
Data source: CIEG-Cubed modelling simulation.

Increased openness to (Indian) FDI lowers the cost of investing in Australia. This, combined with improved access to the Indian market and the greater domestic efficiency that trade liberalisation brings, sees capital in the Australia economy earning a higher return. This in turn causes a rise in real investment, with investment peaking at 0.27 per cent above baseline in 2010. There is an initial surge in investment in order to get that investment/capital 'online' as soon as possible in order to take advantage of the improved access to the Indian economy. Once that investment is online and as liberalisation under the FTA slows, investment tapers off to just under 0.2 per cent above baseline (reflecting that over the longer term, the FTA improves the attractiveness of Australia to investment).

India's trade liberalisation, the allocative efficiency gains brought about by Australia's own trade liberalisation, and dynamic productivity gains all act to increase Australian exports; with exports being around 0.5 per cent above baseline over the longer term.

Exports from Australia are projected to increase up until 2020, at which point real exports will be around 0.54 per cent above baseline (with exports declining slightly thereafter). With the rise in Australia's economic activity and lower barriers to Indian imports, there is an increase in imports of nearly 0.8 per cent (by 2030).

The 'spike' in exports and 'dip' imports in 2013 is attributable to the decline in consumption in that year (when compared with the 2012 level). With reduced domestic demand, locally produced products are exported instead of being consumed domestically. Similarly, a fall in consumptions sees reduced domestic demand for imports. Real household consumption is lower in 2012 than in 2013 due to household's forward looking expectations, and a slight 'over estimating' of the gains (to households) of the FTA. That is, household consumption in one period is determined by lifetime wealth as well as by current household income at that point in time. In the long run these two behaviours converge. But in the short term, they are not necessarily the same. Because of this specification of household's behaviour, overshooting and 'kinks' may be observed in some years. Essentially, in 2013 households realise that their current income level does not support the 2012 level of consumption (which, in turn, was based on income in 2012 plus expected lifetime wealth).

Despite rising GDP, domestic saving does not quite increase by enough to cover the rise in investment. This is due, in part, to consumers seeing/expecting future income gains and raising consumption (today) to smooth this. A small amount of extra capital is therefore needed to fund the increase in investment, and this is met by additional capital inflow from overseas. As a balanced Balance of Payments is assumed in the long run, a slightly increasing capital account necessitates, by definition, a slight deterioration of the current account deficit (that is, imports exceed exports). Hence Australia's current account deficit increases marginally (when measured as a share of GDP) in the first few years after the FTA commences.

To facilitate the capital inflow and trade changes, there must be an appreciation of the Australia currency. The Australia dollar is estimated to strengthen against the US dollar in nominal terms by 0.6 per cent, and in real terms by 0.4 per cent, by 2030.

While real imports (that is, the quantum of imports) increase by almost 0.8 per cent, the appreciation of the Australian dollar lowers the price of these imports. (India's own tariff liberalisation and resultant allocative efficiency gains will also lower the cost of Australian imports sourced from India.) Hence when expressed in local currency units, the change in import value is almost equivalent to the change in value of Australia's exports, hence a small change (increase) in Australia's current account deficit.

Welfare and production gains

The predicted additional production (real GDP) and welfare (real consumption) gains under the FTA are reported in chart 4.2. Results are presented in net present value (NPV) terms. The net present value allows a current value to be placed on gains that may not be experienced until some time in the future. Over the 20 years from 2010 to 2030, Australia is estimated to gain A$43.2 billion in real GDP and A$33.5 billion in real consumption (expressed in 2008 dollar terms). These gains are equivalent to 4.0 and 3.1 per cent of GDP (respectively) in 2008. Expressing the gains as a share of GDP is perhaps a better indication of the magnitude of gains (as opposed to the absolute monetary value) as account is taken of the size of the underlying economy.

4.2 **Australia's production and welfare gains** NPV 2008[a]
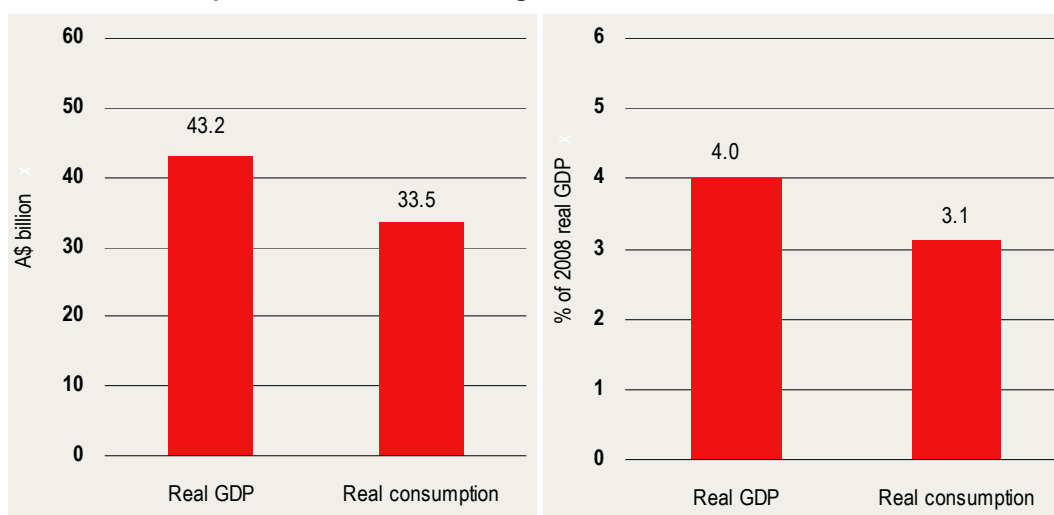
a Over 2010 to 2030, expressed in 2008 dollar terms using a 5 per cent real interest discount rate.
Data source: CIEG-Cubed modelling simulation.

Sources of benefits

Charts 4.3 and 4.4 decompose Australia's predicted gains from bilateral trade and investment liberalisation with India into the various contributing factors.

The left hand panel of chart 4.3 shows the gains from each country acting alone (that is, Australia and Indian unilateral trade and investment liberalisation against trade/investment from the other country). What is interesting to note is that improved access to the Indian market is of more importance to Australia's production and welfare gains than is the opening up the Australia economy to greater trade and investment.

India's liberalisation accounts for nearly all of Australia's GDP and consumption gains. This primarily reflects the starting point for the trade liberalisation. As Australia's trade barriers are already low, Australia has less to gain from its own removal of already low tariff barriers than Australia has to gain from an important trading partner removing high barriers to Australian exports. Hence Australia's gains are largely the result of 'export led growth'.

While Australia's overall level of trade barriers is low, there are a few sectors that still have high barriers to imports. Removal of these high barriers does bring about some allocative efficiency gains, and hence Australia also benefits from its own liberalisation.

The right hand panel of chart 4.3 (and chart 4.4) decomposes the impacts of the trade and investment liberalisation into four factors, namely:

- removal of bilateral tariff barriers to merchandise trade;

- removal of barriers to bilateral services trade;

4.3 **Sources of Australia's gains** NPV 2008[a]
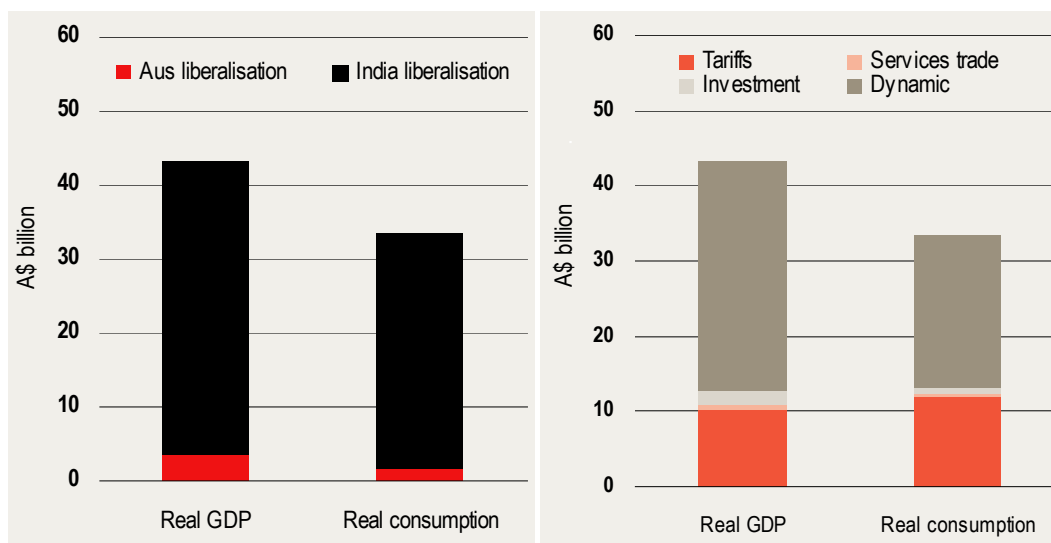
[a] Over 2010 to 2030, expressed in 2008 dollar terms using a 5 per cent real interest discount rate.
Data source: CIEG-Cubed modelling simulation.

4.4 **Changes in real GDP in Australia**
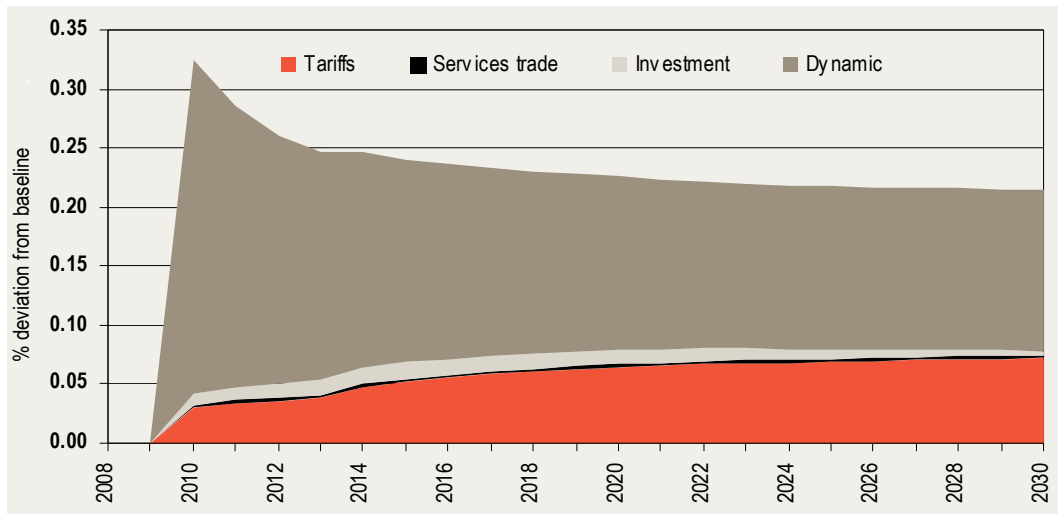
Data source: CIEG-Cubed modelling simulation.

- removal of barriers to bilateral investment; and
- resultant dynamic productivity gains.

Australia's gains are dominated by dynamic productivity gains arising from the trade and investment liberalisation. Indeed, dynamic productivity accounts for 70 per cent of the real GDP gains over 2010–2030. It is interesting to note that dynamic productivity gains account for nearly all of the gains in the first few years after liberalisation. This primarily reflects the increased capital inflow as investment increases so as to take advantage of the improved access to the Indian market. The capital inflow sees a slight appreciation in the exchange rate, which in turn makes imports cheaper. Imports increase, and combined with greater capital inflows, drives dynamic productivity gains.

Elimination of India's relatively high trade barriers, especially in agriculture and food, sees increased Australia exports to India and hence production and welfare gains. As can be seen from chart 4.3, elimination of tariff barriers accounts for 24 per cent of Australia's GDP gains.

Finally, the observed importance of dynamic productivity gains to Australia, combined with the fact that it is India's liberalisation that accounts for the majority of Australia's gains, leads to the conclusion that Australia's dynamic productivity gains are primarily export based. That is, 'learning by exporting' sees the experience and knowledge gained in export markets being translated into productivity gains.

Employment

With the estimated increase in real GDP, the trade and investment liberalisation has a positive impact on employment in Australia (see chart 4.5).

4.5 **Changes in employment and wages in Australia**
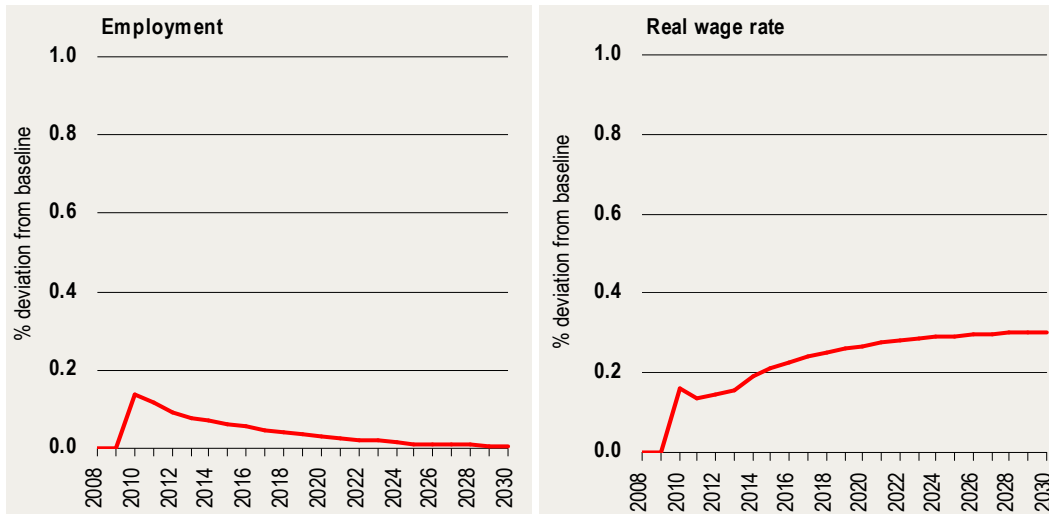
Data source: CIEG-Cubed modelling simulation.

Although the economic model assumes fixed labour supply and full employment determined by the population growth rate in the long run, in the short run employment deviates from the full employment equilibrium level because real wages adjust slowly to labour market conditions.

Employment peaks at 0.14 per cent above baseline in 2010 (in line with the peak in GDP). While real GDP is over 0.3 per cent above baseline in 2010, the employment gain is around half of that figure. Even though GDP increases in 2010, most of the increase is driven by dynamic productivity gains (see chart 4.4). Productivity gains see less labour (and other inputs) being required per unit of output, hence the demand for labour increases by less than the increase economic activity. As the demand for labour increases wages begin to be bid up.

After the liberalisation commences dynamic productivity contributes less to the GDP gain. The increased economic activity and associated demand for labour dominate adjustment costs (which, economywide, will be low due to Australia's already low trade barriers). This sees employment being higher than baseline levels in the 10–15 years after liberalisation. Sticky nominal wages limit the ability of wage increases to bring the demand for labour back to baseline levels.

Over time, wages adjust (increase) to ensure that employment falls back to its baseline level — the natural rate of unemployment. The long term gain to employment is reflected in higher real wages. The real wage rate, which is the difference between the nominal wage rate and inflation, increases over time and reaches around 0.3 per cent higher than the baseline level in 2030.

Macroeconomic effects — India

India is also projected to benefit from bilateral trade and investment liberalisation with Australia.

Chart 4.6 provides the macroeconomic effects for India of entering into a comprehensive bilateral trade and investment agreement with Australia. A first observation to make is that, by and large, the effects on the Indian economy are smaller than that experienced by Australia. This is to be expected given the importance of the Australia economy to India — Australia is the destination for only 0.4 per cent of India's exports and is the source of 2.3 per cent of India's imports.

4.6   **Macroeconomic effects for India**
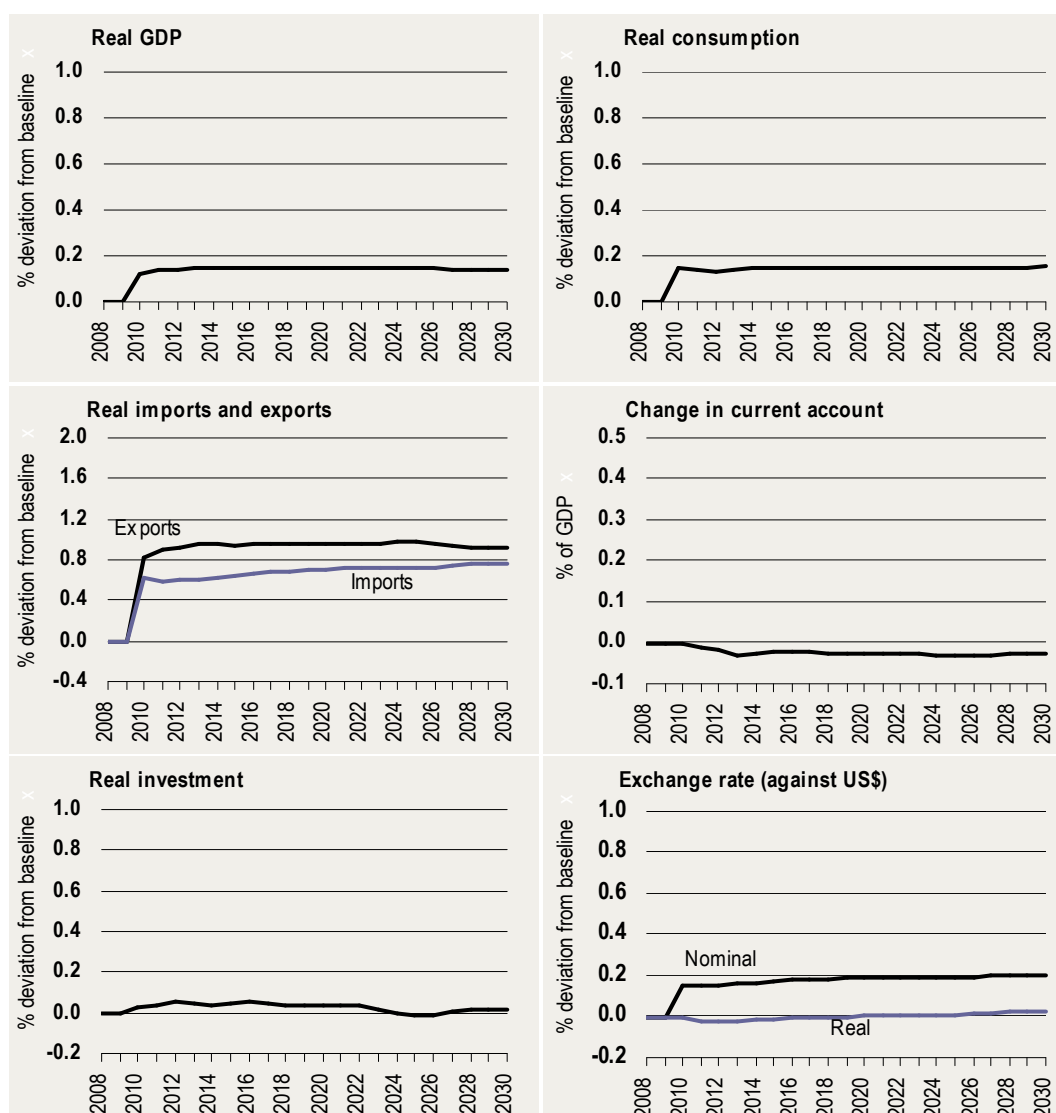
Data source: CIEG-Cubed modelling simulation.

It is estimated that India's real GDP would peak at around 0.15 per cent above baseline by 2015 and remain relatively constant thereafter. Real consumption increases up until 2030 as the allocative efficiency and dynamic productivity gains work their way through the economy. In 2030 real (private household) consumption is estimated to peak at 0.15 per cent above baseline.

India's exports are estimated to continue to peak at nearly 1 per cent above baseline in 2013, after which they will taper off to around 0.9 per cent above baseline in 2030. India's imports increase as well, but with a smaller magnitude than exports, reaching nearly 0.8 per cent above baseline in 2030. While the increase in real exports exceeds the increase in imports, India is estimated to experience a slight deterioration in India's current account. This is largely brought about by movements in Australia's and India's real exchange rates. From chart 4.1 it can be seen that Australia experiences an appreciation of its real exchange rate (0.4 per cent above baseline in 2030), while India's real exchange rate is slightly below baseline levels over 2010 to 2019. This acts to raise the price of Indian imports (2.3 per cent of which were sourced from Australia in 2007). The resultant increase in value of imports exceeds the increase in value of exports, an as such there is a slight deterioration in India's current account.

The allocative efficiency gains expected/brought about by the trade and investment liberalisation sees real investment in India rising due to capital earning a higher return and the increase in economic activity. India's real investment is estimated to peak at 0.06 per cent above baseline in 2012 before tapering off back to baseline levels.

Welfare and production gains

Chart 4.7 reports India's estimated gains in net present value terms. Over the 20 year period from 2010 to 2030, the NPV of increases in India's real GDP and consumption are estimated to be R1595 billion and R1053 billion (equivalent to A$46.1 billion and A$30.4 billion respectively) in 2008 dollar terms. Hence in absolute terms, India would experience a larger GDP gain from the FTA than Australia.

However, the absolute size of the gains can be misleading due to the size of the underlying economy. India's real GDP and consumption gains are equivalent to 3.5 and 2.3 per cent (respectively) of GDP in 2008. Hence relative to the size of the economy, Australia stands to gain more from the FTA. This is expected due to India being a more important trading partner to Australia than Australia is to India.

4.7 India's production and welfare gains NPV 2008[a]
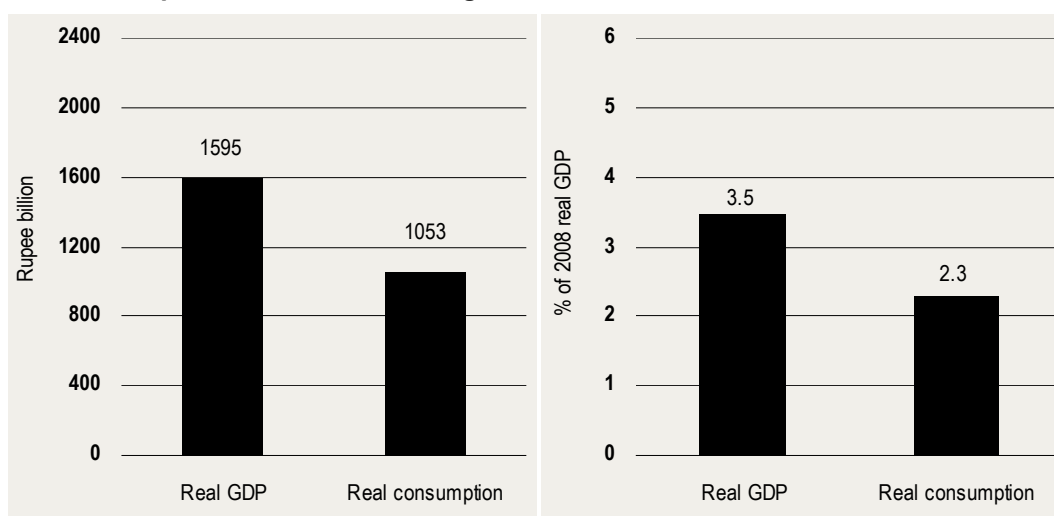
[a] Over 2010 to 2030, expressed in 2008 dollar terms using a 5 per cent real interest discount rate.
Data source: CIEG-Cubed modelling simulation.

Sources of benefits

Charts 4.8 and 4.9 decompose India's estimated gains from the FTA with Australia into the various contributing factors.

The left hand panel of chart 4.8 shows the gains from each country acting alone. As can be seen, India's gains would arise mainly from its own liberalisation, as a result of improved allocative efficiency and dynamic productivity gains resulting from removing high trade barriers. Greater access to the Australian market accounts for around 5 per cent of India's GDP gains.

The right hand panel of chart 4.8 (and chart 4.9) decomposes the impacts of the trade and investment liberalisation.

As was the case for Australia, dynamic productivity contributes the most to India's GDP gains, accounting for 76 per cent of the real GDP gain. Removal of tariffs is also important, accounting for just over 14 per cent of India's GDP gains.

Also note that India's own liberalisation has pluses (allocative efficiency gains) and very slight minuses (terms of trade loss) for real consumption (leading to a net gain overall). In contrast, Australia's liberalisation is unambiguously good for India as it increases demand for Indian exports.

The small loss of real consumption arising from India's own liberalisation is attributable to India's liberalisation of its merchandise trade barriers. As tariffs are removed, imports increase. To pay for these additional imports, India must export more, which necessitates a slight real exchange rate depreciation over 2010–2019 (that is, India experiences a slight terms of trade loss). In other words, a unit of Indian output is worth less than before (in terms of what it can be exchanged for on the

world market). This sees a loss of real consumption, amounting to A$1 billion (in 2008 NPV terms) over the period 2010 to 2030.

4.8   **Sources of India's gains** NPV 2008[a]
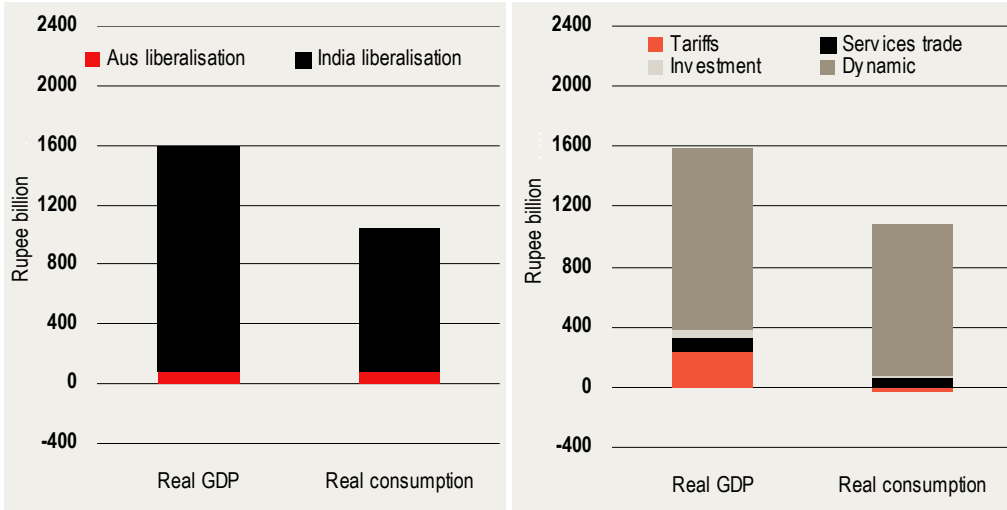
a Over 2010 to 2030, expressed in 2008 dollar terms using a 5 per cent real interest discount rate.
Data source: CIEG-Cubed modelling simulation.

4.9   **Changes in real GDP in India**
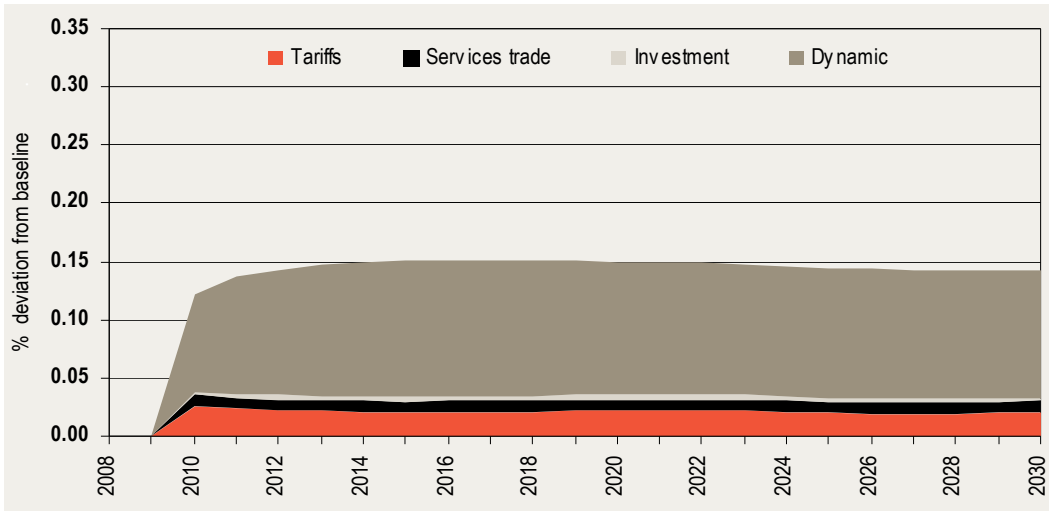
Data source: CIEG-Cubed modelling simulation.

Employment

Similar to the impact on Australia, with a higher level of economic activity the trade and investment liberalisation has a positive, albeit smaller, impact on employment in India. The smaller impact on employment reflects the smaller impact of the trade and investment liberalisation on Indian economic activity. As shown in chart 4.10, and due to slow adjustment in wages, employment rises initially, peaking at 0.1 per cent

higher than the baseline level in 2010. In the long run, the real wage rate adjusts to ensure that employment falls back to its baseline level. The long term gain in employment is reflected in higher real wage rates, which are estimated to be over 0.1 per cent higher than the baseline level in 2030.

Real wages in India are estimated to be lower than baseline levels in the year in which the FTA commences, even though GDP and the demand for labour increases. The appreciating Australian dollar (and a marginally depreciating rupee) sees the price of imports rising, and hence a fall in the real wage (the real wage being the difference between nominal wages and inflation). The fall in the real wage sees an additional stimulus to employment.

4.10 **Changes in employment and wages in India**

Data source: CIEG-Cubed modelling simulation.

Bilateral trade

India's trade barriers are notably higher than those in Australia. As such, bilateral trade liberalisation will advantage Australian exporters more than Indian exporters. That is, and on the whole, Indian exporters face relatively low trade barriers when exporting to Australia, so the trade liberalisation carried out under the FTA will be of greater benefit to Australian producers exporting product to India, as they face the higher barriers.

As such, it is to be expected that Australian exports to India should increase by substantially more than Indian exports to Australia. As can be seen in chart 4.11, this expectation is observed. By 2030, Australia's exports to India are estimated to be over 24 per cent above baseline, whereas Indian exports to Australia are nearly 14 per cent higher. Note that the increase in bilateral exports reflects both the magnitude of the trade barriers being removed and also resultant dynamic productivity gains, which

act to improve the competitive position of a country's exports in all international markets.

Also note that the baseline has Australia undertaking some unilateral tariff reduction on imports of textiles and clothing taking place in 2015. This unilateral tariff liberalisation reduces the trade preference afforded under the Australia–India FTA, hence Indian exports to Australia in 2015 attributable to the FTA are slightly lower than in 2014.

4.11 **Bilateral Australia–India trade**
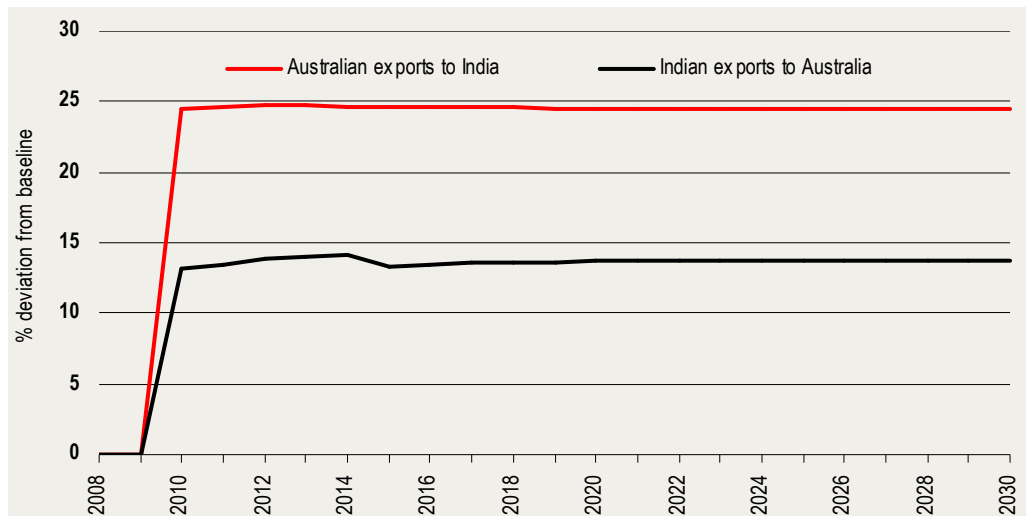
Data source: CIEG-Cubed modelling simulation.

5 Sectoral effects of the liberalisation

Trade and investment liberalisation between Australia and India is estimated to see Australia's GDP being over 0.2 per cent above baseline, and 0.15 per cent above baseline in the case of India. While the economic modelling suggests that both economies 'as a whole' benefit from the bilateral liberalisation, there will be differing impacts between sectors.

Impact of liberalisation on Australian sectors

India has high trade barriers in the areas of agricultural and processed food products, areas where Australia is thought to have a comparative advantage. Hence it would be expected, a priori, that it is these Australian sectors that benefit the most from the bilateral trade and investment liberalisation. However, Australia's exports to India are heavily concentrated in only a few sectors. For example, over 70 per cent of Australia's merchandise exports to India in 2007 were in 3 sectors — non-ferrous metals, coal and other minerals. This leads to what might be described as a 'low base effect' when modelling the impacts on other Australian sectors.

Low base effect

Low levels of current trade are interpreted in the model as reflecting a low level of competitive advantage in those products. As a result, once all barriers are reduced, those low base sectors may see resources (capital and labour) diverted away from them in favour of other sectors where trade currently takes place (and which are therefore deemed to be more competitive). It is those sectors with a combination of the (relatively) largest trade and highest barriers that stand to benefit the most from an FTA. This can lead to some counter-intuitive results. For instance, some globally competitive Australian exports, such as dairy and meat products, face Indian tariff barriers in the order of 30 per cent. The fact that Australia currently exports very little of these products to India, however, results in the modelling suggesting a modest shortfall in output relative to the baseline and to other sectors where trade currently takes place (for example, wheat).

The low base effect can result in aberrant results, however, where current low trade is not due to weak competitiveness, but is rather due to non-trade related impediments such as sanitary and phytosanitary (SPS) measures. This appears to explain the modest decline of output and exports (relative to the non-FTA baseline

outcome) projected for certain agricultural exports such as meat, dairy and other crops. See also 'Impact of sanitary and phytosanitary issues on agricultural trade liberalisation' below.

Modelled outcomes for services sectors such as financial services are mostly also affected by the low-base effect, again reducing the reliability of the results. As before, because many services sectors historically have not been traded in volume between Australia and India, this can see modelled reductions from the baseline under the FTA. This is because resources are assumed to flow to merchandise sectors where trade has occurred in the past, and away from the service sectors. However, trade in financial services, for instance, has historically been negligible between many trading partners due to legislated barriers, such as licence requirements, which can completely block such trade occurring (rather than raising the cost of such business as tariffs do). As a result, when those legislated blockages are removed, it may be discovered that partner countries' financial sectors are much more competitive than was apparent, and more substantial trade could commence after FTA-related liberalisation.

The low base effect largely explains why some of the results reported in table 5.1 are unusual for Australia. For example, in FTA studies results usually see countries exporting more of the goods and services where they are considered to have a comparative advantage. From table 5.1 it can be seen that this is typically not the case for Australia under an FTA with India. Australia's trade with India is somewhat 'unusual' in that Australia's exports to India tend to be in areas not typically associated with a comparative advantage. For example, manufactured exports accounted for over 42 per cent of total Australian exports in 2007, while agricultural and processed food exports (such as dairy and meat) accounted for only 3.4 per cent of total exports. Minerals and energy exports, where Australia does have a strong comparative advantage, accounted for over 33 per cent of total exports. It is this trade profile, in conjunction with the explanation of what determines which sectors are advantaged/disadvantaged under an FTA, that drives the sectoral results.

Of the 57 sectors of the Australian economy identified in the economic modelling, which are aggregated to the 26 sectors reported in table 5.1, output for 70 per cent is expected to increase above baseline levels as a results of Australia entering into a trade and investment agreement with India. Of the benefiting sectors, 20 per cent are primary industries, 53 per cent are in manufacturing, and 28 per cent are service sectors. Modelling results at a greater level of sectoral detail can be found in appendix A.

There are essentially 3 'classes' of impact on Australia's sectors, these being:

▪ higher output, employment, investment and exports

▪ higher output and lower exports

▪ lower output, employment, investment and exports.

5.1 **Impact of liberalisation on Australian sectors** 2020, per cent deviation from baseline

Sector	Output	Employment	Investment	Exports	Imports
	Per cent	Per cent	Per cent	Per cent	Per cent
Rice	-0.2	-0.5	-0.2	-1.7	0.8
Wheat	1.7	1.6	2.4	2.7	3.4
Other crops	-0.1	-0.4	-0.1	-0.6	1.2
Vegetable & fruit	0.9	0.6	1.2	9.4	1.7
Cattle	-0.6	-0.8	-0.6	-0.7	0.3
Other animal products	0.1	-0.2	0.1	0.0	0.2
Forestry	0.8	0.5	0.9	9.7	1.7
Fishing	0.2	-0.2	0.1	-0.5	0.6
Minerals & energy	0.2	-0.1	0.2	0.0	0.6
Meat	-0.8	-0.9	-0.8	-2.6	1.7
Dairy	-0.2	-0.5	-0.2	-2.1	1.3
Sugar	0.2	-0.1	0.2	-0.3	1.3
Other food & beverages	0.1	-0.2	0.1	-0.6	0.8
Textiles & clothing	1.2	0.2	0.7	9.0	0.6
Chemicals	0.5	0.1	0.2	1.0	0.7
Metal	1.2	0.5	1.0	2.7	2.0
Transportation	0.7	0.2	0.2	0.9	0.5
Electrical products	2.4	1.5	1.7	2.6	0.4
Machinery	1.5	0.8	0.9	2.3	0.6
Other manufacturing products	0.3	-0.1	0.1	0.0	0.9
Construction	0.1	0.0	0.0	-1.5	0.0
Transport	0.1	-0.1	0.1	-1.1	0.8
Communication	0.0	0.0	0.0	3.5	0.1
Financial services	-0.1	-0.1	0.0	-2.0	1.0
Other non-public services[a]	0.0	-0.1	0.2	-1.5	0.9
Public services[b]	0.2	0.1	0.2	-1.8	1.2

[a] Other non-public services includes the electricity, gas and water sectors, Other business services (such as accountancy, architectural, engineering and legal services), trade, recreation and ownership of dwellings. [b] Public services includes public administration, defence, health and education.

Source: CIEG-Cubed modelling simulation.

Before discussing each of these classes of results (see below), the impact of the FTA on employment is considered as it is relevant to all sectors. As total employment is assumed to return to baseline levels in the long run, changes in sectoral employment will have a zero net effect on employment Australia wide (in the long run). That is, those sectors experiencing employment gains are balanced by sectors experiencing employment losses of exactly the same magnitude in aggregate. Employment is returned to the baseline level via increasing real wages (as wages increase the demand for labour falls).

In the previous chapter it was reported that the real wage in Australia is estimated to be 0.3 per cent above baseline in 2030. As the real wage rises, the other (main) factor of production — capital — becomes relatively cheaper. Hence in response to rising wages, there will be capital for labour substitution (as a means of reducing costs). In table 5.1 it can be seen that, typically, the change in investment is larger (or less 'negative') than the change in employment. The relativity of the employment and

investment changes will be influenced by the labour/capital intensiveness of the various sectors.

Dynamic productivity gains, which account for around 70 per cent of Australia's GDP gains, will also affect sectors' demand for labour. Productivity gains mean less labour (and other inputs) are required per unit of output. Hence if a sector has large productivity gains, but whose output demand is relatively invariant to price, then less labour will be needed by that sector.

Higher output, employment, investment and exports

These sector experience increases in all indicators (including imports). Examples include the Wheat, Vegetables and fruit and manufacturing (non-food processing) sectors. These sectors accounted for 45 per cent of total Australian exports to India in 2007.

These sectors primarily benefit from export led growth, and an expanding Indian economy (due to India's own liberalisation). For example, India imposes tariffs of nearly 38 per cent on Australian wheat imports. Removing such high barriers to Australian wheat exports, valued at A$91 million in 2007, has a large and positive impact on the Australian Wheat sector. Indeed, wheat exports to India are estimated to be a substantial 119 per cent above baseline in 2020.[33]

The expanding Indian economy sees greater demand for production inputs such as forestry products (timber) and metals, which stimulates output of the corresponding Forestry and Metal sectors in Australia.

As sectoral output increases, so too does the demand for labour and capital (investment) in these sectors. India's trade liberalisation sees an increase in exports, some of which is met by diverting local production from the Australian market to India. The 'shortfall' in product going to the Australian market is met by increased imports.

The increase in output of the Forestry sector is quite large at almost 1 per cent. For this output expansion to take place there needs to be a sufficient resource base. If this is not the case, or if government policies prevent increased logging, then output will not be able to expand by the forecast 0.8 per cent. However, there will still be increased Indian demand for Australian timber, and this increased demand will materialise in the form of higher prices. Hence instead of sectoral output increasing in response to the increase in demand, prices increase. Despite the potential that output might not increase by (up to) 0.8 per cent, GDP is not expected to be lower as the higher prices will ultimately translate into a higher return to sector capital. This

---

[33] Note that this large increase in wheat exports to India translates into an increase in global wheat exports of 2.7 per cent.

will counteract any 'unrealised' increase in output. The same situation would apply to other resource based sectors.

Higher output and lower exports

The Other animal products, Fishing, Sugar, Other food & beverages and several service sectors are forecast to expand output under the FTA, but at the same time have lower exports. The increase in output is therefore clearly not being driven by export led growth.

For these sectors, the expanding Australian economy sees products being diverted from the export market to the local market in order to meet increasing local demand, whether it is from now wealthier households or upstream sectors advantaged under the FTA and subsequently increasing output. This is especially the case for the service sectors — as household income rises, there is increased local consumption of services. (Also note that the 1–1.8 per cent decline in exports for the service sectors may be a manifestation of a low export base.)

Lower output, employment, investment and exports

These sectors experience shortfalls relative to the baseline in all indicators, except imports. The shortfall in the Rice, Other crops, Cattle, Meat, Dairy and some service sectors such as Financial services is largely attributable to these sectors being relatively disadvantaged under the FTA, that is, the low base effect (see also the 'Impact of sanitary and phytosanitary issues on agricultural trade liberalisation' below). Other sectors with higher current trade volumes as well as high tariffs bid resources away from the low trade sectors upon trade liberalisation.

For some sectors, the shortfall in output relative to baseline levels reflects what is happening elsewhere in the economy. For example, the lower than baseline output of the Cattle sector is largely a result of a decline in the downstream Meat and Dairy sectors. Nearly 70 per cent of the output of the Australian Cattle sector is sold to the downstream Meat and Dairy sectors. As these sectors contract output by 0.7 and 0.2 per cent (respectively), demand for output of the upstream Cattle sector is lower than baseline.

Impact of sanitary and phytosanitary issues on agricultural trade liberalisation

In the case of exports of dairy, meat and other crops it is most likely the sanitary and phytosanitary (SPS) requirements put in place by governments to limit the transmission of disease and pests across borders that are constraining trade. SPS requirements can result in little or no trade taking place, despite the trading partner having strong competitive advantages in those products (for example, Australia's dairy and meat exports are highly competitive globally but are unable to be sold into the Indian market due to SPS measures). It is important to note that if in the future

exporters are able to satisfy prevailing SPS requirements, then trade in these products could expand considerably more than estimated here.

Impact of liberalisation on Indian sectors

Reflecting India's smaller GDP gain, the sectoral impacts are likewise typically small — for some sectors, the impacts of the bilateral trade and investment liberalisation are observable at only the second decimal point.

Of the 57 sectors of the Indian economy identified (which are aggregated to the 26 sectors identified in table 5.2), 68 per cent are expected to increase output as a results of the FTA with Australia. Of these benefiting sectors, 33 per cent are primary sectors, 43 per cent are secondary sectors, and 23 per cent are service sectors. Modelling results at a greater level of sectoral detail can be found in appendix A.

5.2 **Impact of liberalisation on Indian sectors** 2020, per cent deviation from baseline

Sector	Output	Employment	Investment	Exports	Imports
	Per cent	Per cent	Per cent	Per cent	Per cent
Rice	0.1	0.1	0.0	-0.7	0.6
Wheat	-0.1	-0.9	-1.0	4.8	114.5
Other crops	0.0	-0.1	-0.2	-0.3	3.0
Vegetable & fruit	0.0	-0.2	-0.3	0.3	4.5
Cattle	0.0	-0.2	-0.2	0.0	0.1
Other animal products	-0.1	-0.3	-0.4	-0.2	19.5
Forestry	0.0	0.0	-0.1	-0.8	1.0
Fishing	0.1	0.1	0.0	-0.5	0.4
Minerals & energy	2.4	1.5	1.4	8.2	0.9
Meat	0.0	-0.1	-0.1	-0.2	0.9
Dairy	0.1	0.1	0.0	-0.7	1.2
Sugar	0.1	0.1	0.0	-0.7	12.9
Other food & beverages	0.0	-0.1	-0.1	-0.4	0.6
Textiles & clothing	0.0	-0.2	-0.3	-0.1	1.3
Chemicals	0.1	0.0	0.0	0.0	0.4
Metal	1.4	0.8	0.7	9.0	1.1
Transportation	0.0	0.0	-0.1	0.0	0.4
Electrical products	-0.7	-0.5	-0.6	-1.1	0.6
Machinery	0.3	0.3	0.3	0.9	0.1
Other manufacturing products	0.3	0.2	0.2	1.3	0.2
Construction	0.0	0.0	0.0	-0.2	0.1
Transport	0.0	0.0	-0.1	-0.5	0.2
Communication	0.1	0.0	0.0	0.4	3.0
Financial services	-0.2	-0.2	-0.2	-0.7	0.2
Other non-public services	0.1	0.0	0.0	-0.4	0.1
Public services	0.1	0.1	0.1	-0.7	0.2

a Other non-public services includes the electricity, gas and water sectors, Other business services (such as accountancy, architectural, engineering and legal services), trade, recreation and ownership of dwellings. **b** Public services includes public administration, defence, health and education.

Source: CIEG-Cubed modelling simulation.

The sectors experiencing the largest increases in output under the FTA are those sectors most important to Australia in terms of exports to India — Minerals & energy (33 per cent of total Australian exports to India in 2007) and Metals (38 per cent of exports).

The gains experienced by these (and other) sectors can be largely attributed to dynamic productivity gains brought about by increased competition from Australian imports.[34] For example, across all 57 sectors of the Indian economy, the (simple) average dynamic productivity gain in 2020 is 0.17 per cent, but 1.2 per cent in the Minerals & energy sector and 0.95 per cent in the Metals sector. These are large productivity gains, and act to increase the efficiency and output of the Minerals & energy and Metal sectors despite the trade liberalisation. Indeed, the import competition drives the dynamic productivity gains, allowing these sectors to expand output and increase exports.

Dynamic productivity has a large impact on the modelling results as the productivity effects apply to all trade (irrespective of source and destination), and not just to bilateral trade. Hence while bilateral trade liberalisation improves India's competitive position in the Australian market, productivity gains improve India's competitive position globally.

There are 4 classes of (noteworthy) sectoral impact for India's sectors, these being:

- higher output, employment, investment, exports and imports
- lower output and higher exports
- higher output and lower exports
- lower output, employment, investment and exports.

Each of these classes of impact is discussed below.

Higher output, employment, investment, exports and imports

The 4 sectors of Minerals & energy, Metal, Machinery and Other manufacturing products experience increases in all indicators.

With respect to the trade — export and import — indicators, the FTA sees substitution and scale effects. India's own trade liberalisation sees an increase in imports, while Australia's trade liberalisation increases India's exports. That is, there is substitution towards now cheaper imports from the FTA partner. As imports decline in price there will be an increase in demand for those imports.

---

[34] Note that it is the change in the price of the total import bundle relative to the price of locally produced products that drives the dynamic productivity gains, and not changes in trade volumes (that is, the quantum of imports).

The FTA also sees improvements in allocative efficiency, and this sees an expansion of the Indian and Australian economies. As the Indian economy expands there will be further increased demand for imports, some of which will be sourced from Australia. Similarly, as the Australian economy expands there will be increased demand for imports, some of which will be sourced from India (hence Indian exports will increase).

All sectors in this class experience a larger (per cent) change in exports than imports in year 2020.

However, when the underlying values of exports and imports in the baseline is taken into account, it is clear that all sectors' benefits arise via the substitution effect (that is, export led growth). That is, the dollar value of the change in exports exceeds the change in imports, hence there is a net increase in demand and export led growth.[35] This export led growth will in part be attributable to Australia's own trade liberalisation, but will mainly be the result of the Indian sectors experiencing dynamic productivity gains and increasing exports to all markets.

As output increases, so too does employment and investment, tempered by any dynamic productivity effects (which lower labour and capital needed per unit of output) and any capital for labour substitution caused by real wages rising (in the previous chapter it was reported that Indian real wages will be 0.1 per cent above baseline levels in 2020).

Lower output and higher exports

India's Wheat sector experiences a fall in output yet increased exports. The Wheat sector experiences a loss of market share to imports from Australia, and hence lower sector output, following India's trade liberalisation plus increased export opportunities following dynamic productivity gains brought about by the import competition from Australia (productivity in India's Wheat sector is estimated to have risen by 0.4 per cent in 2020). The key observation is take is that the increase in exports is not sufficient to offset the loss of local market share, and hence sectoral output, employment and investment all fall. Note that the decline in employment will also reflect dynamic productivity gains (hence less labour is needed per unit of output) and rising real wages (making capital relatively cheaper, thereby encouraging capital for labour substitution).

---

[35] This 'back of the envelope' type calculation assumes that domestic demand for the sectors' output does not contract by more than the (dollar value) difference between the change in exports and imports (that is, X – M). As Indian GDP is expected to be 0.15 per cent above baseline levels in 2030, domestic demand for the sectors' products is unlikely to have contracted.

Higher output and lower exports

The Rice, Fishing, Meat, Dairy, Sugar, Other foods & beverages, Other non-public services and Public service sectors all experience an increase in output but a fall in exports under the FTA. As was the case for Australian sectors of the same class, the expanding Indian economy sees products being diverted from the export market to the local market in order to meet increasing local demand.

The Meat and Other foods & beverages sectors also see employment and investment being lower than baseline levels in year 2020. The lower than baseline levels of employment and investment in these sectors reflects some small dynamic productivity gains (less inputs per unit of output) experienced by the sectors, and the substitution of intermediate production inputs for factors of production (labour and capital).

Lower output, employment, investment and exports

India's Other animal products, Electrical products and Financial services sectors are all expected to experience a decline in all indicators (excluding imports).

The adverse impact on these sectors is a result of those sectors either being relatively disadvantaged under the FTA, which sees other Indian sectors expanding at their expense, or India's trade liberalisation seeing the local sectors losing market share to now cheaper Australian imports. As these sectors accounted for only 1.7 per cent (nearly A$175 million) of Australia's total exports to India in 2007, it is likely to be the former effect that dominates. That is, other Indian sectors are advantaged more by the trade and investment liberalisation with Australia, and these more advantaged sectors attract resources (labour and capital) away from the less advantaged sectors, resulting in their decline. The subsequent loss of local production is met by imports.

6   Other modelling simulations

In addition to the main modelling simulation, the results of which were reported in chapters 4 and 5, several other modelling simulations have been conducted to investigate how a slower pace of bilateral trade and investment liberalisation affects the economic benefits.

Slower pace of trade liberalisation

The modelling results presented in chapter 4 report the economic impacts for Australia and India from the immediate removal of bilateral barriers to trade and investment on commencement of the agreement on 1 January 2010. We now consider what happens when the trade and investment barriers between Australia and India are removed over time. Two scenarios are considered — 5 year and 10 year phase-ins of the agreement (commencing in 2010). In each scenario, the same percentage point reduction in trade and investment barriers occurs every year after 2010 until the full liberalisation is achieved in the specified time period.

Chart 6.1 shows the paths of Australia's and India's real GDP and consumption under the five year phase in and ten year phase in. The impacts under overnight liberalisation (taken from chapter 4) are also shown for comparison. It can be seen from the chart that immediate liberalisation leads to a larger and earlier increase in economic benefits (as measured by real GDP and consumption). These results are as expected — removing trade barriers earlier results in a greater gain net of adjustment costs. The results for Australia show that the greatest gain in production (real GDP) is when the barriers are removed immediately. Reflecting the fact that most of Australia's gains are attributable to India's trade liberalisation, the slower the pace of liberalisation the smaller the GDP gains. Note that after liberalisation has been completed, there is little difference between the three reported scenarios. Hence the additional gains attributable to faster paced liberalisation accrue in the earlier years.

Exactly the same situation exist for India under slower paced liberalisation — the slower the liberalisation, the smaller the gains.

6.1 **Main economic impacts under different phase-in scenarios**
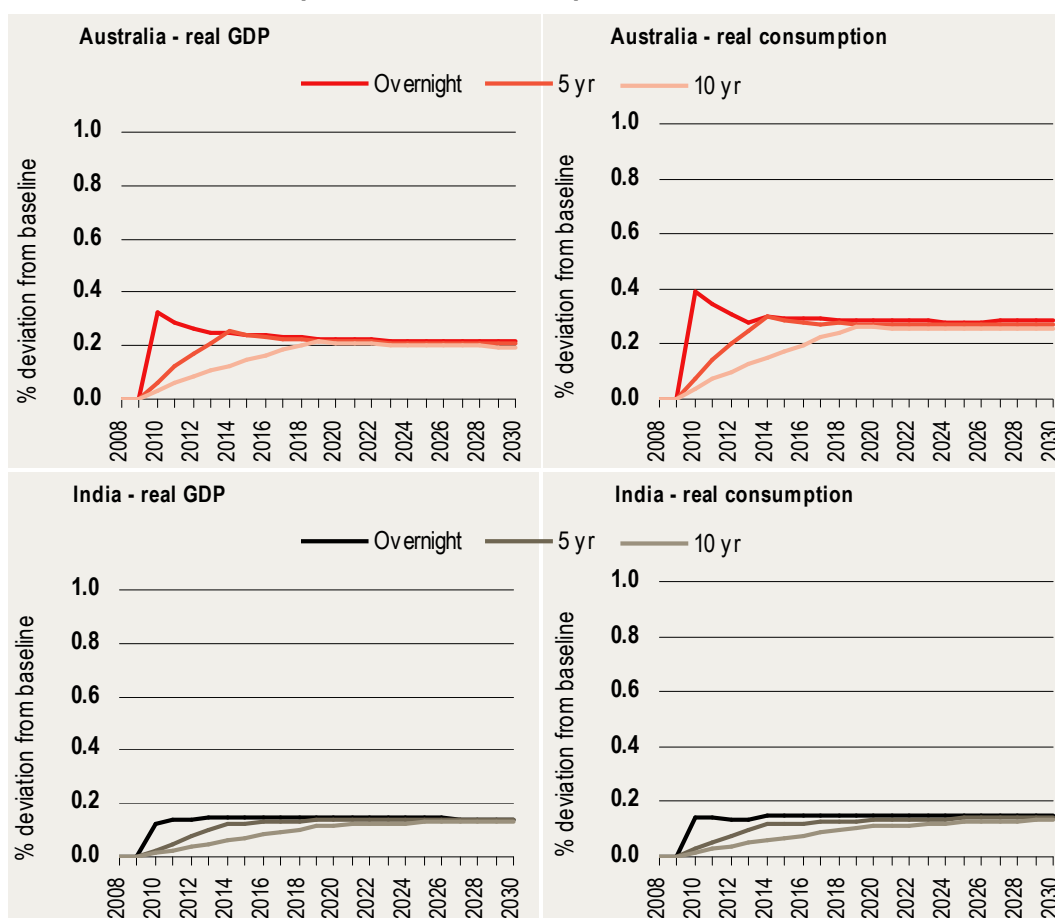
Data source: CIEG-Cubed modelling simulation.

Delaying the potential gains from the FTA, as the slower phase in scenarios do, translates into a substantial reduction in gains when results are expressed in present value terms. Chart 6.2 shows the production and welfare gains expressed in net present value terms. As can be seen, the slower paced liberalisation scenarios are associated with smaller gains. Indeed, removing trade barriers over 5 years sees Australia's GDP gain being reduced by over 15 per cent, and by 31 per cent in the case of a 10 year phase-in of the FTA.

In the case of India, a 5 year phase-in of the FTA sees the real GDP gain being reduced by over 16 per cent, and by 33.2 per cent under the 10 year phase-in scenario.

The conclusion to draw is that it is in both Australia's and India's best interests to liberalise bilateral trade and investment as quickly as possible.

6.2 **Present value of economic impacts under different phase-in scenarios** NPV[a]
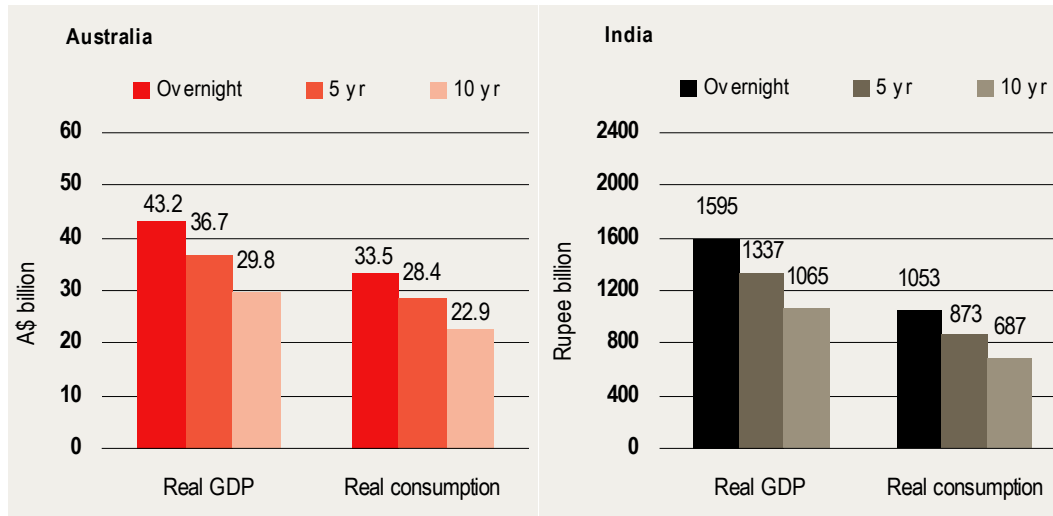
a Over 2010 to 2030, expressed in 2008 dollar terms using a 5 per cent real interest discount rate.
Data source: CIEG-Cubed modelling simulation.

Appendix

A Detailed sectoral modelling results

In Chapter 5 modelling results for 26 aggregated sectors are reported. The sectoral aggregation was undertaken so as to ease the presentation of the modelling results. The mapping between the (aggregated) 26 sectors reported in chapter 5 and the 57 (GTAP) sectors identified in the CIEG-Cubed economic model is reported in table A.1.

The impact of the phased liberalisation scenario at the detailed (57) sectoral level for each of Australia and India is reported in the tables that follow. Results at five yearly intervals of 2010, 2015, 2020, 2025 and 2030 are provided for each of:

- Australia
    - sectoral output — table A.2
    - sectoral employment — table A.3
    - sectoral capital stock/investment — table A.4
    - sectoral exports — table A.5
    - sectoral imports — table A.6
- India
    - sectoral output — table A.7
    - sectoral employment — table A.8
    - sectoral capital stock/investment — table A.9
    - sectoral exports — table A.10
    - sectoral imports — table A.11.

A.1 **Sectoral aggregation**

Aggregated sectors	*Comprising sectors*
Rice	Paddy rice, Processed rice
Wheat	Wheat
Other crops	Cereal grains, Oil seeds, Plant fibres, Other crops
Vegetable & fruit	Vegetables, fruits and nuts
Cattle	Cattle
Other animal products	Wool, Other animal products
Forestry	Forestry
Fishing	Fishing
Minerals & energy	Coal, Oil, Gas, Other minerals
Meat	Cattle meat, Other meat
Dairy	Raw milk, Milk
Sugar	Sugar cane, Sugar
Other food & beverages	Vegetable oils and fats, Other food products, Beverages and tobacco
Textiles & clothing	Textiles, Wearing apparel, Leather products
Chemicals	Petroleum and coal products, Chemicals, rubber and plastic products, Other mineral products
Metal	Ferrous metals, Other metals, Metal products
Transportation	Motor vehicles and parts, Other transport equipment
Electrical products	Electronic products
Machinery	Machinery and equipment
Other manufacturing products	Wood products, Paper products and publishing, Other manufactures
Construction	Construction
Transport	Water transport, Air transport, Other transport
Communication	Communication
Financial services	Insurance, Other financial services
Other non-public services	Electricity, Gas manufacture and distribution, Water, Other business services, Trade, Recreation and other services, Dwellings
Public services	Public administration, defence, health and education,

Source: CIE.

A.2 **Australian sectoral output**   per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	-0.1	-0.3	-0.4	-0.4	-0.4
Wheat	1.0	1.4	1.7	1.8	1.8
Cereal grains nec	-0.1	-0.2	-0.2	-0.2	-0.2
Vegetables, fruit, nuts	0.8	0.8	0.9	0.9	1.0
Oil seeds	-0.3	-0.5	-0.6	-0.6	-0.6
Sugar cane, sugar beet	0.3	0.2	0.1	0.1	0.1
Plant-based fibers	-0.1	-0.2	-0.3	-0.4	-0.4
Crops nec	0.1	0.0	0.0	0.0	0.0
Cattle, sheep and goats, horses	-0.2	-0.4	-0.6	-0.6	-0.6
Animal products nec	-0.2	-0.4	-0.4	-0.5	-0.5
Raw milk	0.1	-0.1	-0.1	-0.2	-0.2
Wool, silk-worm cocoons	0.5	0.4	0.4	0.4	0.4
Forestry	0.7	0.7	0.8	0.8	0.8
Fishing	0.3	0.2	0.2	0.2	0.2
Coal	0.4	0.6	0.7	0.7	0.7
Oil	0.6	0.6	0.6	0.6	0.6
Gas	-0.8	-0.8	-0.7	-0.7	-0.7
Minerals nec	0.0	0.0	0.0	-0.1	-0.1
Bovine meat products	-0.7	-1.0	-1.2	-1.3	-1.4
Meat products nec	0.2	0.1	0.0	0.0	0.0
Vegetable oils and fats	0.4	0.2	0.2	0.2	0.2
Dairy products	0.0	-0.2	-0.2	-0.3	-0.3
Processed rice	0.0	-0.1	-0.1	-0.2	-0.2
Sugar	0.3	0.2	0.2	0.2	0.2
Food products nec	0.3	0.1	0.1	0.1	0.1
Beverages and tobacco products	0.2	0.1	0.1	0.1	0.1
Textiles	1.3	1.4	1.6	1.6	1.6
Wearing apparel	0.8	0.7	0.7	0.7	0.7
Leather products	1.7	1.5	1.6	1.7	1.7
Wood products	0.5	0.3	0.3	0.3	0.3
Paper products, publishing	0.2	0.2	0.1	0.1	0.1
Petroleum, coal products	0.6	0.5	0.6	0.6	0.6
Chemical, rubber, plastic products	0.7	0.6	0.7	0.7	0.6
Mineral products nec	0.2	0.2	0.2	0.2	0.2
Ferrous metals	0.6	0.5	0.5	0.5	0.5
Metals nec	1.5	1.8	2.0	2.0	2.0
Metal products	0.5	0.4	0.4	0.4	0.4
Motor vehicles and parts	0.6	0.5	0.5	0.5	0.5
Transport equipment nec	1.4	1.4	1.4	1.4	1.4
Electronic equipment	2.1	2.2	2.4	2.4	2.4
Machinery and equipment nec	1.5	1.5	1.5	1.5	1.5
Manufactures nec	0.6	0.6	0.6	0.6	0.6
Electricity	0.4	0.4	0.4	0.5	0.5
Gas manufacture, distribution	0.3	0.3	0.4	0.4	0.4
Water	0.0	0.0	0.1	0.1	0.1
Construction	0.2	0.1	0.1	0.1	0.0
Trade	0.2	0.1	0.1	0.0	0.0
Transport nec	0.2	0.1	0.1	0.1	0.1
Water transport	0.0	0.0	0.0	-0.1	-0.1

(Continued on next page)

A.2 **Australian sectoral output** per cent deviation from baseline (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Air transport	0.3	0.2	0.2	0.2	0.2
Communication	0.0	0.0	0.0	0.0	0.0
Financial services nec	0.0	-0.1	-0.1	-0.1	-0.1
Insurance	0.0	0.0	0.0	0.0	0.0
Business services nec	0.0	-0.2	-0.2	-0.2	-0.2
Recreational and other services	0.2	0.1	0.1	0.1	0.1
Public admin., Defence, Edu., Health	0.3	0.2	0.2	0.2	0.2
Dwellings	0.3	0.3	0.3	0.3	0.3

Source: CIEG-Cubed modelling simulation.

A.3 **Australian sectoral employment** per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	-0.2	-0.4	-0.6	-0.7	-0.7
Wheat	0.9	1.3	1.6	1.6	1.6
Cereal grains nec	-0.2	-0.3	-0.4	-0.5	-0.5
Vegetables, fruit, nuts	0.6	0.6	0.6	0.7	0.7
Oil seeds	-0.5	-0.7	-0.9	-1.0	-1.0
Sugar cane, sugar beet	0.1	0.0	-0.1	-0.1	-0.2
Plant-based fibers	-0.2	-0.4	-0.6	-0.7	-0.7
Crops nec	0.0	-0.2	-0.3	-0.4	-0.4
Cattle, sheep and goats, horses	-0.4	-0.7	-0.8	-0.9	-0.9
Animal products nec	-0.3	-0.6	-0.7	-0.8	-0.8
Raw milk	-0.1	-0.3	-0.4	-0.5	-0.5
Wool, silk-worm cocoons	0.4	0.3	0.2	0.1	0.1
Forestry	0.5	0.5	0.5	0.5	0.5
Fishing	0.0	-0.1	-0.2	-0.3	-0.3
Coal	0.5	0.5	0.5	0.4	0.4
Oil	0.1	0.0	0.0	0.0	-0.1
Gas	-1.0	-1.0	-1.0	-1.0	-1.0
Minerals nec	-0.2	-0.2	-0.3	-0.4	-0.5
Bovine meat products	-0.8	-1.2	-1.4	-1.5	-1.6
Meat products nec	0.0	-0.2	-0.2	-0.3	-0.3
Vegetable oils and fats	0.0	-0.3	-0.4	-0.4	-0.4
Dairy products	-0.2	-0.4	-0.5	-0.5	-0.5
Processed rice	-0.1	-0.3	-0.4	-0.5	-0.5
Sugar	0.1	0.0	-0.1	-0.1	-0.1
Food products nec	0.0	-0.1	-0.2	-0.3	-0.3
Beverages and tobacco products	0.0	-0.1	-0.2	-0.2	-0.2
Textiles	0.7	0.6	0.6	0.7	0.7
Wearing apparel	0.1	-0.1	-0.2	-0.3	-0.3
Leather products	0.7	0.5	0.5	0.5	0.5
Wood products	0.1	-0.1	-0.2	-0.2	-0.2
Paper products, publishing	0.0	-0.1	-0.2	-0.2	-0.2
Petroleum, coal products	0.3	0.2	0.1	0.1	0.1
Chemical, rubber, plastic products	0.3	0.2	0.2	0.2	0.2
Mineral products nec	0.0	-0.1	-0.1	-0.1	-0.1
Ferrous metals	0.3	0.3	0.3	0.2	0.2

A.3 Australian sectoral employment per cent deviation from baseline (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Metals nec	1.2	1.5	1.6	1.7	1.6
Metal products	0.2	0.1	0.1	0.0	0.0
Motor vehicles and parts	0.2	0.1	0.0	0.0	0.0
Transport equipment nec	0.9	0.8	0.8	0.7	0.7
Electronic equipment	1.3	1.4	1.5	1.5	1.5
Machinery and equipment nec	0.9	0.8	0.8	0.8	0.8
Manufactures nec	0.2	0.1	0.1	0.0	0.0
Electricity	0.4	0.3	0.3	0.3	0.3
Gas manufacture, distribution	0.3	0.2	0.2	0.2	0.1
Water	-0.1	0.0	0.0	0.0	0.0
Construction	0.1	0.0	0.0	0.0	0.0
Trade	0.1	0.0	0.0	0.0	0.0
Transport nec	0.1	0.0	0.0	-0.1	-0.1
Water transport	-0.1	-0.2	-0.2	-0.2	-0.2
Air transport	0.1	0.0	0.0	0.0	0.0
Communication	0.0	0.0	0.0	0.0	0.0
Financial services nec	-0.1	-0.1	-0.1	-0.1	-0.1
Insurance	0.0	-0.1	-0.1	-0.1	-0.1
Business services nec	-0.1	-0.2	-0.3	-0.3	-0.3
Recreational and other services	0.1	0.1	0.0	0.0	0.0
Public admin., Defence, Edu., Health	0.2	0.2	0.1	0.1	0.1
Dwellings	0.5	0.3	0.2	0.2	0.2

Source: CIEG-Cubed modelling simulation.

A.4 Australian sectoral investment per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	-3.6	-0.4	-0.3	-0.4	-0.4
Wheat	4.8	2.7	2.4	2.0	1.9
Cereal grains nec	-2.9	-0.2	-0.1	-0.2	-0.2
Vegetables, fruit, nuts	2.0	1.3	1.2	1.1	1.0
Oil seeds	-5.3	-0.8	-0.6	-0.7	-0.7
Sugar cane, sugar beet	-1.2	0.2	0.2	0.2	0.2
Plant-based fibers	-3.6	-0.4	-0.3	-0.4	-0.4
Crops nec	-2.4	0.0	0.0	0.0	0.0
Cattle, sheep and goats, horses	-4.7	-0.7	-0.6	-0.6	-0.6
Animal products nec	-4.3	-0.6	-0.5	-0.5	-0.5
Raw milk	-2.8	-0.2	-0.1	-0.1	-0.2
Wool, silk-worm cocoons	0.5	0.7	0.5	0.4	0.4
Forestry	1.6	1.0	0.9	0.8	0.8
Fishing	-2.0	0.1	0.1	0.1	0.0
Coal	0.8	1.2	1.0	0.9	0.9
Oil	-0.4	0.1	0.1	0.1	0.0
Gas	-6.9	-1.0	-0.9	-0.8	-0.8
Minerals nec	-2.2	0.0	-0.2	-0.2	-0.3
Bovine meat products	-7.4	-1.6	-1.4	-1.4	-1.3
Meat products nec	-1.8	0.0	0.0	0.0	0.0
Vegetable oils and fats	-2.4	-0.1	-0.1	-0.1	-0.1

(Continued on next page)

A.4 Australian sectoral investment per cent deviation from baseline (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Dairy products	-2.9	-0.3	-0.2	-0.2	-0.3
Processed rice	-2.6	-0.2	-0.2	-0.2	-0.2
Sugar	-1.0	0.2	0.2	0.2	0.2
Food products nec	-1.7	0.0	0.1	0.0	0.0
Beverages and tobacco products	-1.5	0.1	0.1	0.1	0.1
Textiles	2.3	1.2	1.1	1.0	1.0
Wearing apparel	-1.8	0.0	0.1	0.0	0.0
Leather products	2.0	0.9	0.8	0.8	0.8
Wood products	-1.3	0.1	0.0	0.0	0.0
Paper products, publishing	-1.4	0.1	0.1	0.1	0.1
Petroleum, coal products	0.5	0.3	0.3	0.3	0.3
Chemical, rubber, plastic products	1.1	0.4	0.3	0.3	0.3
Mineral products nec	-0.8	0.0	0.0	0.0	0.0
Ferrous metals	1.3	0.5	0.4	0.3	0.3
Metals nec	7.9	2.3	1.9	1.8	1.7
Metal products	0.4	0.2	0.2	0.1	0.1
Motor vehicles and parts	0.2	0.2	0.1	0.1	0.1
Transport equipment nec	4.4	1.0	0.9	0.8	0.8
Electronic equipment	7.9	2.0	1.7	1.6	1.6
Machinery and equipment nec	4.6	1.1	0.9	0.9	0.9
Manufactures nec	0.3	0.2	0.2	0.1	0.1
Electricity	1.1	0.6	0.5	0.5	0.5
Gas manufacture, distribution	0.4	0.5	0.4	0.4	0.3
Water	-0.7	0.1	0.1	0.1	0.1
Construction	0.1	0.1	0.0	0.0	0.1
Trade	0.2	0.0	0.1	0.0	0.1
Transport nec	-0.5	0.1	0.1	0.1	0.1
Water transport	-1.4	-0.1	-0.1	-0.1	-0.1
Air transport	-0.2	0.1	0.1	0.1	0.1
Communication	0.1	0.0	0.0	0.0	0.0
Financial services nec	-1.0	-0.1	0.0	0.0	-0.1
Insurance	-0.5	0.0	0.0	0.0	0.0
Business services nec	-1.3	-0.3	-0.2	-0.2	-0.2
Recreational and other services	0.2	0.1	0.1	0.1	0.1
Public admin., Defence, Edu., Health	0.9	0.2	0.2	0.2	0.2
Dwellings	1.5	0.3	0.3	0.3	0.3

Source: CIEG-Cubed modelling simulation.

A.5 Australian sectoral exports per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	-3.0	-3.6	-4.1	-4.3	-4.3
Wheat	1.4	2.2	2.7	2.9	2.8
Cereal grains nec	-0.4	-0.4	-0.5	-0.5	-0.5
Vegetables, fruit, nuts	6.5	8.2	9.4	9.8	9.9
Oil seeds	-0.7	-0.9	-1.0	-1.0	-1.1
Sugar cane, sugar beet	0.0	0.0	0.0	0.0	0.0
Plant-based fibers	-0.5	-0.7	-0.8	-0.9	-0.9

(Continued on next page)

A.5 Australian sectoral exports per cent deviation from baseline (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Crops nec	-0.1	-0.1	-0.1	-0.1	-0.2
Cattle, sheep and goats, horses	-0.5	-0.6	-0.7	-0.7	-0.7
Animal products nec	-0.4	-0.6	-0.6	-0.7	-0.7
Raw milk	0.0	0.0	0.0	0.0	0.0
Wool, silk-worm cocoons	0.3	0.2	0.2	0.1	0.1
Forestry	7.4	8.9	9.7	9.9	9.8
Fishing	-0.3	-0.4	-0.5	-0.6	-0.6
Coal	0.4	0.6	0.8	0.8	0.8
Oil	0.2	0.2	0.2	0.2	0.2
Gas	-2.0	-2.0	-1.9	-1.9	-1.9
Minerals nec	-0.3	-0.4	-0.5	-0.5	-0.6
Bovine meat products	-1.7	-2.3	-2.7	-2.8	-2.9
Meat products nec	-1.4	-2.1	-2.5	-2.6	-2.7
Vegetable oils and fats	0.3	0.0	-0.1	-0.1	-0.2
Dairy products	-1.4	-1.9	-2.1	-2.2	-2.3
Processed rice	-0.9	-1.2	-1.4	-1.5	-1.5
Sugar	-0.1	-0.2	-0.3	-0.3	-0.3
Food products nec	-0.4	-0.6	-0.7	-0.7	-0.8
Beverages and tobacco products	-0.5	-0.6	-0.6	-0.6	-0.6
Textiles	10.1	12.4	14.0	14.6	14.6
Wearing apparel	1.5	1.1	1.1	1.2	1.2
Leather products	1.9	2.5	2.7	2.7	2.7
Wood products	-0.1	-0.4	-0.5	-0.6	-0.6
Paper products, publishing	-0.3	-0.5	-0.5	-0.5	-0.6
Petroleum, coal products	0.6	0.6	0.7	0.7	0.7
Chemical, rubber, plastic products	1.1	1.2	1.3	1.3	1.3
Mineral products nec	0.0	0.0	0.0	0.1	0.0
Ferrous metals	2.1	2.5	2.7	2.8	2.7
Metals nec	2.1	2.5	2.7	2.8	2.8
Metal products	0.8	0.7	0.7	0.7	0.7
Motor vehicles and parts	0.4	0.3	0.3	0.3	0.2
Transport equipment nec	2.5	2.7	2.9	3.0	3.0
Electronic equipment	2.1	2.4	2.6	2.6	2.6
Machinery and equipment nec	2.0	2.2	2.3	2.4	2.4
Manufactures nec	1.0	1.0	1.0	1.1	1.1
Electricity	0.0	0.0	0.0	0.0	0.0
Gas manufacture, distribution	-0.7	-0.8	-0.8	-0.8	-0.9
Water	-2.4	-2.3	-2.3	-2.3	-2.3
Construction	-1.0	-1.3	-1.5	-1.6	-1.6
Trade	-1.0	-1.3	-1.5	-1.6	-1.6
Transport nec	-0.9	-1.2	-1.4	-1.4	-1.4
Water transport	-0.8	-1.0	-1.0	-1.0	-1.1
Air transport	-0.6	-0.8	-0.9	-1.0	-1.0
Communication	2.4	3.1	3.5	3.7	3.7
Financial services nec	-1.7	-1.9	-2.0	-2.0	-2.0
Insurance	-1.6	-1.8	-2.0	-2.0	-2.0
Business services nec	-1.2	-1.5	-1.7	-1.7	-1.8
Recreational and other services	-1.2	-1.3	-1.4	-1.5	-1.5
Public admin., Defence, Edu., Health	-1.3	-1.6	-1.8	-1.9	-2.0
Dwellings	0.0	0.0	0.0	0.0	0.0

Source: CIEG-Cubed modelling simulation.

A.6   **Australian sectoral imports**   per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	1.6	1.7	1.8	1.8	1.8
Wheat	2.2	3.0	3.4	3.6	3.6
Cereal grains nec	0.4	0.4	0.4	0.4	0.4
Vegetables, fruit, nuts	1.4	1.5	1.7	1.8	1.8
Oil seeds	0.4	0.4	0.5	0.5	0.4
Sugar cane, sugar beet	0.3	0.2	0.1	0.1	0.1
Plant-based fibers	0.7	0.7	0.7	0.7	0.7
Crops nec	1.1	1.2	1.3	1.3	1.3
Cattle, sheep and goats, horses	0.3	0.3	0.3	0.2	0.2
Animal products nec	0.2	0.1	0.1	0.1	0.1
Raw milk	0.1	-0.1	-0.1	-0.2	-0.2
Wool, silk-worm cocoons	2.8	3.2	3.5	3.6	3.6
Forestry	1.3	1.5	1.7	1.8	1.8
Fishing	0.5	0.5	0.6	0.6	0.6
Coal	1.9	2.3	2.5	2.5	2.6
Oil	0.3	0.2	0.2	0.2	0.2
Gas	2.0	2.5	2.7	2.8	2.9
Minerals nec	3.5	4.2	4.4	4.4	4.4
Bovine meat products	0.4	0.5	0.5	0.5	0.5
Meat products nec	1.3	1.6	1.8	1.8	1.9
Vegetable oils and fats	0.4	0.6	0.6	0.7	0.7
Dairy products	1.0	1.2	1.3	1.3	1.3
Processed rice	0.7	0.8	0.8	0.8	0.8
Sugar	1.0	1.2	1.3	1.3	1.4
Food products nec	0.7	0.8	0.8	0.8	0.9
Beverages and tobacco products	0.5	0.5	0.5	0.5	0.5
Textiles	0.9	1.1	1.3	1.3	1.3
Wearing apparel	0.1	0.2	0.2	0.2	0.2
Leather products	0.1	0.1	0.1	0.1	0.1
Wood products	0.7	0.8	0.8	0.8	0.9
Paper products, publishing	0.9	1.1	1.1	1.2	1.2
Petroleum, coal products	0.4	0.4	0.4	0.4	0.5
Chemical, rubber, plastic products	0.6	0.7	0.8	0.8	0.8
Mineral products nec	0.8	1.0	1.0	1.1	1.1
Ferrous metals	1.0	1.2	1.3	1.3	1.3
Metals nec	2.1	2.5	2.8	2.9	2.9
Metal products	1.0	1.2	1.3	1.4	1.4
Motor vehicles and parts	0.4	0.5	0.5	0.5	0.5
Transport equipment nec	0.3	0.4	0.4	0.4	0.5
Electronic equipment	0.4	0.4	0.4	0.4	0.4
Machinery and equipment nec	0.4	0.5	0.6	0.6	0.6
Manufactures nec	0.6	0.8	0.8	0.8	0.9
Electricity	0.4	0.4	0.4	0.5	0.5
Gas manufacture, distribution	1.4	1.5	1.6	1.6	1.6
Water	1.3	1.3	1.3	1.3	1.3
Construction	0.2	0.1	0.1	0.1	0.0
Trade	0.8	0.9	1.0	1.0	1.0
Transport nec	0.7	0.8	0.8	0.9	0.9
Water transport	0.6	0.7	0.8	0.8	0.8

(Continued on next page)

A.6   **Australian sectoral imports**   per cent deviation from baseline   (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Air transport	0.6	0.7	0.7	0.8	0.8
Communication	0.1	0.1	0.1	0.1	0.1
Financial services nec	0.9	0.9	1.0	1.0	1.0
Insurance	0.9	1.0	1.0	1.0	1.0
Business services nec	0.6	0.8	0.8	0.9	0.9
Recreational and other services	0.8	0.9	0.9	0.9	1.0
Public admin., Defence, Edu., Health	1.0	1.1	1.2	1.2	1.3
Dwellings	1.8	0.8	0.7	0.6	0.6

Source: CIEG-Cubed modelling simulation.

A.7   **India sectoral output**   per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	0.1	0.1	0.1	0.1	0.1
Wheat	-0.1	-0.1	-0.1	-0.1	-0.1
Cereal grains nec	0.1	0.1	0.1	0.1	0.1
Vegetables, fruit, nuts	0.0	0.0	0.0	0.0	0.0
Oil seeds	0.0	0.0	0.0	0.0	0.0
Sugar cane, sugar beet	0.1	0.1	0.1	0.1	0.1
Plant-based fibers	0.0	0.0	0.0	0.0	0.0
Crops nec	0.0	0.0	0.0	0.0	0.0
Cattle, sheep and goats, horses	0.0	0.0	0.0	0.0	0.0
Animal products nec	0.1	0.1	0.1	0.1	0.1
Raw milk	0.1	0.1	0.1	0.1	0.1
Wool, silk-worm cocoons	-0.6	-0.7	-0.7	-0.7	-0.8
Forestry	0.0	0.0	0.0	0.0	0.0
Fishing	0.1	0.1	0.1	0.1	0.1
Coal	1.5	1.6	1.6	1.7	1.7
Oil	-0.3	-0.3	-0.3	-0.3	-0.4
Gas	0.1	0.2	0.2	0.2	0.1
Minerals nec	7.7	7.8	7.8	7.8	7.8
Bovine meat products	0.0	0.0	0.0	0.0	0.0
Meat products nec	-0.7	-0.6	-0.6	-0.7	-0.7
Vegetable oils and fats	-0.2	-0.1	-0.2	-0.2	-0.2
Dairy products	0.1	0.1	0.1	0.1	0.1
Processed rice	0.1	0.1	0.1	0.1	0.1
Sugar	0.1	0.1	0.1	0.1	0.1
Food products nec	0.1	0.1	0.1	0.1	0.1
Beverages and tobacco products	0.1	0.1	0.1	0.1	0.1
Textiles	0.1	0.1	0.0	0.0	0.0
Wearing apparel	0.1	-0.1	-0.1	-0.1	-0.2
Leather products	-0.2	-0.1	-0.1	-0.1	-0.2
Wood products	-0.2	-0.2	-0.2	-0.3	-0.3
Paper products, publishing	0.0	0.1	0.1	0.0	0.0
Petroleum, coal products	0.1	0.2	0.2	0.2	0.2
Chemical, rubber, plastic products	0.0	0.0	0.0	0.0	0.0
Mineral products nec	0.2	0.3	0.2	0.2	0.2

(Continued on next page)

A.7 **India sectoral output**   per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Ferrous metals	0.4	0.5	0.5	0.5	0.5
Metals nec	4.9	5.4	5.8	6.0	6.1
Metal products	0.6	0.7	0.7	0.7	0.7
Motor vehicles and parts	0.0	0.1	0.1	0.0	0.0
Transport equipment nec	-0.1	-0.1	0.0	-0.1	-0.1
Electronic equipment	-0.8	-0.7	-0.7	-0.8	-0.7
Machinery and equipment nec	0.1	0.3	0.3	0.2	0.2
Manufactures nec	0.6	0.6	0.6	0.6	0.6
Electricity	0.6	0.6	0.6	0.6	0.6
Gas manufacture, distribution	0.0	0.0	0.0	0.0	0.0
Water	0.1	0.1	0.1	0.1	0.0
Construction	0.0	0.0	0.0	0.0	0.0
Trade	0.0	0.0	0.0	0.0	0.0
Transport nec	0.0	0.0	0.0	0.0	0.0
Water transport	0.0	0.0	-0.1	-0.1	-0.1
Air transport	-0.1	-0.1	-0.1	-0.1	-0.1
Communication	0.1	0.1	0.1	0.1	0.1
Financial services nec	-0.2	-0.2	-0.2	-0.2	-0.2
Insurance	-0.2	-0.2	-0.2	-0.2	-0.2
Business services nec	-0.1	-0.1	-0.1	-0.1	-0.2
Recreational and other services	0.1	0.1	0.1	0.1	0.1
Public admin., Defence, Edu., Health	0.1	0.1	0.1	0.1	0.1
Dwellings	0.1	0.1	0.1	0.1	0.1

Source: CIEG-Cubed modelling simulation.

A.8 **Indian sectoral employment**   per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	0.2	0.1	0.1	0.0	0.1
Wheat	-0.7	-0.8	-0.9	-0.9	-0.8
Cereal grains nec	0.1	0.0	0.0	0.0	0.0
Vegetables, fruit, nuts	0.0	-0.2	-0.2	-0.3	-0.3
Oil seeds	0.1	0.0	-0.1	-0.1	-0.1
Sugar cane, sugar beet	0.2	0.1	0.1	0.1	0.1
Plant-based fibers	0.0	-0.1	-0.2	-0.2	-0.2
Crops nec	0.1	-0.1	-0.1	-0.1	-0.1
Cattle, sheep and goats, horses	0.0	-0.1	-0.2	-0.2	-0.2
Animal products nec	0.2	0.0	0.0	0.0	0.0
Raw milk	0.2	0.1	0.1	0.1	0.1
Wool, silk-worm cocoons	-2.5	-2.4	-2.6	-2.6	-2.6
Forestry	0.1	0.0	0.0	-0.1	-0.1
Fishing	0.3	0.2	0.1	0.1	0.1
Coal	-1.3	-1.3	-1.3	-1.3	-1.3
Oil	-0.1	-0.2	-0.2	-0.2	-0.3
Gas	-0.4	-0.5	-0.6	-0.6	-0.6
Minerals nec	6.2	6.2	6.2	6.2	6.1
Bovine meat products	0.1	0.0	-0.1	-0.1	-0.1
Meat products nec	-0.4	-0.5	-0.6	-0.6	-0.6
Vegetable oils and fats	0.0	-0.1	-0.2	-0.2	-0.2

(Continued on next page)

A.8   **Indian sectoral employment** per cent deviation from baseline   (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Dairy products	0.2	0.1	0.1	0.0	0.1
Processed rice	0.2	0.1	0.1	0.1	0.1
Sugar	0.2	0.1	0.1	0.0	0.0
Food products nec	0.1	0.0	-0.1	-0.1	-0.1
Beverages and tobacco products	0.2	0.0	0.0	0.0	0.0
Textiles	0.1	-0.1	-0.1	-0.1	-0.2
Wearing apparel	0.1	-0.2	-0.3	-0.3	-0.3
Leather products	-0.1	-0.2	-0.2	-0.2	-0.3
Wood products	-0.1	-0.3	-0.3	-0.3	-0.3
Paper products, publishing	0.1	0.0	-0.1	-0.1	-0.1
Petroleum, coal products	0.1	0.1	0.1	0.0	0.0
Chemical, rubber, plastic products	0.0	0.0	0.0	0.0	0.0
Mineral products nec	0.2	0.2	0.1	0.1	0.1
Ferrous metals	0.4	0.4	0.4	0.4	0.4
Metals nec	1.6	2.1	2.4	2.6	2.6
Metal products	0.5	0.5	0.5	0.5	0.5
Motor vehicles and parts	0.0	0.0	0.0	0.0	0.0
Transport equipment nec	0.0	0.0	-0.1	-0.1	-0.1
Electronic equipment	-0.5	-0.4	-0.5	-0.6	-0.6
Machinery and equipment nec	0.3	0.3	0.3	0.2	0.2
Manufactures nec	0.5	0.5	0.5	0.5	0.5
Electricity	0.3	0.3	0.2	0.2	0.2
Gas manufacture, distribution	0.1	0.0	0.0	0.0	0.0
Water	0.1	0.1	0.0	0.0	0.0
Construction	0.0	0.0	0.0	-0.1	0.0
Trade	0.0	0.0	0.0	0.0	0.0
Transport nec	0.1	0.0	0.0	0.0	0.0
Water transport	0.0	-0.1	-0.1	-0.1	-0.1
Air transport	0.0	-0.1	-0.1	-0.1	-0.1
Communication	0.0	0.0	0.0	0.0	0.0
Financial services nec	-0.1	-0.2	-0.2	-0.2	-0.2
Insurance	-0.1	-0.2	-0.2	-0.2	-0.2
Business services nec	0.0	-0.1	-0.1	-0.1	-0.2
Recreational and other services	0.2	0.1	0.1	0.1	0.1
Public admin., Defence, Edu., Health	0.1	0.1	0.1	0.1	0.1
Dwellings	0.2	0.2	0.1	0.1	0.1

Source: CIEG-Cubed modelling simulation.

A.9   **Indian sectoral investment** per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	-1.1	0.0	0.0	-0.1	0.0
Wheat	-6.7	-1.2	-1.0	-1.1	-1.0
Cereal grains nec	-1.5	-0.2	-0.1	-0.2	-0.1
Vegetables, fruit, nuts	-2.7	-0.4	-0.3	-0.4	-0.3
Oil seeds	-1.7	-0.2	-0.1	-0.2	-0.2
Sugar cane, sugar beet	-0.9	0.0	0.0	-0.1	0.0
Plant-based fibers	-1.9	-0.4	-0.3	-0.4	-0.3

A.9   **Indian sectoral investment** per cent deviation from baseline   (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Crops nec	-1.8	-0.2	-0.2	-0.2	-0.2
Cattle, sheep and goats, horses	-2.2	-0.3	-0.2	-0.3	-0.3
Animal products nec	-1.4	-0.1	-0.1	-0.1	-0.1
Raw milk	-0.9	0.0	0.0	-0.1	0.0
Wool, silk-worm cocoons	-16.2	-3.4	-2.8	-2.8	-2.7
Forestry	-1.1	-0.1	-0.1	-0.2	-0.1
Fishing	-0.4	0.0	0.0	0.0	0.0
Coal	-15.4	-1.6	-1.3	-1.5	-1.4
Oil	-1.4	-0.4	-0.3	-0.4	-0.3
Gas	-3.6	-0.8	-0.7	-0.7	-0.7
Minerals nec	38.8	7.4	6.2	5.8	6.0
Bovine meat products	-1.3	-0.2	-0.1	-0.2	-0.1
Meat products nec	-4.0	-0.9	-0.7	-0.8	-0.7
Vegetable oils and fats	-1.8	-0.4	-0.3	-0.4	-0.3
Dairy products	-0.7	0.0	0.0	-0.1	0.0
Processed rice	-0.7	0.0	0.0	0.0	0.0
Sugar	-0.4	0.0	0.0	-0.1	0.0
Food products nec	-1.3	-0.2	-0.1	-0.2	-0.1
Beverages and tobacco products	-1.0	-0.1	-0.1	-0.1	-0.1
Textiles	-1.5	-0.3	-0.2	-0.3	-0.2
Wearing apparel	-0.9	-0.6	-0.5	-0.6	-0.4
Leather products	-1.9	-0.4	-0.4	-0.5	-0.4
Wood products	-2.6	-0.5	-0.4	-0.5	-0.5
Paper products, publishing	-1.2	-0.2	-0.2	-0.2	-0.2
Petroleum, coal products	0.1	0.0	0.0	-0.1	0.0
Chemical, rubber, plastic products	-0.3	-0.1	-0.1	-0.2	-0.1
Mineral products nec	0.6	0.1	0.1	0.0	0.0
Ferrous metals	1.9	0.5	0.4	0.3	0.3
Metals nec	11.1	3.4	3.0	2.8	2.8
Metal products	2.5	0.6	0.5	0.4	0.4
Motor vehicles and parts	-0.4	0.0	0.0	-0.1	-0.1
Transport equipment nec	-0.6	-0.1	-0.1	-0.2	-0.1
Electronic equipment	-3.1	-0.7	-0.6	-0.7	-0.8
Machinery and equipment nec	1.3	0.4	0.3	0.1	0.1
Manufactures nec	2.9	0.6	0.5	0.3	0.4
Electricity	0.8	0.2	0.2	0.1	0.2
Gas manufacture, distribution	-0.7	-0.1	-0.1	-0.1	-0.1
Water	0.1	0.0	0.0	0.0	0.0
Construction	-0.3	0.0	0.0	0.0	-0.1
Trade	-0.4	0.0	0.0	-0.1	0.0
Transport nec	-0.5	-0.1	0.0	-0.1	-0.1
Water transport	-0.9	-0.2	-0.2	-0.2	-0.2
Air transport	-1.0	-0.2	-0.2	-0.2	-0.2
Communication	0.0	0.0	0.0	0.0	0.0
Financial services nec	-1.2	-0.2	-0.2	-0.2	-0.2
Insurance	-1.3	-0.2	-0.2	-0.3	-0.3
Business services nec	-0.6	-0.2	-0.2	-0.3	-0.2
Recreational and other services	0.4	0.1	0.1	0.0	-0.1
Public admin., Defence, Edu., Health	0.3	0.0	0.1	0.0	0.1
Dwellings	0.7	0.1	0.1	0.1	0.1

Source: CIEG-Cubed modelling simulation.

A.10 **Indian sectoral exports**   per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	-0.8	-1.0	-1.1	-1.2	-1.3
Wheat	4.3	4.7	4.8	4.8	4.7
Cereal grains nec	-0.1	-0.1	-0.1	-0.1	-0.2
Vegetables, fruit, nuts	0.4	0.4	0.3	0.3	0.3
Oil seeds	-0.2	-0.3	-0.3	-0.4	-0.4
Sugar cane, sugar beet	-0.4	-0.5	-0.6	-0.6	-0.7
Plant-based fibers	0.0	0.0	0.0	0.0	-0.1
Crops nec	-0.4	-0.5	-0.6	-0.7	-0.8
Cattle, sheep and goats, horses	-0.1	0.0	0.0	-0.1	-0.1
Animal products nec	-0.3	-0.3	-0.4	-0.4	-0.4
Raw milk	0.0	0.0	0.0	0.0	0.0
Wool, silk-worm cocoons	18.4	19.8	20.5	20.7	20.6
Forestry	-0.6	-0.7	-0.8	-0.8	-0.9
Fishing	-0.4	-0.4	-0.5	-0.5	-0.5
Coal	15.4	15.1	14.7	14.6	14.4
Oil	-1.4	-1.4	-1.5	-1.6	-1.7
Gas	0.0	0.0	0.0	0.0	0.0
Minerals nec	7.5	8.0	8.3	8.4	8.3
Bovine meat products	-0.3	-0.2	-0.2	-0.2	-0.3
Meat products nec	-1.4	-1.1	-1.2	-1.3	-1.4
Vegetable oils and fats	-0.9	-0.8	-0.9	-0.9	-1.0
Dairy products	-0.7	-0.6	-0.7	-0.7	-0.8
Processed rice	-0.5	-0.6	-0.7	-0.8	-0.9
Sugar	-0.6	-0.6	-0.7	-0.7	-0.8
Food products nec	0.0	0.0	0.0	0.0	-0.1
Beverages and tobacco products	-0.2	-0.1	-0.1	-0.1	-0.2
Textiles	0.3	0.4	0.2	0.2	0.1
Wearing apparel	0.0	-0.2	-0.4	-0.4	-0.5
Leather products	-0.5	-0.4	-0.5	-0.5	-0.7
Wood products	-0.2	-0.3	-0.4	-0.4	-0.5
Paper products, publishing	0.1	0.2	0.2	0.2	0.1
Petroleum, coal products	0.0	0.1	0.1	0.1	0.0
Chemical, rubber, plastic products	-0.3	-0.1	-0.2	-0.2	-0.3
Mineral products nec	0.8	1.0	1.1	1.1	1.0
Ferrous metals	0.3	0.4	0.4	0.4	0.3
Metals nec	23.3	24.7	25.5	25.8	25.8
Metal products	2.5	3.0	3.1	3.2	3.1
Motor vehicles and parts	0.0	0.2	0.2	0.2	0.1
Transport equipment nec	-0.6	-0.4	-0.5	-0.5	-0.6
Electronic equipment	-1.3	-1.0	-1.1	-1.2	-1.3
Machinery and equipment nec	0.6	0.9	0.9	0.9	0.6
Manufactures nec	1.7	1.5	1.4	1.5	1.4
Electricity	1.8	1.8	1.7	1.7	1.6
Gas manufacture, distribution	-0.2	-0.2	-0.3	-0.3	-0.3
Water	-0.6	-0.6	-0.7	-0.8	-0.9
Construction	-0.1	-0.1	-0.2	-0.2	-0.3
Trade	-0.6	-0.6	-0.7	-0.7	-0.7
Transport nec	-0.4	-0.4	-0.5	-0.5	-0.6
Water transport	-0.4	-0.4	-0.4	-0.5	-0.5

A.10 **Indian sectoral exports** per cent deviation from baseline (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Air transport	-0.5	-0.4	-0.5	-0.5	-0.6
Communication	0.4	0.4	0.4	0.4	0.4
Financial services nec	-0.7	-0.7	-0.7	-0.7	-0.8
Insurance	-0.7	-0.7	-0.7	-0.7	-0.8
Business services nec	-0.2	-0.3	-0.3	-0.4	-0.4
Recreational and other services	-0.2	-0.2	-0.3	-0.3	-0.3
Public admin., Defence, Edu., Health	-0.4	-0.6	-0.7	-0.8	-0.8
Dwellings	1.8	0.8	0.7	0.6	0.6

Source: CIEG-Cubed modelling simulation.

A.11 **Indian sectoral imports** per cent deviation from baseline

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Paddy rice	0.1	0.1	0.1	0.1	0.1
Wheat	115.0	114.6	114.5	114.4	114.5
Cereal grains nec	21.4	21.3	21.3	21.3	21.3
Vegetables, fruit, nuts	4.4	4.4	4.5	4.6	4.6
Oil seeds	52.2	52.3	52.5	52.6	52.6
Sugar cane, sugar beet	0.1	0.1	0.1	0.1	0.1
Plant-based fibers	2.7	2.8	2.8	2.8	2.9
Crops nec	1.9	1.9	2.0	2.0	2.0
Cattle, sheep and goats, horses	0.1	0.1	0.1	0.1	0.2
Animal products nec	0.9	0.9	1.0	1.0	1.0
Raw milk	0.1	0.1	0.1	0.1	0.1
Wool, silk-worm cocoons	28.7	28.0	27.6	27.4	27.5
Forestry	0.9	0.9	1.0	1.0	1.1
Fishing	0.4	0.4	0.4	0.4	0.4
Coal	2.2	2.0	1.9	1.9	1.9
Oil	1.1	1.1	1.1	1.1	1.2
Gas	28.9	29.6	30.5	31.0	31.5
Minerals nec	-1.0	-0.5	-0.3	-0.2	-0.1
Bovine meat products	3.2	3.2	3.3	3.3	3.3
Meat products nec	0.9	0.8	0.8	0.8	0.9
Vegetable oils and fats	0.6	0.5	0.6	0.6	0.6
Dairy products	1.2	1.1	1.2	1.2	1.3
Processed rice	0.4	0.5	0.6	0.6	0.6
Sugar	12.7	12.7	12.9	13.0	13.1
Food products nec	0.9	0.9	0.9	0.9	1.0
Beverages and tobacco products	1.2	1.2	1.2	1.2	1.2
Textiles	1.5	1.4	1.5	1.4	1.5
Wearing apparel	0.3	0.3	0.3	0.3	0.3
Leather products	0.7	0.7	0.8	0.8	0.8
Wood products	0.3	0.3	0.4	0.4	0.5
Paper products, publishing	0.4	0.3	0.4	0.4	0.4
Petroleum, coal products	0.4	0.3	0.3	0.3	0.3
Chemical, rubber, plastic products	0.5	0.4	0.5	0.4	0.5
Mineral products nec	0.0	-0.1	0.0	-0.1	0.0

A.11 **Indian sectoral imports** per cent deviation from baseline   (continued)

Sector	2010	2015	2020	2025	2030
	Per cent	Per cent	Per cent	Per cent	Per cent
Ferrous metals	0.6	0.6	0.6	0.6	0.7
Metals nec	1.4	1.8	1.9	2.0	2.0
Metal products	-0.1	-0.2	-0.2	-0.3	-0.2
Motor vehicles and parts	0.3	0.3	0.3	0.3	0.3
Transport equipment nec	0.5	0.5	0.5	0.5	0.6
Electronic equipment	0.6	0.5	0.6	0.5	0.6
Machinery and equipment nec	0.1	0.1	0.1	0.1	0.2
Manufactures nec	0.0	0.0	0.0	0.0	0.1
Electricity	-0.3	-0.3	-0.2	-0.2	-0.2
Gas manufacture, distribution	0.5	0.5	0.6	0.6	0.6
Water	-0.1	-0.1	0.0	0.0	0.0
Construction	0.1	0.1	0.1	0.1	0.1
Trade	0.2	0.2	0.2	0.2	0.2
Transport nec	0.2	0.2	0.3	0.3	0.3
Water transport	0.2	0.2	0.2	0.2	0.2
Air transport	0.2	0.2	0.2	0.2	0.2
Communication	2.8	2.9	3.0	3.1	3.1
Financial services nec	0.2	0.3	0.3	0.3	0.3
Insurance	0.2	0.2	0.2	0.2	0.2
Business services nec	0.1	0.1	0.1	0.1	0.1
Recreational and other services	0.2	0.2	0.2	0.2	0.2
Public admin., Defence, Edu., Health	0.2	0.2	0.2	0.2	0.3
Dwellings	0.1	0.1	0.1	0.1	0.1

Source: CIEG-Cubed modelling simulation.