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Contents

Article

Appendix

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Australian Exports: Global Demand and the High Exchange Rate

Tim Atkin and Ellis Connolly*

Growth in Australian exports was weaker than had been expected over the past 10 years across all major categories: resources, rural, manufactures and services. While exports of bulk commodities and liquefied natural gas (LNG) grew strongly in response to higher demand from Asia, this was partly offset by declines in exports of oil and processed metals. Non-resource exports have been adversely affected by the appreciation of the exchange rate and the ongoing rise in the share of global production occurring in emerging economies. Looking ahead, the surge in mining-related investment since the mid 2000s is expected to lead to stronger growth in resource exports over the next five years. As incomes grow further in emerging Asia, demand for Australia's exports of food products, high-skilled manufactures and services is also expected to rise.

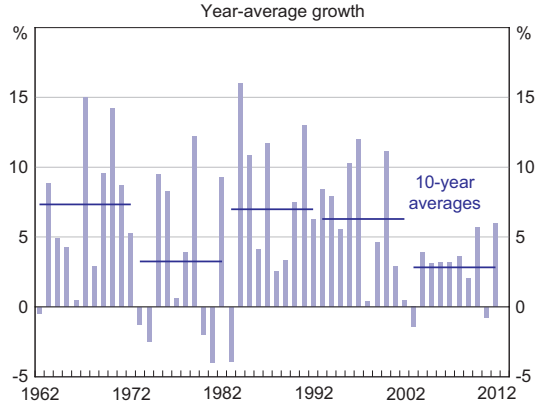
Introduction

Australian exports are heavily influenced by trends in global demand and Australia's competitiveness in international markets. As a major exporter of resource commodities, the resource-intensive nature of the rapid growth in emerging Asia has been an important driver of developments over the past 10 years. Over the same period, the competitiveness of Australia's non-resource exporters has been reduced by the appreciation of the exchange rate, which has lowered export revenue relative to domestic production costs.

Export growth over the past 10 years was consistently below the expectations of the Bank and other macroeconomic forecasters – even though the rapid growth in Asia, and in particular China, exceeded consensus forecasts over the period (Connolly and Orsmond 2011). The slowdown in exports was broadly based across resource, rural, manufactured and services exports (Graph 1, Table 1).

While most advanced economies experienced slower growth in exports, the reasons for the slowdown in Australia were somewhat different than for other advanced economies (Graph 2). This reflects the fact that Australia is predominantly a commodity exporter, while other advanced economies typically export a higher share of manufactures and services. Manufacturers have been facing increasing competition from lower-cost producers in developing Asia. In addition, other advanced economies were more heavily affected than Australia by the downturns in the global business cycle in the early 2000s and during the global financial crisis. In contrast, Australia's exports slowdown was driven

Graph 1
Australian Export Volumes
Year-average growth



Sources: ABS; RBA

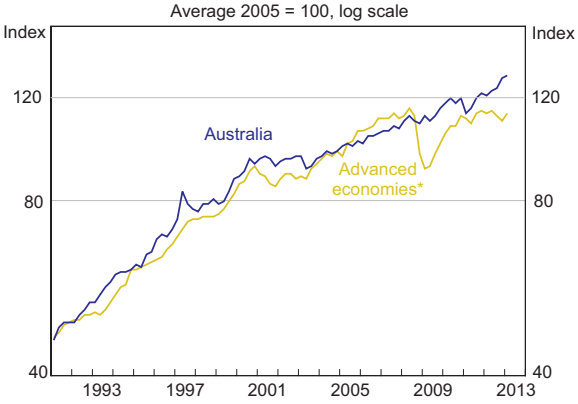
* The authors are from Economic Analysis Department.

Table 1: Export Growth
Chain volumes; annual average; per cent

	1973–1982[a]	1983–1992	1993–2002	2003–2012
Resources	2.9	8.5	4.7	3.6
Rural	2.3	2.6	4.4	2.1
Manufactures	6.8	11.2	10.4	2.4
Services	4.8	7.8	7.1	1.2
Total	**3.3**	**7.0**	**6.3**	**2.8**

(a) Resources, rural and manufactured growth rates are calculated for 1976–1982
Sources: ABS; RBA

Graph 2
World Export Volumes
Average 2005 = 100, log scale



* OECD excluding central European economies, Mexico, South Korea and Turkey
Sources: ABS; CPB Netherlands Bureau for Economic Policy Analysis; RBA

more by supply constraints on resource exports and the appreciation of the exchange rate weighing on non-commodity exports.

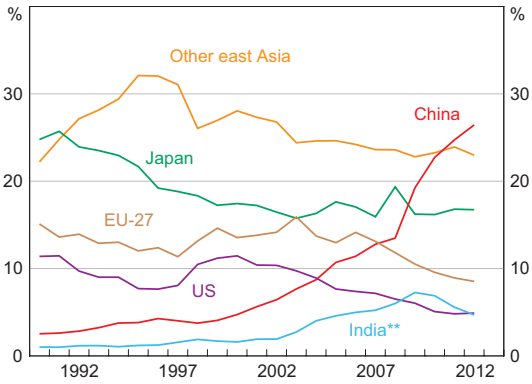
There are some interesting parallels between the recent slowdown in Australian exports and the previous slowdown from the mid 1970s to the early 1980s: the world economy experienced two downturns relatively close together in the mid 1970s and the early 1980s; in addition, commodity prices rose strongly through the 1970s, investment in resources surged and Australia's real exchange rate was at a relatively high level earlier in the period. Looking ahead, after the recent surge in resource investment is fully reflected in increased production and export capacity, the prospects for a return to stronger growth of exports over coming years are good.

Demand from Emerging Asia

In response to the rapid growth in emerging Asia, Australia's trade has continued to shift towards Asia and away from more traditional destinations such as the United States and Europe (Graph 3). In 2009, China overtook Japan to become Australia's largest export destination and in 2012 accounted for around a quarter of Australia's exports. Although the growth in exports to China has been driven by resource exports, China has also become an increasingly important source of demand for Australia's rural, manufactured and services exports.

China's increased demand for Australia's resource exports has been a consequence of its rapid industrialisation and urbanisation. Over the past decade, China accounted for most of the growth

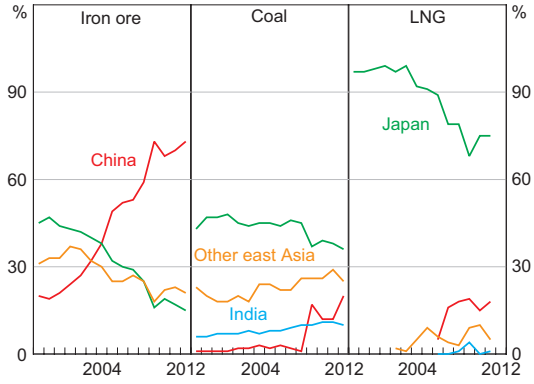
Graph 3
Australian Exports by Destination
Share of total goods and services*



* Financial years prior to 1999
** Goods exports prior to 1999
Source: ABS

in world steel production, which required inputs of iron ore and coking coal. China now produces almost half of the world's steel (largely for use in construction and manufacturing) and it has also experienced strong growth in energy consumption, raising demand for Australia's reserves of thermal coal and gas. While China is the largest producer of coal in the world and one of the largest producers of iron ore, the scale of its growing demand for these commodities has inevitably made it increasingly reliant on global markets, resulting in a rising share of Australian resource exports going to China (Graph 4). At the same time, there has been continued growth in resource exports to other economies in Asia. With commodity suppliers initially unable to keep pace with the surge in Chinese demand, global commodity prices rose significantly through the 2000s (Plumb, Kent and Bishop 2013).

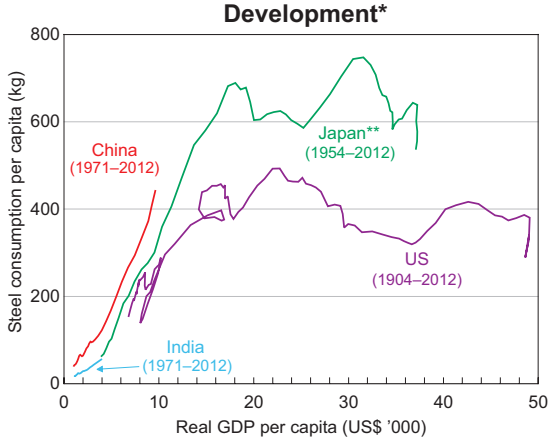
Graph 4
Australian Bulk Commodity Exports
By destination, share of respective export category



Sources: Bureau of Resources and Energy Economics; International Energy Agency; RBA

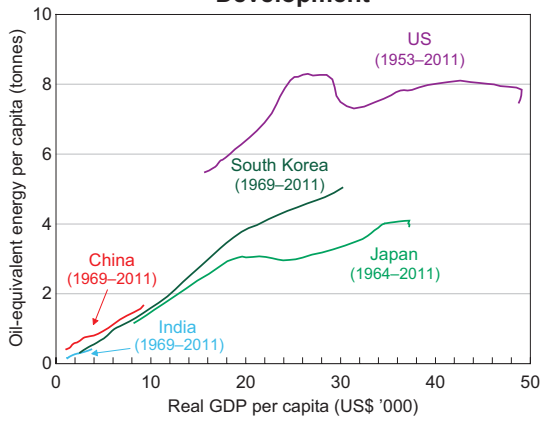
Demand for resources from emerging Asia is expected to continue to grow strongly over the period ahead. So far, China's per capita consumption of steel and energy has followed similar paths to economies such as the United States, Japan and South Korea when they were at equivalent stages of economic development (Graphs 5 and 6). While China's level of steel consumption per capita has already increased substantially, its infrastructure needs remain substantial and steel consumption is likely to continue to grow, albeit at a slower rate than over the past decade.[1] Further, India has a relatively low urbanisation rate and a small manufacturing sector, and its demand for steel and energy could therefore increase considerably (Hyvonen and Langcake 2012).

Graph 5
Steel Consumption and Economic Development*



* 2012 prices converted at 2005 PPP exchange rates; 5-year moving averages
** Japanese fiscal years prior to 2009
Sources: Bureau of Resources and Energy Economics; Conference Board; IMF; The Japan Iron and Steel Federation; Maddison (2009); RBA; US Geological Survey; World Steel Association (worldsteel)

Graph 6
Energy Consumption and Economic Development*

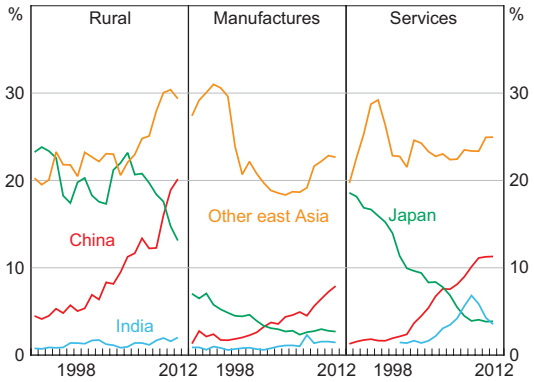


* 2012 prices converted at 2005 PPP exchange rates; 5-year moving averages
Sources: BP; Conference Board; IMF; Maddison (2009); RBA; U.S. Energy Information Administration; World Bank

1 For more details on steel demand and residential construction in China, see Berkelmans and Wang (2012).

Higher incomes in emerging Asia have also generated increasing demand for Australia's non-resource exports. This has been particularly evident for rural and services exports, although the share of manufactured exports going to emerging Asia has also increased (Graph 7). While Japan remains an important market for Australia's exports, its share of non-resource exports from Australia has fallen as the relative size of Japan's economy in the region has declined and exporters turned to higher-growth markets in emerging Asia.

Graph 7
Australian Exports to Asia
Share of respective export category



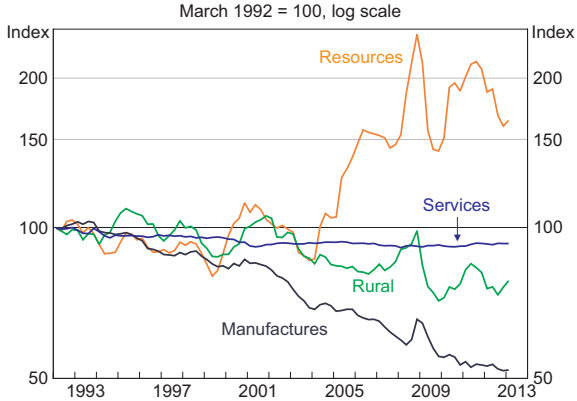
Source: ABS

Recognising the importance of fostering trade linkages with Asia, Australia has entered into a number of free trade agreements with economies in the region since 2000, including Malaysia, Singapore and Thailand. Along with New Zealand, Australia has also entered into a regional free trade agreement with the Association of South East Asian Nations (ASEAN), and negotiations aimed at achieving further trade liberalisation with other economies in the region continue, including with China, India, Japan and South Korea (Australian Government 2012).

Relative Prices and Competitiveness

Movements in commodity prices and the exchange rate have driven divergent trends in the competitiveness of the nation's resource and non-resource exporters over the past 10 years. In response to the surge in Chinese demand for resources, resource export prices increased considerably, boosting the profitability of Australia's commodity exporters. However, the accompanying appreciation of the exchange rate has placed downward pressure on non-resource export prices relative to the domestic costs they face (Graph 8). This has been most evident for manufactured export prices, with declines in world prices, especially for high-tech electronic goods, also contributing.

Graph 8
Export Prices Relative to the Australian Price Level*
March 1992 = 100, log scale

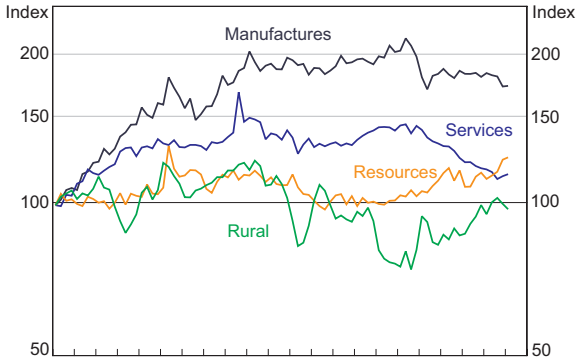


* Export price deflators relative to domestic demand price deflator
Sources: ABS; RBA

These trends in relative prices have affected growth in export volumes and their contribution to Australian economic growth. After a period of relatively subdued commodity prices and low investment, Australia's resource industries were not able to increase supply rapidly in response to the surge in demand from China, and resource exports grew at a slower pace than the broader Australian economy through the early to mid 2000s (Graph 9). Subsequently, the strong increase in investment in the resources sector started to flow through to faster volumes growth. In contrast, after growing at a faster pace than the broader economy through the 1990s, manufactured and services exports growth slowed through the mid 2000s, and they have been in relative decline over recent years.

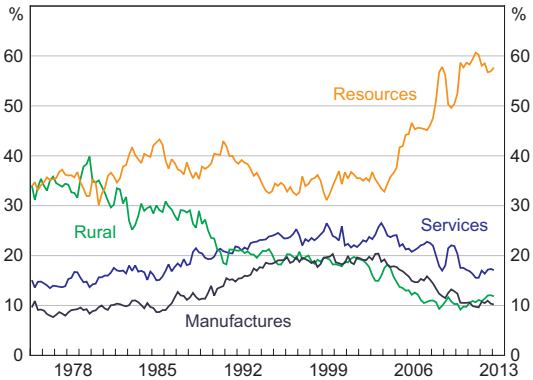
Given these trends in export prices and volumes, the composition of Australia's exports in value terms has shifted substantially towards resource exports (Graph 10). In contrast, the shares of manufactures, rural goods and services in Australian exports have declined to relatively low levels. The remainder of the article provides further detail on the factors that have affected the export performance of Australia's resource, rural and non-commodity exports.

Graph 9
Export Volumes Relative to Australian Output
March 1992 = 100, log scale



Sources: ABS; RBA

Graph 10
Australian Exports
Share of total goods and services exports



Source: ABS

Resource Exports

Supply constraints and future prospects

The composition of Australia's resource exports has shifted over the past 10 years towards iron ore, coal and LNG, and away from oil and processed metals. This shift has been primarily driven by trends in export volumes, with most resource prices increasing substantially over the period, although they have eased back over the past year or so (Table 2). After growing slowly in the early 2000s, iron ore, coal and LNG exports have picked up over recent years following large-scale investment in response to high prices and strong demand from Asia. In contrast, crude oil exports have fallen, reflecting declining production as mature fields are exhausted, while metals manufacturing has faced increasing pressure from the high level of the exchange rate and competition from lower-cost producers in Asia (Connolly and Orsmond 2011).

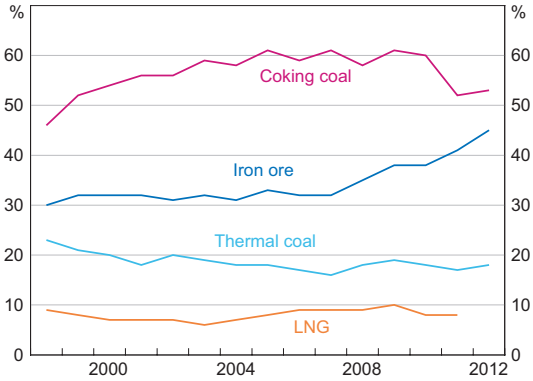
The response of Australia's supply of bulk commodities has been more protracted than expected, partly because of the long lead times between mining investment and production. Labour and equipment shortages, bottlenecks along production chains and the effects of floods have also been significant constraints. While many of these challenges were experienced across industries, it is notable that iron ore exports were able to grow considerably faster than coal exports over the period, albeit not quite at the pace that some producers expected at the outset. Consistent with this, Australia's share of the globally traded iron ore market has risen substantially since 2007, while the share of the coking coal market declined and the share of the thermal coal market has been flat (Graph 11). Australia's iron ore producers not only had the benefit of vertically integrated supply chains, which enabled them to coordinate expansions in infrastructure more easily, but they also operated at the lower end of the global industry cost curve. In contrast, it was more difficult for the coal industry to expand given the fragmented ownership of the mine, rail and port infrastructure and higher costs

Table 2: Resource Exports
Per cent

	Volumes Average annual growth		Prices Average annual growth		Share of total export value	
	1993–2002	2003–2012	1993–2002	2003–2012	2002	2012
Iron ore	5	12	1	13	3	18
Other ores	4	1	2	8	6	7
Coal	5	5	1	7	8	14
Crude oil	9	–1	4	9	4	5
LNG	4	11	5	7	2	4
Processed metals	4	–1	1	6	11	9
Total resources	**5**	**4**	**2**	**8**	**35**	**57**

Sources: ABS; Bureau of Resources and Energy Economics; RBA

Graph 11
Global Bulk Commodity Markets
Australia's share of the globally traded market



Sources: Bureau of Resources and Energy Economics; International Energy Agency

compared with some other global competitors. Subsequent attempts to coordinate supply chain expansions in New South Wales have resulted in increased export capacity and contributed to faster exports growth from that state over recent years.[2] Severe short-term events have also affected exports; in particular, coal exports from Queensland were hampered by flooding in 2011, with coal shipments only recently surpassing the high level reached in 2010.

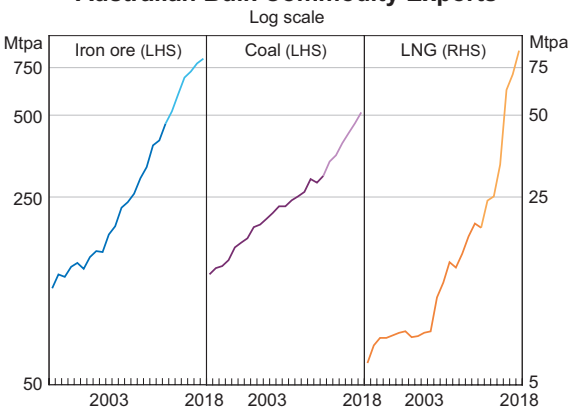
Bulk commodity export volumes are expected to continue growing strongly as the capacity expansions currently under construction are completed. In the latest medium-term outlook of the Bureau of Resources and Energy Economics (BREE), iron ore and coal exports are projected to increase by more than half their current level by 2017/18, and Australia's share of the globally traded market is projected to rise for both of these goods (Graph 12). Given the expectation of a substantial increase in the global supply of bulk commodities, the traded prices of these commodities are expected to continue to decline over coming years.

Australian LNG exports have been growing strongly and are expected to more than triple once the projects currently under construction start to be completed from around 2015/16, supported by long-term contracts to supply LNG to major Asian trading partners such as China and Japan. While Australian LNG exports increased rapidly over the past 10 years from a low base, this just maintained Australia's share of the global market in LNG, since supply from competitors such as Qatar also increased at a fast pace (Graph 11). Looking ahead, Australia's global market share would be expected to rise given the sheer magnitude of the LNG projects under construction, although global supply is likely to be given another boost by the exploitation of unconventional gas reserves in the United States and other economies.[3]

2 See, for example, Andrews and Arculus (2008) and RBA (2012).

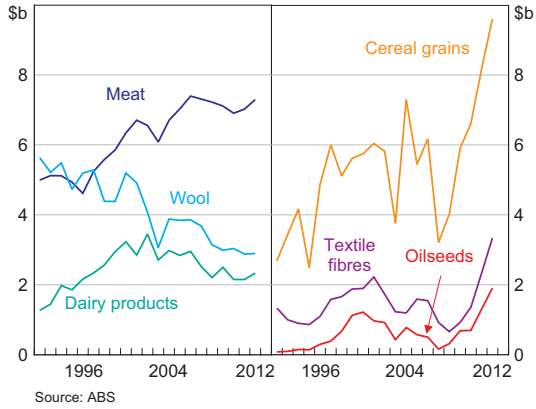
3 For further detail on the global LNG industry, see Jacobs (2011).

Graph 12
Australian Bulk Commodity Exports



Source: Bureau of Resources and Energy Economics

Graph 13
Rural Export Volumes



Source: ABS

Rural Exports

Drought and recovery

Rural exports were subdued over much of the 2000s as a result of prolonged drought, although exports have rebounded over recent years in response to better growing conditions. The recovery has been particularly rapid for cereal grains, textile fibres and oilseeds, which are more sensitive to drought (Graph 13; Rayner, Tan and Ward 2010). The recovery has been more tentative for exports such as meat, wool and dairy products, reflecting the time it takes for herd sizes to recover and the competitive pressures faced by Australian producers, particularly given the appreciation of the exchange rate. Overall, the difficult conditions faced by producers have resulted in global market shares for some of Australia's key rural exports, such as beef and wheat, declining over the past 10 years, although they have recovered recently.

Looking ahead, demand for rural commodities is expected to be supported by ongoing global population growth and rising incomes in emerging Asian economies, with food consumption patterns shifting towards higher-value rural exports. In particular, increasing incomes tend to lead to stronger demand for protein, which can be sourced from meat and dairy products (Rayner, Laing and Hall 2011). These developments are likely to provide opportunities for rural exporters and support prices of food over the medium term.

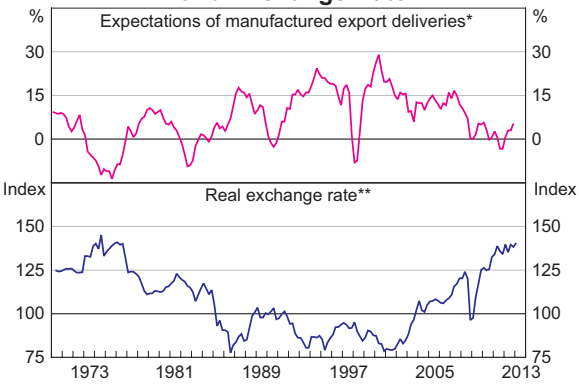
Manufactured Exports

Responses to the high exchange rate

Australia's manufactured exports have been weakened by the appreciation of the Australian dollar and movements in the global business cycle over recent years, with the effects highlighted by business surveys.[4] In the ACCI/Westpac survey, the sharpest declines in the outlook for exports have occurred during downturns in trading partner growth, such as during the Asian financial crisis and the global financial crisis (Graph 14). Looking through these fluctuations in the business cycle, there has also been a broad relationship between the export outlook and the real exchange rate (which adjusts for differences in domestic inflation across economies). When the real exchange rate was at low levels in the mid 1990s and the early 2000s, the export outlook was relatively positive. In contrast, when the real exchange rate was high in the mid 1970s and again in recent years, manufacturers have been pessimistic about the export outlook. Consistent with this survey

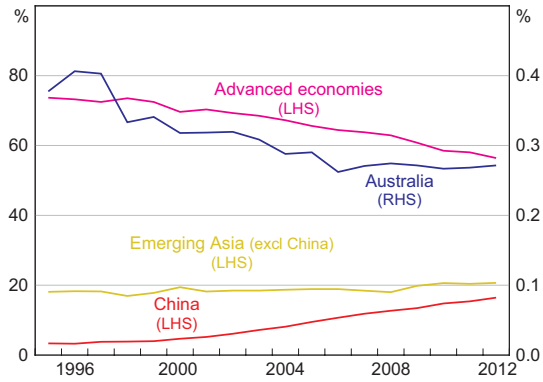
4 Econometric studies find that an appreciation of the Australian dollar has a significant negative effect on manufactured export volumes. For example, see Dvornak, Kohler and Menzies (2003) and Norman (2006).

Graph 14
Manufactured Exports Expectations and Exchange Rate



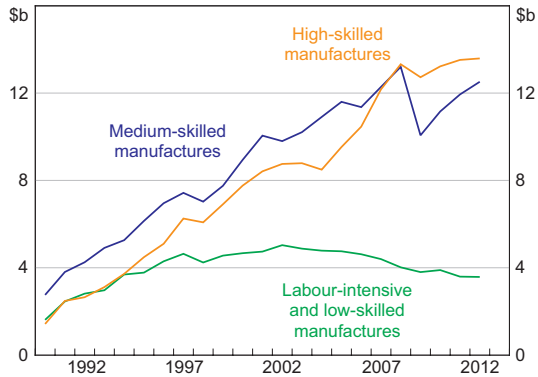
* Share of firms expecting higher deliveries less share expecting lower deliveries; 3-quarter moving average
** Real trade-weighted index; post-float average = 100
Sources: ACCI/Westpac; RBA

Graph 15
Manufactured Exports
Share of world manufactured exports



Sources: RBA; UNCTADstat

Graph 16
Manufactured Export Volumes
By category*



* Based on the UNCTADstat definitions; excludes iron and steel exports
Sources: ABS; RBA; UNCTADstat

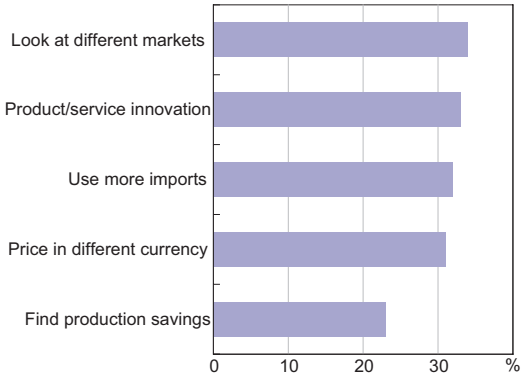
evidence, the combination of the global financial crisis and the further appreciation of the Australian dollar led to a sharp fall in Australia's manufactured exports in 2008/09 and the recovery over the past four years has been relatively subdued, with exports remaining well below their 2008 peak.

In addition to these factors, the manufacturing sector has faced increased competition from lower-cost manufacturers in developing Asian economies, particularly China, as reflected in the rising share of those economies in global manufactured exports (Graph 15). In comparison, Australia's share has declined, albeit at a similar pace to other advanced economies. The competitive pressures from emerging Asia have particularly affected Australia's labour-intensive and low-skilled manufactured exports, such as construction materials and textiles, clothing and footwear (Graph 16).

Despite the challenges faced by Australian manufacturers over recent years, there have been some industries which have experienced relatively strong export growth, particularly producers of high-skilled manufactures such as professional & scientific equipment and specialised machinery & equipment. This suggests that manufacturers of more highly skilled products have been able to adapt their business models to develop their presence in markets demanding these products despite the high exchange rate.

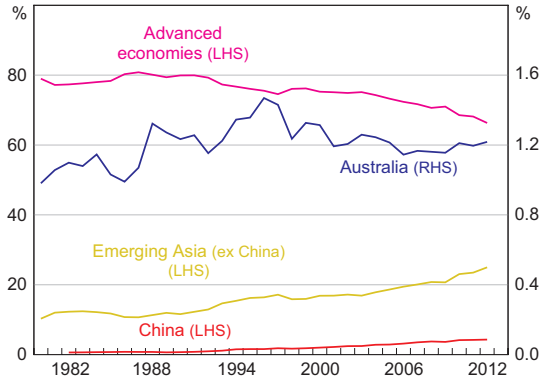
Surveys highlight the various ways in which firms have been adjusting their business practices to improve their competitiveness. According to the DHL Export Barometer, around a third of Australian exporters are looking at different markets or innovating in response to the high Australian dollar, while some firms are also increasing their use of imports, which have become cheaper as a result of the high exchange rate (Graph 17). This is consistent with findings from the ABS business characteristics

Graph 17
Business Strategies to Manage the Australian Dollar
May 2013



Source: DHL Export Barometer

Graph 18
Services Exports
Share of world services exports



Sources: RBA; UNCTADstat

survey, which indicate that manufacturing firms have been more actively reviewing their business practices in recent times (Lowe 2012).

Some firms have also responded by withdrawing from export markets; the number of non-mining exporters declined by 3 per cent over the five years to 2011/12, with the number of manufacturing exporters falling by 10 per cent. Nevertheless, while the total number of firms involved in exporting has declined, the number of firms exporting to economies such as China, India, Thailand and Vietnam has increased over the period, consistent with a shift in focus towards emerging Asia.

Services Exports

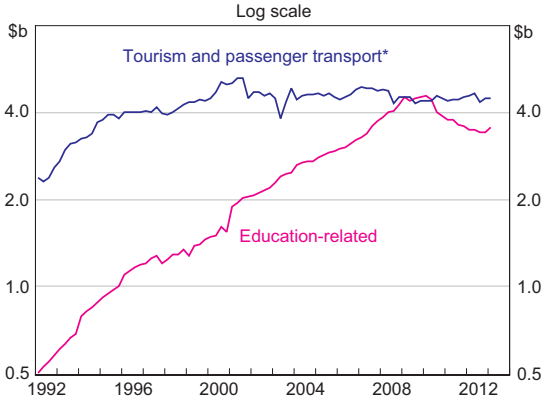
Growth in services exports has also slowed over the past 10 years. While services export prices have grown at a similar pace to domestic prices, services exporters have still become less competitive in foreign currency terms as a result of the appreciation of the Australian dollar. Nevertheless, Australia's overall share of world services exports has been relatively steady over the past 10 years, which is a better performance than for other advanced economies (Graph 18). In part, this reflects the fact that Australia has been well placed to provide services such as tourism and education to consumers from emerging Asia.

In aggregate, Australia's tourism exports have been flat over much of the past decade, with the industry hit by a range of negative shocks, including concerns about terrorism in the early 2000s, the appreciation of the Australian dollar and the global downturn in the late 2000s (Graph 19; Hooper and Van Zyl 2011). The number of tourist arrivals from emerging Asia, particularly China, has increased strongly over this period. In contrast, the share of arrivals from the more traditional Japanese and British tourist markets has declined. Consistent with this, China has become the most important source of export income for the Australian tourism industry since 2010/11 (Graph 20). The latest forecasts from the Tourism Forecasting Committee suggest that growth in arrivals from Asia will continue to support Australia's tourism industry over the period ahead.

Education-related exports increased strongly during the 2000s, largely driven by demand from India and China. However, education-related exports have declined over the past three years following changes to the requirements for overseas students to obtain visas. The education sector has responded by focusing on costs, minimising fee increases and diversifying export-related programs, while the government has introduced further reforms to its student visa program. Over the past year, there have been signs that the decline in education-related exports has slowed and could have reached a

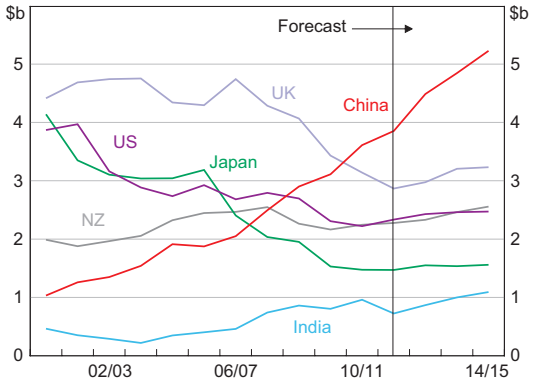
trough. Indeed the Bank's liaison suggests that the number of overseas students commencing studies has increased at some universities over the past year.

Graph 19
Services Export Volumes
Log scale



* Tourism exports represent travel services excluding education-related exports
Sources: ABS; RBA

Graph 20
Real Inbound Tourism Expenditure



Source: Tourism Forecasting Committee

Conclusion

Growth in Australia's exports has been relatively slow over the past 10 years, as a result of supply factors affecting resource and rural exports, as well as the effects of the high exchange rate and strong global competition on manufactured and services exports. Looking ahead, Australia is well placed to supply resources to the economies of emerging Asia as they continue to urbanise and industrialise. Moreover, as incomes grow strongly in the region, there will be increasing demand for Australia's exports of food products, high-skilled manufactures and services.

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Macroeconomic Management in China

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China's economy has expanded at a rapid pace over the past three decades, underpinned by a range of economic reforms. While many of these reforms have focused on the supply side of the economy, the authorities have employed a range of policies to manage aggregate demand and control the build-up of inflationary pressures and financial risks. The operation of macroeconomic policy in China differs from that typically used in developed economies, reflecting China's particular institutional and economic environment. Macroeconomic policy is implemented in a coordinated manner with authorities using a range of monetary, fiscal and regulatory policy instruments to achieve economic objectives.

Introduction

The Chinese economy has expanded rapidly over the past three decades, with annual growth averaging around 10 per cent per annum. This has been underpinned by a range of economic reforms that have made the economy more market oriented and encouraged growth of the productive capacity of the economy. The initial reforms freed up agricultural production; subsequent reforms extended to rationalisation of the state-owned industrial sector, property ownership and the gradual opening up of the economy to international trade and investment, including accession to the World Trade Organization in 2001. While these reforms have had a supply-side focus, policymakers have nevertheless needed to employ a range of policies to manage aggregate demand.

A central aim of macroeconomic demand management has been to support economic growth, while also responding to fluctuations in global and domestic business conditions in order to sustain domestic employment and prevent an excessive build-up in inflationary pressures or financial risks. As in other economies, Chinese policymakers employ a range of monetary, fiscal and regulatory policy instruments to manage aggregate demand. However, the operation of macroeconomic policy differs in a number of significant ways from that in most developed economies, owing to differences in institutional characteristics and the stage of development of the Chinese economy.

Compared with the typical arrangements in developed economies, Chinese monetary and fiscal policy are tightly coordinated by the central government. Moreover, in the area of monetary policy, the managed float exchange rate regime relies on significant restrictions on capital flows, and the relative dominance of banks in the financial sector means that monetary policy can be largely implemented through a range of regulatory instruments. Nonetheless, as the Chinese economy has developed, there has been a gradual evolution towards the use of market-based policy instruments like those used in more developed economies. The Chinese Government has signalled its intention for this evolution to continue in line with developments in the economy and financial markets in particular.

This article provides an overview of the operation and evolution of macroeconomic policy in China over the past decade. It begins with a discussion of the institutional and economic environment in which demand management policies operate, and then describes the performance of the Chinese economy in terms of macroeconomic growth and

* The authors completed this work in Economic Group.

inflation outcomes over the past decade, before outlining the operation of monetary, fiscal and property market policies.

Institutional Environment and Objectives of Policy

Chinese national economic policy is determined by the State Council, which sets out the five-year plans containing the government's broad long-term economic agenda, including targets for urbanisation, industrialisation and gradual market liberalisation. Recent five-year plans have also provided medium-term targets that lay down the path to achieving the longer-term objectives. Some examples from the Twelfth Five-year Plan in 2010 include targets for the service industry share of GDP, education completion rates, and reforms to the financial sector which are expected to be achieved by 2015.[1] While the State Council determines the overall objectives of policy, implementation is the responsibility of both local and central government agencies.

Within the context of the five-year plans, the State Council also sets annual goals for macroeconomic outcomes. Targets for inflation and growth in the money supply and in GDP are announced at the annual meeting of the National People's Congress; the 2013 targets for these are 3.5, 13 and 7.5 per cent per annum, respectively. The central budget is also announced at this meeting. Thus, the general stance of macroeconomic policy, as summarised by the budgetary stance and the targets for growth in money supply, is set in a coordinated manner in the context of the State Council's longer-term economic objectives. Over the past decade, GDP growth has exceeded the targets set by the State Council, while consumer price inflation has both overshot and undershot the targets. The targets for inflation in particular are often adjusted annually reflecting the State Council's assessment of what is an acceptable trade-off between growth and inflation in response to the experience of the most recent year. Unlike the inflation targets in most inflation-targeting monetary policy systems, the Chinese target is not a fixed objective but a guide that is adjusted as conditions evolve.

The State Council is also responsible for setting the broad stance of other policies that have an influence on macroeconomic management – the most important of these being the managed float exchange rate regime. The objective of exchange rate policy has been to encourage industrialisation and development of the export sector by insulating the economy from exchange rate volatility. Prior to 2005, the Chinese currency was fixed against the US dollar. Since 2005, the currency has been managed in a way that has allowed gradual adjustment, as the authorities have attempted to gradually move towards a more market-determined exchange rate regime (see Ballantyne, Garner and Wright (2013)).

Other State Council policies that are often intended to have macroeconomic effects include several direct controls on particular sectors of the economy. The State Council promotes the development of certain industries and moderates growth in others to help achieve a range of economic, environmental and social outcomes considered necessary for sustainable development in the long term. The most notable example is the property market, where property price inflation and construction activity have important implications for macroeconomic and financial stability, and where the government is active in affecting both the supply and demand for housing.

A range of institutions are responsible for the implementation of macroeconomic policies. Exchange rate policy is implemented by the People's Bank of China (PBC) and the State Administration of Foreign Exchange (SAFE) (IMF 2012). The managed float exchange rate regime has necessitated regulatory controls over foreign capital flows in order to provide some leverage over domestic money supply. In the absence of capital controls, it would not be possible to control both the exchange rate and domestic money supply. Within this framework, the PBC implements domestic monetary policy

1 For further information on financial sector goals, see PBC, CBRC, CSRC, CIRC and SAFE (2010).

using a range of tools in order to control domestic money and credit growth. These include benchmark interest rates on loans and deposits, variations in reserve requirement ratios for banks, open market operations and direct influence over bank lending (referred to as 'window guidance').

Fiscal and other regulatory policies are implemented by a broad range of central and local government agencies. While the majority of public revenue is collected by the central government, most government expenditure is undertaken at the local level. This is particularly the case for social security, education and infrastructure spending. Although local governments are typically responsible for undertaking infrastructure projects, the National Development and Reform Commission (NDRC) plays an important role in the implementation of this aspect of fiscal policy by providing central oversight of major investment projects. The relatively large size of infrastructure and other public investment spending as a share of the Chinese economy has meant this component of fiscal policy has been an important element of macroeconomic management, in addition to its importance in expanding the supply side of the economy.[2] The complete impact of China's fiscal policy is not reflected in the consolidated local and central government budget position, since the government also relies on its ability to influence the investment activities of state-owned enterprises to achieve policy objectives.

An important feature of macroeconomic policy implementation in China is that fiscal and monetary policies are implemented in a highly coordinated way, with the overall direction of policy set by the State Council. This is in contrast to the trend in developed economies, over recent decades, towards greater independence of central banks from fiscal authorities. An example of this coordination in the Chinese system is where the government implements fiscal policy through its influence over the investment activities of state-owned enterprises and local governments, which are supported by the credit policy actions of the PBC that ensure the Chinese banking system provides the necessary funding. This coordination was particularly evident during the global financial crisis, when state-owned banks lent to state-owned enterprises in industries that the government was seeking to stimulate.[3] This episode also demonstrated how policy authorities in China are able to respond, when necessary, to changing circumstances in a timely manner, notwithstanding the institutional structures that underpin the five-year plans and annual targets.

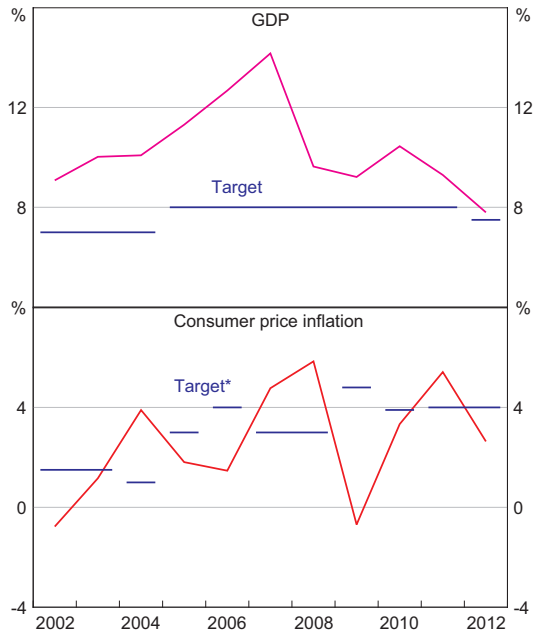
Recent Cycles in Growth and Inflation

China's economy has experienced noticeable cycles in growth and inflation over the past decade (Graph 1). Fluctuations in demand have reflected developments in the global business cycle and policy responses to emerging domestic imbalances. Following the reforms of the 1990s and the early 2000s, GDP growth picked up, averaging more than 10 per cent per annum over the five years to 2008. In the latter part of that period, a combination of strong global demand and a relatively stable exchange rate saw rapid growth in external demand, with net exports making a significant contribution to growth (Graph 2). During the global financial crisis, growth slowed sharply as external demand weakened and net exports subtracted from growth. With the implementation of the Chinese coordinated stimulus, growth recovered through to 2009 with a surge in investment activity, and was around 10 per cent in 2010. More recently, growth has been steady at a more moderate pace. The recent lowering of the growth target reflects the widely held view that trend growth will gradually slow as the economy

2 The majority of infrastructure fixed asset investment is undertaken by the government, and accounts for over 20 per cent of total fixed asset investment. Since investment accounts for around 50 per cent of GDP, it is a significant contributor to economic growth. Fixed Asset Investment (FAI) differs from Gross Fixed Capital Formation (GFCF), which is the national accounts measure of investment.

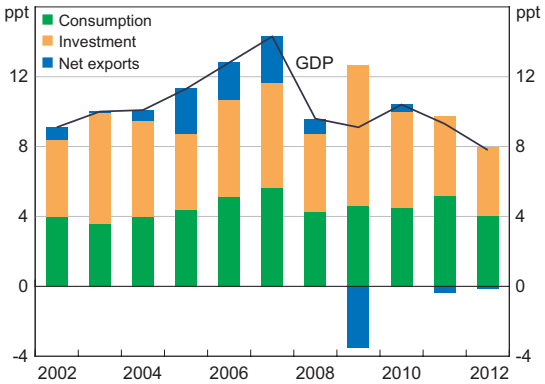
3 In addition to acting in concert with the fiscal authorities to respond to cyclical variations in growth and inflation, the PBC also contributes to the government's structural objectives by influencing the direction of credit flows in accordance with the government's industry policy.

Graph 1
China – GDP Growth and Inflation
Year-average percentage change



* In 2002, 2003 and 2010 the target shown is the midpoint of a range; the announced targets were 1–2 per cent in 2002–2003 and 3.8–4.0 per cent in 2010
Sources: CEIC; RBA

Graph 2
China – Contributions to GDP Growth
Year-average



Source: CEIC

develops further.[4] Over the longer term, China's potential growth rate is expected to ease as the pace of labour and capital accumulation slows.

4 Chinese Premier, Wen Jiabao, explained that in setting the GDP growth target for 2013 at 7.5 per cent, policymakers must ensure that 'economic growth is in accord with the potential economic growth rate, the ability to supply factors of production, and the bearing capacity of resources and the environment' (Wen 2013).

Since 2000, China has achieved an average annual growth rate of 10 per cent. This has supported solid growth in urban employment of over 4 per cent per year on average, which is an important priority of the government. The available annual data on employment suggest that fluctuations in employment growth have been relatively muted, with employment growth easing to only around 3¾ per cent during the crisis years of 2008 and 2009, and slowing to a decade low of around 3¼ per cent in 2012.[5] Consumer price inflation has undergone three cycles over the past decade, with adverse food supply shocks, movements in commodity prices as well as fluctuations in aggregate demand affecting inflation outcomes. Notwithstanding these fluctuations, average inflation over the period has been relatively low at around 4 per cent, indicating that overall demand management has been consistent with the expansion in the economy's supply capacity. These macroeconomic outcomes compare well with the economic performance of both emerging and developed economies over the same period.[6]

Monetary Policy

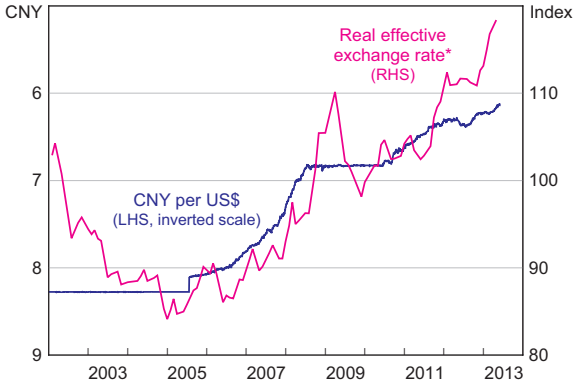
The PBC seeks to meet the growth and inflation targets set by the State Council through its control of the exchange rate and influence over domestic money supply and credit growth in the economy. Following the move from a fixed to a managed float exchange rate regime in 2005, the PBC has allowed the renminbi (RMB) to gradually appreciate, except for a pause for two years from mid 2008. This pause was in response to the global financial crisis, which saw demand for Chinese exports decline sharply (Graph 3).[7] Since the shift to the managed float

5 See Rush (2012) for a discussion of long-term trends in the Chinese labour market.

6 China has grown faster and with lower average inflation than its fast-growing emerging economy peers (Russia, Brazil, India and South Africa). Moreover, while Chinese inflation has been more variable than in the slow-growing developed economies, average inflation has only been moderately higher.

7 See Ballantyne, Garner and Wright (2013) for a discussion of recent developments in regulation of RMB trading.

Graph 3
Chinese Renminbi Exchange Rates



* Indexed to 2001 average = 100
Source: Bloomberg

regime, the currency has appreciated by around 30–35 per cent against the US dollar and on a real effective basis.

Although a managed float exchange rate regime implies that the domestic money supply is driven by developments in the current account, the use of tight capital controls in China provides the PBC with the capacity to 'sterilise' the effect of balance of payment flows on the domestic money supply. Moreover, given the dominance of the regulated banking sector in China's overall financial system, the PBC's control of a range of regulatory and market instruments that influence banks' funding and loan creation has enabled it to assert considerable influence on the amount of money and credit in the economy and therefore macroeconomic outcomes.

Like other central banks, the PBC monitors economic and financial conditions continuously to assess the need for adjustments in the stance of policy; however, the PBC does not have a fixed timetable for policy announcements.[8] The instruments used by the PBC to adjust the overall stance of policy include: benchmark interest rates on bank loans and deposits; banks' reserve requirements; open market operations; and window guidance on banks' credit creation activities. This is different from the way that monetary policy is implemented in most developed economies, where typically the short-term interest rate is the key policy instrument.[9] One implication of the breadth of policy instruments employed by the PBC is that it is not possible to summarise changes in the stance of policy by considering only a single instrument. The overall stance of policy is determined by the combination of instrument settings, with the mix of policy instruments at any one time depending on the PBC's assessment of which instruments will be most effective in achieving the desired financial conditions.

The PBC directly sets benchmark interest rates on Chinese banks' deposits and loans, with the benchmarks differentiated by the term of the deposit or loan (Graph 4). The benchmark rates are a significant determinant of actual deposit and loan rates and so influence both the supply of bank deposits and the demand for bank loans. Benchmark rates previously set a ceiling on deposit rates and a floor on loan rates, although there were exceptions to these rates. Recent reforms have eased these restrictions by allowing banks to pay up to 1.1 times the relevant benchmark rate on deposits, and charge lending rates as low as 0.7 times the benchmark (PBC 2012).[10] Benchmark interest rates influence the rates faced by businesses and households, though many actual lending rates exceed the benchmark, with the spread to benchmark lending rates influenced by a range of factors including the risk profile of borrowers and the general availability of funds in the market.

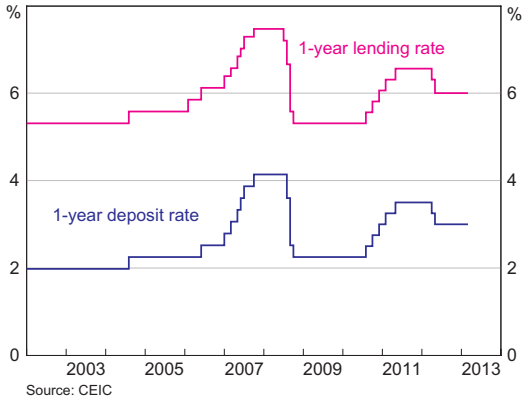
The transmission of changes in benchmark interest rates to economic activity is influenced by the structure of Chinese banks' balance sheets, which are reliant on household deposits while lending is predominately to businesses. Chinese households are net savers and have low leverage; this may

8 The PBC publishes a Quarterly Monetary Policy report; see PBC (2012).

9 Since the crisis, a number of developed economies have reached the zero lower bound on the short-term interest rates used as the instrument of monetary policy and have been implementing monetary policy through quantitative measures such as asset purchases designed to influence other interest rates in the economy.

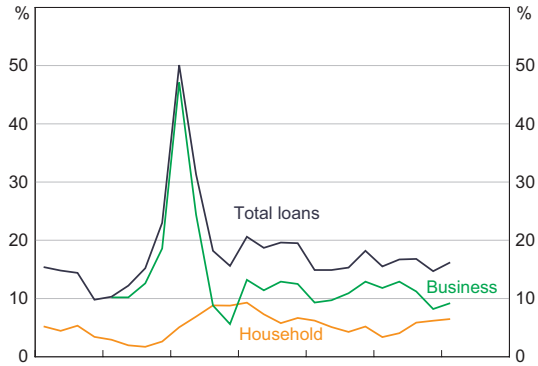
10 These reforms were announced in June 2012, when the PBC cut benchmark interest rates.

Graph 4
China – Benchmark Interest Rates



Source: CEIC

Graph 5
China – Credit Flows
Share of GDP



Sources: CEIC; RBA

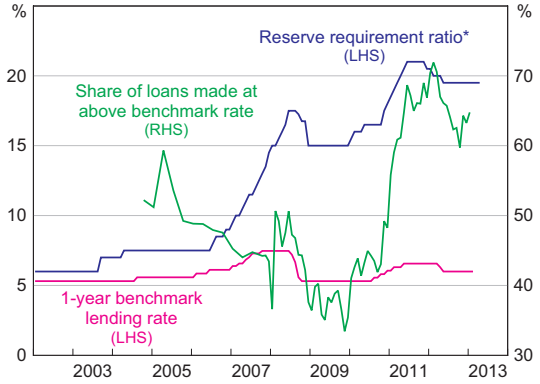
reflect limited access to alternative investment opportunities outside of deposits and the purchase of real estate, coupled with a precautionary savings motive (Nabar 2011). Low benchmark deposit rates have meant that many households have been receiving interest rates that have been below the rate of inflation on their savings. Due to their large pool of savings, Chinese households have had a lower tendency to borrow and the flow of bank lending to businesses exceeds that to households (Graph 5). The banking system appears to be gradually changing as financial institutions, such as trust companies, have emerged offering wealth management products that pay higher interest rates than bank deposits. This may lead to further evolution of how monetary policy is implemented, by raising the importance of instruments affecting market interest rates directly, relative to those based on the PBC's regulatory control over bank interest rates and lending.

The PBC's ability to directly influence the quantity and type of lending is strengthened by its window guidance activities, where it advises banks on how much and to which industries they should be lending. Although formal credit quotas were abolished in 1998, the PBC continues to maintain considerable input into the decisions about the quantity and composition of bank lending (PBC 2002). In part, window guidance has a macroeconomic policy objective, such as supporting the fiscal stimulus during the global financial crisis period. They are also designed to reinforce microeconomic industry policy, such as the government's support for the agricultural sector during the early 2000s and, more recently, providing support for the small and medium-sized enterprise sector.

Another important instrument is the reserve requirement ratio (RRR), which determines the proportion of deposit liabilities that the PBC requires banks to hold as assets at the central bank. By varying RRRs, the PBC is able to affect the supply of funds available for lending in the economy, which can influence the growth in credit. The PBC introduced RRRs in the mid 1980s, although changes to RRRs were initially infrequent: between their establishment in 1984 and 2005, RRRs were adjusted only eight times (Ma, Xiandong and Xi 2011). Since 2006, the PBC has used RRRs as an active tool of monetary policy (Graph 6).[11] One reason for this has been the pick-up in foreign exchange inflows. Under its managed float exchange rate policy, the PBC has often been required to purchase foreign exchange inflows in order to keep the exchange rate within

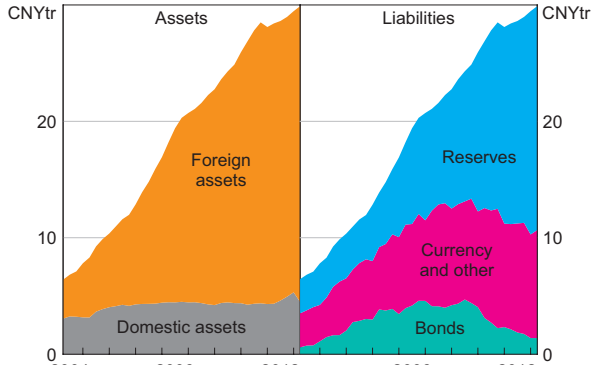
11 Since 2011, the PBC has set 'dynamic differentiated' reserve requirement ratios for individual banks. These were introduced to allow the PBC to have different reserve requirements for individual banks and to adjust these over time based on a range of criteria, such as the industry breakdown of their loans or financial stability considerations (Turner, Tan and Sadeghian 2012).

Graph 6
China – Monetary Policy Instruments



* Large banks
Source: CEIC

Graph 7
Balance Sheet of the PBC



Sources: CEIC; RBA

its daily trading band.[12] These foreign exchange purchases have needed to be sterilised to prevent an expansion of the domestic money supply and an overshoot of the money growth target. Increases in RRRs have played a key role in withdrawing the excess liquidity resulting from foreign exchange purchases from the banking system, as can be seen by the dominance of reserves on the liabilities side of the PBC balance sheet (Graph 7).

At the same time, RRRs have played a role in enhancing the effect of changes in benchmark rates on domestic credit conditions. For example, increases in RRRs in 2011 were associated with a spike in the share of loans made at above benchmark rates, with this effect unwinding somewhat in 2012 when RRRs were eased.

In addition to adjustments to regulated benchmark interest rates and RRRs, the PBC also uses open market operations to influence the availability of liquidity in the banking system. Prior to the global financial crisis, the PBC issued bonds that, along with adjustments in the RRRs, helped to sterilise foreign exchange inflows. In recent years, with slower foreign exchange inflows, outright bond issuance has been limited, but the PBC has been more active in using repurchase agreements (repos) and reverse repurchase agreements to influence liquidity conditions in the banking sector. These transactions are similar in nature to those used to implement monetary policy in many developed economies, including Australia. However, in China these operations are currently used only for higher frequency 'finetuning' of liquidity conditions as the relevant markets are not sufficiently established for this to be the primary tool for monetary policy implementation. Substantial adjustments in the stance of policy at this stage are still likely to require adjustments in benchmark interest rates and/or RRRs.

As the Chinese financial system continues to evolve there is likely to be an increasing reliance on open market operations in the implementation of monetary policy. The government's current five-year plan for financial sector development emphasises market-based reforms and the recent rapid growth in non-bank components of total social financing (TSF) indicates that the dominance of the regulated banking sector in the Chinese economy will lessen over time (PBC *et al* 2010). As this proceeds, the effectiveness of monetary policy instruments that act only on financial institutions' regulated banking activities will be diminished; at the same time a deepening of domestic financial markets will improve the potency of market-based policy instruments.

12 The PBC manages the exchange rate by setting a daily fixing rate and allowing fluctuations within a defined band. The trading band was widened in 2007 and again in 2012 to its current setting.

Fiscal Policy

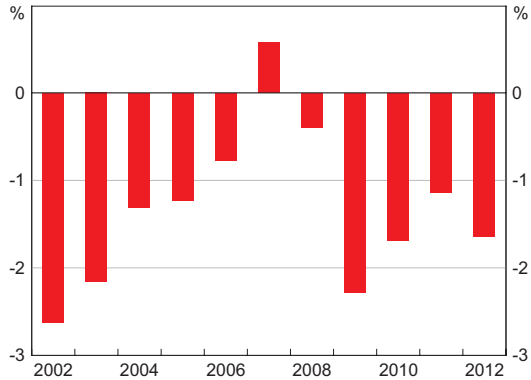
Fiscal policy is implemented by a range of central and local government agencies. While the State Council is again responsible for the overall direction of policy, much of the responsibility for implementation resides with local governments, which account for a large proportion of government expenditure, including social security, education and infrastructure investment.

Investment by local governments is financed through a combination of central government transfers, local revenues and borrowing. Local governments are subject to restrictions on direct borrowing, which has led to the creation of local government financing vehicles (LGFVs) that raise funds on their behalf. Local governments raise funds though LGFVs to finance public infrastructure projects. As a result, spending by local governments, and the impact of fiscal policy, is not fully reflected in the consolidated local and central government budget position.

The budget balance nevertheless provides a useful guide to the changes in the stance of fiscal policy. The consolidated local and central government budget shows that the general government sector ran a budget deficit in the early 2000s (Graph 8). Then, as economic growth picked up, the budget balance moved from a deficit of around 2.5 per cent of GDP in 2002, to a surplus of around 0.5 per cent in 2007. In response to the global financial crisis, the central government announced a CNY 4 trillion stimulus package in the December quarter of 2008 to be spent over the following two years. This was equivalent to about 6.7 per cent of GDP in each year (OECD 2010), although only part of this was reflected in the consolidated budget, with a significant proportion also financed by local governments through LGFVs.

The stimulus package was directed largely at infrastructure projects executed by local governments, with the focus in the early stages of implementation on smaller projects that could be executed quickly. Around CNY 1 trillion of the

Graph 8
China – Fiscal Balance*
Share of GDP



* Excludes Central Budget Stabilisation Fund transfers and does not adjust for the timing of actual local government expenditure
Sources: CEIC; RBA

expenditure was allocated to reconstruction in areas damaged by the Sichuan earthquake of May 2008. At the same time, and reflecting the close coordination between fiscal and monetary policy, the increase in expenditure was accompanied by an expansion of bank lending, particularly to state-owned enterprises and LGFVs.

When economic growth recovered in the years following the global financial crisis, the budget deficit correspondingly contracted to 1.1 per cent in 2011. More recently, economic growth has slowed; and fiscal policy appears to have been moderately expansionary in 2012 and government estimates suggesting that fiscal policy will again be mildly expansionary in 2013.[13] The shift to a moderately expansionary fiscal policy has been evident in the pick-up in growth in infrastructure investment over the second half of 2012. Notably, on this occasion, the authorities have not eased monetary policy settings, reflecting the PBC's assessment that policy needs to remain prudent given concerns over the lingering effects of the crisis period on asset quality in the banking sector.

Borrowings by LGFVs increased significantly during the global financial crisis and led to concerns about

13 The shift in the budget position will reflect both the operation of automatic stabilisers and active spending decisions.

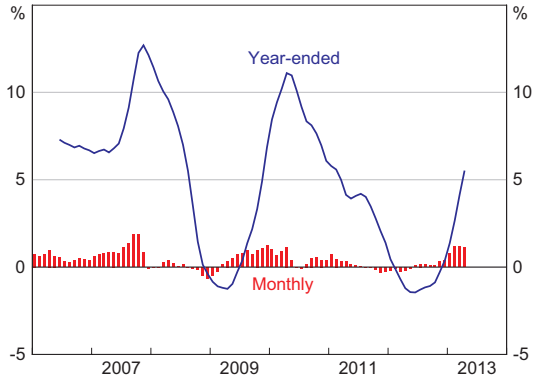
the quality of banking sector assets. After a National Audit Office report in 2010 highlighted the size of local government debt, the CBRC has stepped up its monitoring of, and implemented controls on, lending to LGFVs; these have been strengthened further in 2013. Although the risks associated with the quality of lending during the stimulus period of 2009–2010 is a downside risk to the outlook for the economy, policy flexibility is not as constrained as in many of the North Atlantic economies most affected by the crisis.

Property Market

The property market is an important driver of economic activity in China, with the property investment cycle contributing to fluctuations in aggregate demand. As part of the urbanisation process, the housing stock has needed to be expanded and its quality upgraded. Property construction affects industrial production through demand for materials such as concrete, steel products and glass. The property market remains a significant destination for household saving, as China's financial markets are not sufficiently developed to offer the range of alternative investment opportunities typically available in developed economies.

In the lead-up to the global financial crisis, residential property prices were rising rapidly. However, the onset of the global financial crisis led to a sharp fall in activity and property price inflation. With growth in overall economic activity slowing rapidly, the authorities acted to stimulate the property sector with several measures, including: reducing down-payment requirements on the purchase of properties; lowering minimum mortgage interest rates; and lowering the minimum holding period for a property to qualify for an exemption from capital gains tax (RBA 2012). These policy changes had the desired effect, with both turnover and property prices increasing significantly in 2009 and early 2010 (Graph 9).

Graph 9
China – Residential Property Price Inflation*
Percentage change



* RBA estimates
Sources: CEIC; RBA

With property prices continuing to rise at a fast pace through to early 2010, authorities shifted the policy focus to preventing property prices from growing too rapidly. While this is likely to have been motivated largely by the desire to avoid overheating in the property market and the economy more broadly, there were also concerns about the affordability of housing. Authorities addressed this by introducing a number of property market restrictions targeted at curbing speculative and investor demand, while simultaneously introducing measures to increase the supply of affordable housing. Growth in transaction volumes eased in 2010 as a whole, after having risen sharply in 2009, and property price inflation slowed until mid 2012.

Although property controls have remained in place, property price inflation has once again begun to pick up from early 2013. This has led to the announcement of additional property market controls, as well as renewed efforts to enforce previously announced controls. It appears that these announcements have recently brought forward sales, as property owners attempt to avoid the new restrictions and additional taxes. Overall, while demand-side property controls have at times been effective in temporarily curtailing price appreciation, these policies are unlikely to be effective in the long run unless housing supply is able to keep up with rapid growth in underlying demand.

Conclusion

Over the past decade, Chinese authorities have used macroeconomic policies to support economic growth and to promote the longer-term policy objectives of industrialisation and urbanisation while also managing financial and inflationary pressures. To manage aggregate demand growth, monetary and fiscal policy, together with controls on the property market, have been used in a coordinated manner to respond to external shocks and domestic developments. The coordinated nature of macroeconomic management was most evident in the combined monetary and fiscal stimulus in response to the collapse in external demand associated with the global financial crisis. Adjustments to the stance of macroeconomic policy have been implemented using a range of tools, which has included managing the appreciation of the exchange rate and regulatory control of bank lending (through benchmark interest rates, reserve requirements and window guidance). However, reflecting the evolution of the Chinese economy, there has also been a gradual development of market-based policy instruments. As the Chinese economy becomes increasingly market based and open, the reliance on market-based instruments to manage the economy is expected to increase in future (Hu 2010). More generally, the Chinese authorities have emphasised the goal of sustainable growth. One aspect of this is that, with some concerns about the build-up of debt in recent years, including that associated with the stimulus in the global financial crisis, the room for proactive macroeconomic policy is more limited than in the past. In addition, the target for growth has been lowered, consistent with a slowing in potential growth as the economy reaches a more advanced stage of economic development following very rapid growth over the past three decades.

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Demand for Manufacturing Imports in China

Claudia Godbout and Sean Langcake*

Fluctuations in Chinese imports are often viewed by analysts as containing information about domestic demand in China. However, identifying the extent to which imports of manufactured goods depend on domestic demand is difficult given the integration of Chinese trade in regional manufacturing supply networks. This article analyses Chinese imports of manufactured goods and assesses whether the determinants of manufactured goods imports have changed over the past few years. Over time, imports have declined as a share of Chinese sales of manufactured goods and appear to have become less affected by domestic demand and instead become more sensitive to exports.

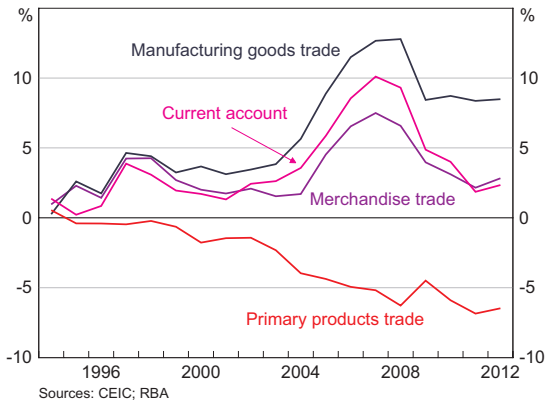
Introduction

China has emerged as a major global trading nation since its accession to the World Trade Organization (WTO) in 2001. The expansion of the traded goods sector has been important for China's industrialisation and growth, with net exports having made a significant contribution to the expansion in output in the Chinese economy since then. Analysts routinely examine Chinese export data as a means of gauging the strength of global demand. At the same time, Chinese imports are often considered to provide information on the strength of domestic demand in the Chinese economy. However, such an analysis misses the fact that some imports are also used as intermediate inputs for the production of exports. Thus, to some extent, imports will also reflect the strength of demand from China's export partners.

China imports a mix of primary products, manufactured goods and services, and predominately exports manufactured goods. Consequently, China has traditionally exported more manufactured goods than it imports, while it imports more primary products and services than it exports (Graph 1). Since reaching a peak around the time of the onset of the global financial crisis, China's trade surplus has declined as a share of GDP, from around 8 per cent in 2008 to around 4 per cent in 2012. Consistent with this, net exports have made little contribution to growth in recent years.

The decline in the trade surplus reflects, at least in part, the effect of subdued global demand on Chinese exports, while import growth has been supported by the relative strength of Chinese demand. In particular,

Graph 1
China – Trade Balance
Share of GDP



Sources: CEIC; RBA

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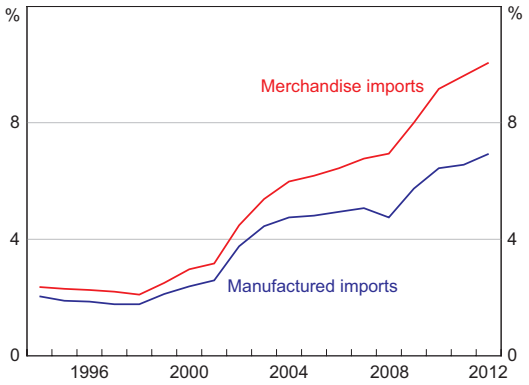
imports of primary resources, which tend to be driven by investment demand, have grown strongly in recent years. However, China's manufactured goods imports, which are affected by both domestic demand and export demand, have not kept pace with China's imports of goods more generally or the economy since the early 2000s (Graph 2). China's integration in global and regional manufacturing supply chains means that a proportion of manufactured goods imports are directly linked to export demand. But many manufactured goods destined for the domestic market also use imported manufactured inputs. Understanding the significance of these two sources of demand is useful for interpreting overall import demand.

Graph 2
China – Imports
Values, share of global imports



Sources: Thomson Reuters; United Nations COMTRADE database

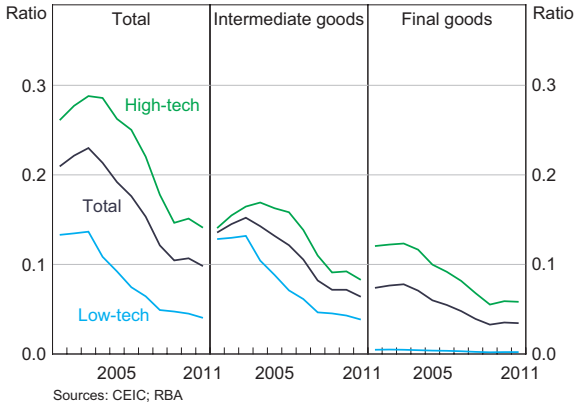
The development of international supply chains may have affected China's processing trade and its demand for imported manufactured goods in different ways. On the one hand, as domestic firms improve their product quality and production capacity over time, firms based in China may decide to source more of their intermediate inputs domestically. This would accord with the government's stated aim to increase the domestic value-added content in production. On the other hand, reductions in the country's trade barriers, and the existence of lower-cost labour in neighbouring economies, may have encouraged firms to use more imported inputs.

This article seeks to illustrate changes in imports of manufactured goods in China and assess whether the determinants of manufactured goods imports have changed recently. The article also evaluates whether any changes are uniform across production stages (intermediate and final goods), as well as the level of technological sophistication of an industry. Overall, Chinese manufacturing production appears to have become less dependent on imports of manufactured goods in recent years. Panel regressions indicate that China's manufactured goods imports have become more closely correlated with exports and less correlated with domestic demand over time, controlling for other factors.

Manufactured Goods Imports and Manufacturing Sales

To study the relationship between manufactured goods imports, exports and domestic demand, it is helpful to start by considering the size of manufactured imports relative to total Chinese sales of manufactured goods, which includes both export and domestic sales. Relative to total sales of manufactured goods, Chinese manufactured imports have declined significantly over the past decade (Graph 3). This decline in the import intensity of sales is largely explained by the decline in intermediate goods imports relative to sales, although imports

Graph 3
China – Manufacturing Goods Import Ratios
Ratio of imports to manufacturing sales



Sources: CEIC; RBA

of final goods have also declined relative to sales.[1] The decline in import intensity does not appear to be due to compositional change across industries, with the decline in import intensity broad based across most of the 16 key manufacturing industries, covering both 'high-tech' and 'low-tech' industries.[2] At face value, these data suggest that Chinese production has become less reliant on the use of imported intermediate goods and that the domestic economy has been able to supply more of the final goods sold domestically.

Intermediate goods imports would be expected to have a strong link to both exports and domestic demand since these inputs are typically transformed into other goods and sold both domestically and abroad. Final goods are more likely to be consumed domestically, but they can also have a link to exports. In some cases, goods classified as final goods may actually be used as components in other products, or alternatively, some imported final goods will be capital equipment that is used in production to satisfy export demand. The next section uses a panel regression framework to model the relationship between Chinese imports of manufactured goods and Chinese export and domestic demand.

Panel Regressions

To further explore the relationship between imports, exports and domestic demand, industry-specific panel regressions are estimated, covering the period 2001–2011 for the 16 manufacturing industries. While the sample period is relatively short, and only incorporates data after China's accession to the WTO, this may be an advantage as earlier studies have found a structural break around the WTO entry (Garcia-Herrero and Koivu 2007; Aziz and Li 2008).

A standard equation for imports of industry j (M_{jt}) is estimated, where the explanatory variables are exports (X_{jt}), domestic demand (DD_{jt}) and the real exchange rate (XR_{jt}):[3]

$$M_{jt} = c + \alpha X_{jt} + \beta DD_{jt} + \delta XR_{jt} + (\eta_j + T_t + \varepsilon_{jt}) \quad (1)$$

where t denotes time.[4] All variables are in natural logarithms (see Appendix A for data details); c is a constant term, the coefficients α, β, and δ capture the influence of exports, domestic demand and the exchange rate on imports. Both industry and time effects (η_j and T_t) are included, while ε_{jt} denotes a residual idiosyncratic error term.[5] This specification assumes that imports in one industry are primarily related to exports and domestic demand for the same industry, and are not related to the demand conditions in other industries. Although this is a relatively strong assumption, investigation of the World Input-Output database suggests that production processes are relatively confined within the broad industry categories used here and that inter-industry production spillovers are relatively small.

The first column of Table 1 shows the results of estimating regression (1) for total manufactured goods imports over the full sample. As expected, both exports and domestic demand have a positive effect on imports. Column 1 shows that a 1 per cent increase in the level of exports is associated with an increase in imports of 0.35 per cent, while a 1 per cent increase in the level of domestic demand is associated with an increase in the level of imports

1 This article follows Gaulier, Lemoine and Ünal (2011) in the categorisation of intermediate and final goods. Broad Economic Categories (BEC) 121, 22, 322, 42 and 53 are considered intermediate goods, while BEC 112, 122, 41, 51, 521, 522, 61, 62 and 63 are considered final goods.

2 The industry categories used in this article are textiles, wood, furniture, paper and paper products, pharmaceuticals, chemicals, non-metallic mineral products, ferrous metals, non-ferrous metals, general equipment, transport equipment, electrical machinery, computers and other electronics, metal products, rubber products and special equipment. This article follows the OECD categorisation by considering pharmaceuticals, chemical, electrical machinery, transport equipment, computers and electronic equipment, general equipment and special equipment as high-tech. The remaining industries are considered low-tech. See Hatzichronoglou (1997) and OECD (2005).

3 While data on imports and exports at the industry level are readily available, industry-specific domestic demand is more difficult to measure. For the analysis in this article, a proxy is constructed by using the National Bureau of Statistics of China industrial survey to subtract exports from total industrial sales.

4 The regressions also include one lead and lag of the first difference of the explanatory variables in order to ensure the coefficient standard errors are more efficient (Stock and Watson 1993). The regression results are qualitatively similar when we include the value of industrial inventories as an explanatory variable.

5 Statistical tests confirm the presence of unit roots and cointegration among the time series in the panel.

of 0.55 per cent. The exchange rate does not have a statistically significant effect on imports.

In order to assess whether the relationship has changed over the sample period, a dummy variable – $D_{Post\ 2005,t}$ – is included. The dummy is equal to 1 if the period is after 2005 and 0 otherwise. It interacts with the export and domestic demand variables. Equation (1) is transformed to:

$$M_{jt} = c + (\alpha_1 + \alpha_2 * D_{Post\ 2005,t})X_{jt} + (\beta_1 + \beta_2 * D_{Post\ 2005,t})DD_{jt} + \delta XR_{jt} + (\eta_j + T_t + \varepsilon_{jt}) \quad (2)$$

The results are presented in the second column of Table 1. The coefficient on the interaction term provides the marginal impact of a shock to export or domestic demand over the more recent period *compared with* the impact over the first period. Exports have a stronger impact on imports since 2005, with the interaction term being positive and statistically significant; a 1 per cent increase in the level of exports increases the level of imports by 0.49 per cent after 2005, compared with only 0.32 per cent for the period up to 2005. Conversely, domestic demand appears to have had a weaker effect on manufactured goods imports in more recent years.

The interaction term with domestic demand is negative and statistically significant, implying that a 1 per cent increase in domestic demand results in a 0.80 per cent increase in imports over the more recent period, compared with 0.96 per cent over the earlier period. When estimated with fixed effects, the main results are qualitatively similar (Table 1, Columns 3 and 4). The coefficients are estimated less precisely; however, the interaction terms are both significant at the 1 per cent level.[6]

The finding that imports have become more sensitive to changes in exports in recent years can be compared with the preceding analysis, which suggests that imports have fallen in magnitude relative to manufacturing sales. Together, these results suggest that while the value of manufactured goods imports has fallen as a share of manufacturing sales, imports have become more sensitive to changes in exports. It is worth noting that export growth slowed dramatically during the global financial crisis, whereas domestic demand growth remained relatively stable. In terms of contributions to demand for imports, the increase in the sensitivity of import demand to exports is offset by the fact that exports have grown less rapidly since the global financial crisis.

Table 1: Panel Regression Results
Total imports, 2001–2011

	Random effects		Fixed effects[(a)]	
	(1)	(2)	(3)	(4)
X_{jt}	0.35**	0.32**	0.20	0.05
$X_{jt} * D_{Post\ 2005,\ t}$		0.17***		0.18***
DD_{jt}	0.55**	0.96***	0.22	0.33*
$DD_{jt} * D_{Post\ 2005,\ t}$		–0.16*		–0.15***
XR_{jt}	–0.97	–1.21	–1.32	–1.35
Observations	128	128	128	128

Notes: *,**,*** represent statistical significance at the 10, 5 and 1 per cent levels, respectively
(a) Time fixed effects are dropped from the estimation as they were found to be jointly insignificant
Source: RBA

6 The Hausman test indicates that random effects estimators can be used. However, to allow for the fact that idiosyncratic industry effects may not be orthogonal to the explanatory variables, the models are also estimated using fixed effects. It is a standard result for the standard errors of the estimated coefficients to increase when using fixed effects estimators (Wooldridge 2002).

Some Extensions

Intermediate and final goods imports

Given that the drivers of imports might vary across production stages, the panel regression is also estimated separately for imports of intermediate goods and imports of final goods (consumption goods and capital goods). Since trade processing is widespread, with China assembling imported intermediate goods and exporting final goods, it might be expected that exports would have a larger impact on intermediate goods' imports compared with final goods. Table B1 in Appendix B suggests that exports are indeed more closely associated with imports in the case of intermediate goods when compared with final goods, but the estimates are imprecise. In line with the results for total imports, the results in Table B1 suggest that for the two types of goods, the impact of exports has increased over the recent period while the influence of domestic demand has declined.

Technological sophistication

Another extension is to consider whether imports of products by industries with different levels of technological sophistication have responded differently to changes in foreign and domestic demand. It is reasonable to expect that the more sophisticated a product is, the harder it is to find a comparable substitute domestically. This would result in both domestic demand and exports being associated with a higher level of imports for high-tech industries. Moreover, given the government's objective to increase domestic production of high-tech industries, it could be expected that the relationship of both export and domestic demand to imports would have diminished more for these industries compared with the others. Graph 3 supports this hypothesis, with the value of imports relative to manufacturing sales declining more for the high-tech than for the low-tech industries. To consider the question in the panel regression framework, an interaction term equal to 1 if the industry is designated 'high-tech' and 0 otherwise is added to the model. No significant interaction between either exports or domestic demand and the 'high-tech' dummy is found, and this result does not change in the post-2005 period. This suggests that the processes driving the decline in import intensity across industries has been relatively uniform across industries.

Conclusion

The imported content of Chinese manufactured goods sales has declined over the past decade. This suggests that as China has developed, Chinese firms have increasingly produced intermediate and final goods that previously would have been imported. Results from panel regressions indicate that while an increase in domestic demand now has a smaller impact on manufactured goods imports than in the past, an increase in exports has a larger effect on these imports. Over the period of interest, domestic demand growth was relatively stable, while export growth slowed dramatically during the global financial crisis. So, although manufactured goods imports have become less sensitive to changes in domestic demand, domestic demand has continued to have a significant and positive effect on imports of manufactured goods.

Appendix A

Total export and import data at the two-digit level based on Standard International Trade Classification revision 3 are drawn from the United Nations Comtrade Database. These trade data are converted into renminbi. Given that trade prices are only available from 2005 onwards, a price index is estimated for the period 2001–2004. The monthly change in export prices is correlated with the change in China's producer price index (PPI) and import prices are correlated with the unit value of Hong Kong's exports to China (correlation coefficients of 0.49 and 0.33, respectively, on average across industries). Therefore, for export prices, a monthly regression of export prices over the industry-specific PPI is estimated. Based on the estimated

coefficients, a proxy for export prices before 2005 is generated. For import prices, a similar method is used, regressing import prices on Hong Kong export unit values to China, as well as sector-specific total Hong Kong export unit values.[7]

A proxy for industry-specific domestic demand is created by subtracting export sales from total industrial sales using the National Bureau of Statistics of China industrial survey. However, this measure of domestic demand should not be interpreted as final demand given that an industry could be producing goods used as intermediate inputs in another industry. This should not be a problem for the analysis as long as inter-industry linkages have remained broadly constant over time. The World Input-Output Database suggests that for the period 2001–2009 this is indeed the case.[8]

Domestic demand is deflated using an industry-specific producer price index. An industry-specific real effective exchange rate is constructed using Chinese bilateral nominal exchange rates with its 12 largest trading partners.[9] These nominal bilateral exchange rates are transformed into real terms using relative PPI prices. The industry-specific real effective exchange rate is created as follows:

$$XR_{jt} = \sum_{i=1}^{12} a_{jt} * S_{it} * \left(\frac{PPI_{it}}{PPI_{China,t}}\right) \quad \text{(A1)}$$

where XR_j is the real effective exchange rate specific to industry j, a_{jt} is the share of partner i in imports by industry j, S_{it} is amount of RMB per unit of currency from country i, PPI_{it} is the level of producer prices in country i and $PPI_{China,t}$ is the level of Chinese producer prices.[10]

Appendix B

Table B1: Panel Regression Results
Intermediate and final goods imports, 2001–2011

	Intermediate				Final Goods	
	Random effects		Fixed effects[(a)]		Fixed effects[(a)]	
	(1)	(2)	(3)	(4)	(5)	(6)
X_{jt}	0.34*	0.37**	0.22	0.13	0.09	0.02
$X_{jt} * D_{Post\ 2005,\ t}$		0.13**		0.14**		0.07
DD_{jt}	0.54**	0.63***	0.29	0.29*	0.37***	0.43***
$DD_{jt} * D_{Post\ 2005,\ t}$		–0.13		–0.12***		–0.06
XR_{jt}	–1.52	–0.60	–1.45	–1.25	–0.57	–0.60
Observations	128	128	128	128	112	112

Notes: *,**,*** represent statistical significance at the 10, 5 and 1 per cent levels, respectively; final goods data cover only 14 industries as two industries do not include final goods; Hausman test results indicate random effects estimators should not be used for final goods

(a) Time fixed effects are dropped from the estimation as they were found to be jointly insignificant

Source: RBA

7 As a robustness check, only Chinese industry-specific PPI and Hong Kong export prices were used to proxy for export and import prices over the full period. The results were largely unchanged.

8 The main exception is the chemical industry, which has become more important for other industries over time. Excluding this industry, the conclusions were unchanged.

9 This includes Australia, Brazil, euro area, India, Japan, Malaysia, Russia, Singapore, South Korea, Thailand and the United States. Hong Kong is excluded from the data in order to avoid dealing with specific issues related to re-exporting.

10 The results are largely unchanged if trade shares are used instead of import shares and CPIs are used instead of PPIs.

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Shifts in Production in East Asia

Laura Berger-Thomson and Mary-Alice Doyle*

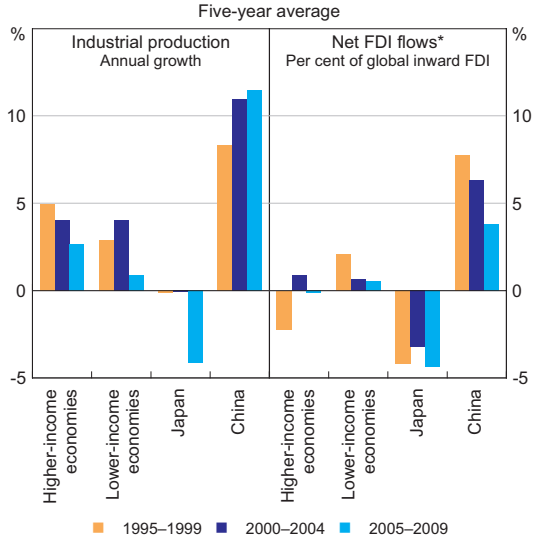
Over the past few decades, manufacturing production has shifted from the higher to the lower income economies in east Asia. This article uses input-output analysis to explore how total value added in manufacturing has shifted around the region. It finds that for most economies, the domestic content of manufacturing production has decreased over time, reflecting the increasing complexity of supply chains and the growth of intra-industry trade in the region. Also, a rising share of the region's production has been taking place in China, and this trend is expected to continue for some time yet.

Introduction

Over the past two decades, growth in industrial production in China has far outstripped growth in the other economies in the region (Graph 1). While this partly reflects more rapid growth in Chinese domestic demand, it is also a consequence of China's increasing integration into Asian supply chains. While several other lower-income economies in east Asia have received substantial foreign direct investment (FDI), China has been the destination for the greatest net amount of FDI over the past two decades.[1] Much of this investment inflow has been used to develop manufacturing capabilities in the region, and these economies' share of global exports of manufactured goods has grown strongly.

While China and other lower-income economies are attracting foreign direct investment from developed economies outside the region, a large share also comes from other Asian economies. Faced with rising costs of production in their home markets, firms in Japan, Korea and Taiwan have increasingly been looking to outsource production to the lower-income (and hence lower-wage) economies in the region, often by setting up subsidiaries in those countries. This raises the question of the extent to which the growth in manufacturing in the lower-income Asian economies (including China) reflects a shift in production away from the higher-income economies in the region. This has implications for assessments of trend rates of growth in individual economies in east Asia, as well as for the region as a whole. This article explores this question in more detail, looking at how production in east Asia has shifted geographically over time,

Graph 1
East Asia – Production and FDI
Five-year average



* Inward minus outward
Sources: CEIC; IMF; Thomson Reuters; UNCTADstat

* The authors are from Economic Analysis Department.

1 In this article, 'higher-income economies' refers to Hong Kong, Singapore, South Korea and Taiwan and 'lower-income economies' refers to Indonesia, Malaysia, the Philippines and Thailand.

and examines evidence about the extent to which this shift in production has resulted in the loss of some manufacturing capacity in the higher-income economies.

Factory Asia

Global supply chains involve the production of different components across multiple economies, some of which cross national borders multiple times, with final assembly in one country drawing these components together (Riad *et al* 2012). The supply chains in Asia are widely considered to be among the more complex in the world. There are extensive cross-country production networks, particularly in the automotive and information and communication technology (ICT) sectors. While China accounts for around half of the region's exports of final goods, these supply chains effectively spread the value-added contribution of these goods over many economies. The chains have developed over more than 30 years, with production gradually spreading from the higher-income economies in the region to the lower-income economies, and they continue to develop today.

Historically, Japan was the first economy in the Asian region to develop its manufacturing sector on an industrial scale, and remains a significant driver of many production processes in the region. This began in the mid 1950s, as coordinated investment in infrastructure and physical and human capital combined with the diffusion of foreign technology. Over the subsequent 20 years real per capita GDP increased by around 400 per cent, while exports grew at a faster pace.

The development of supply chains in the east Asian region, however, began in the 1980s, as the competitive advantages of Japanese firms began to wane and they looked to reduce production costs by moving some production processes offshore. This first wave of 'offshoring' was concentrated in Hong Kong, Singapore, South Korea and Taiwan, where labour costs were relatively low. The labour-intensive, 'low-tech' processes moved offshore first, with the 'high-tech' processes remaining. Once these economies developed, and labour and other costs began to rise, Japanese firms, and others that had started up in these economies, looked to move production to other lower-income economies in east Asia to contain costs.[2]

This gradual shift in production in Asia from higher-income economies to lower-income economies was enhanced by a number of other changes in the region throughout this period. Up until the early 2000s, real transport costs had been falling in trend terms since at least the mid 1980s. Further, trade barriers in east Asia have gradually been reduced, with a noticeable decline in average applied tariffs in the early 1990s around the time that the Association of South East Asian Nations (ASEAN) – then comprising Indonesia, Malaysia, the Philippines, Singapore and Thailand – implemented a free trade agreement.[3]

The shift in production across east Asian economies is reflected in net FDI by country. Japan has had a net outflow of FDI since at least the 1970s (Table 1).

FDI outflows from South Korea and Taiwan have also gradually increased, both having moved from being net recipients of FDI flows to net investors in the 1980s. In contrast, Singapore continues to receive large inflows of FDI (as a share of global inflows as well as relative to Singapore's own GDP), while inflows to Hong Kong are also generally positive. This is likely to reflect these economies' positions as key transport hubs in the region, with investment inflows reflecting the growth of trade in the region in general, which is positively correlated with the increasing complexity of supply chains (Craig, Elias and Noone 2011). FDI has also been increasing in many of the lower-income economies in the region. This is particularly apparent for China, which

2 This progressive development process was formalised by Akamatsu (1962) and is called the 'Flying Geese Model', to reflect its similarity to the formation of a flock of flying geese, with one leader and other geese following the same path behind. For an interpretation of this model in the wider context of east Asia, see Kojima (2000).

3 These countries were subsequently joined by Brunei, Cambodia, Laos, Myanmar and Vietnam. ASEAN also has separate free trade agreements with Australia, China, India, Japan, New Zealand and South Korea.

Table 1: East Asia – Net Foreign Direct Investment
Decade average flows[(a)]

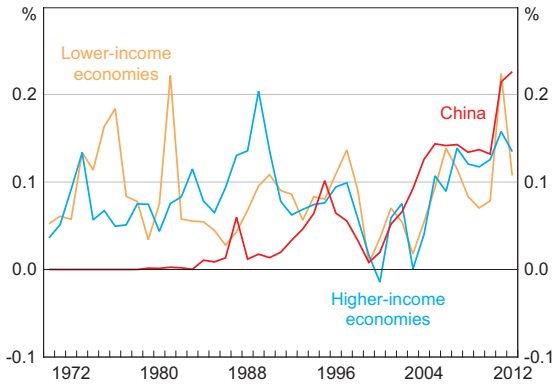
	Per cent of global inward FDI				Per cent of economy's GDP
	1970s	1980s	1990s	2000s	2000s
China	–	1.6	6.9	5.1	2.4
Hong Kong	1.0	1.0	–2.6	0.0	0.1
Indonesia	1.9	0.4	0.5	0.0	–0.1
Japan	–5.7	–12.1	–8.6	–3.8	–1.0
Malaysia	1.3	1.0	1.3	0.0	–0.1
Philippines	–	0.3	0.3	0.1	1.0
Singapore	1.0	1.9	1.2	0.9	6.9
South Korea	0.5	–0.1	–0.3	–0.2	–0.3
Taiwan	0.3	–0.3	–0.6	–0.4	–0.9
Thailand	1.0	0.5	0.8	0.5	3.0

(a) Inflows minus outflows
Sources: RBA; UNCTADstat

now accounts for around two-thirds of net FDI inflows into east Asia. Net flows into Indonesia, the Philippines and Thailand have also been increasing, although flows into Malaysia have recently declined.

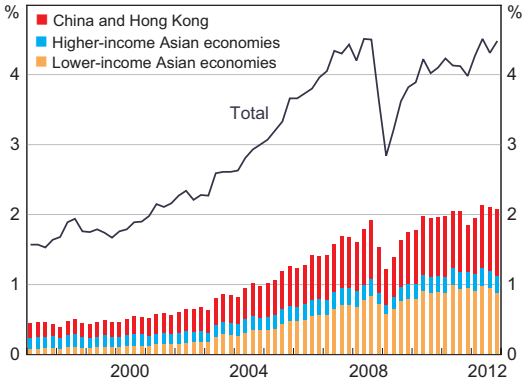
The increasing importance of China and the other lower-income economies in the region can be clearly seen in Japanese FDI data. Following a period of strong investment outflows to other economies in east Asia in the 1970s and 1980s, Japanese FDI to China began to grow strongly around the mid 1990s, at around the time that the magnitude of outflows to the US and some other advanced economies began to decline. China has received more investment from Japan than either the higher-income or the lower-income economies in east Asia since the early 2000s, and now accounts for around one-third of new Japanese investment in Asia (Graph 2). More detailed data, which are only available from 2005, suggest that growth in Japanese FDI to China has been strongest in the manufacturing sector, with China now accounting for close to 40 per cent of Japanese manufacturing investment in Asia. FDI has financed growth in Japanese subsidiaries in China and the other lower-income economies in the region. Subsidiaries in China now account for almost one-quarter of all Japanese foreign subsidiary sales and the other lower-income economies a further one-quarter (Graph 3).

Graph 2
Japan – Outward FDI Flows*
Per cent of Japanese GDP



* Based on reports and notifications available prior to 1998; balance of payments basis post-1998
Sources: IMF; Japan External Trade Organization; Thomson Reuters

Graph 3
Japan – Overseas Subsidiary Sales
Manufacturing industries, per cent of Japanese GDP



Sources: CEIC; Thomson Reuters

Geographical Shifts in Production: Mid 1990s to Mid 2000s

The development of east Asian supply chains can be seen by examining how total value added has shifted across the region. Value added is the amount by which the value of a product is increased at each stage of production, excluding the value of intermediate inputs to that good. Considering movements in value added, rather than trade flows, accounts for the fact that various components of a single final good may be produced in different countries.

This article uses a broader measure of value added than that provided in national accounts data. This measure includes all the value that is added domestically to a good produced by an industry, and we call this 'total value added'. To calculate this, input-output tables are used for the seven economies in the region for which data are available.[4] As an example of how total value added is calculated, consider the production of a car. The value added by the car industry, as measured in the national accounts, is equal to the value of the car, minus the value of the rubber for the tyres, the steel used to create the body, and the value of all other inputs from different industries. If the steel, rubber, and other supporting industries are located domestically, the total value added to the car domestically will be substantially larger than the value added just by the motor vehicle industry itself. This is because total value added accounts for the activity in the rubber and steel industries (as well as in industries that provide inputs to those rubber and steel products) that would not take place if the car were not produced.[5] However, note that owing to data limitations, total value added does not include any domestic content in imported inputs where the reimported good is in a different industry from that of the initial value added.[6] For further details on methodology, see Chen *et al* (2012) and Rayner and Bishop (2013).

Looking at the manufacturing industry as a whole, the results are consistent with the evidence outlined above about the shift of manufacturing from Japan and the higher-income economies in the region into China and the other lower-income economies from the mid 1990s. Japan contributed around 65 per cent of the total value added in the region to final manufactured goods in the mid 1990s (Table 2).[7] China accounted for about 15 per cent of regional value added at that time, but manufacturing value added in China has grown rapidly since then and accounted for around 35 per cent of regional value added in the mid 2000s. This has corresponded with a decline in Japan's share, to around 40 per cent. The share of total value added in all other economies has remained little changed.

The strong growth in production in China has been driven in part by strong growth in Chinese domestic demand. This can be seen by China's share of the

4 The dataset consists of input-output tables for China, Indonesia, Japan, Malaysia, South Korea, Taiwan and Thailand, with three observations: the mid 1990s, the early 2000s and mid 2000s. These data are available from the OECD or from national sources. Tables for Malaysia are not available for the mid 1990s, so Malaysia's share of value added is assumed to be the same in the mid 1990s as it was in the early 2000s.

5 Of course, individual industry value added calculated in this way cannot be summed, since there would be substantial double counting.

6 For example, if China exports steel to Japan, Japan uses the steel to make part of a car, and then exports that part to China for final assembly, the value added in the Chinese steel industry will not be counted in China's total value added to the car. However, if the part were made in China, not Japan, the steel production would be counted in China's total value added.

7 Note that the value added in the region will not equal the value of gross output, since it does not capture the value of intermediate inputs produced outside the region.

Table 2: Domestic Value Added from Final Demand for Manufactured Goods
Share of region, per cent

	Mid 1990s	Early 2000s	Mid 2000s
Japan	67.2	55.5	41.1
China	14.5	25.0	36.3
South Korea	7.1	8.6	10.8
Taiwan	4.1	4.0	4.0
Indonesia	2.9	2.4	3.1
Thailand	2.3	2.7	2.8
Malaysia	1.9	1.9	1.9

Sources: Bank of Korea; Department of Statistics (Malaysia); IMF; National Economic and Social Development Board (Thailand); OECD; RBA

region's domestic final demand for manufactured goods increasing rapidly over the past two decades, bringing it closer to its share of the region's total value added in manufacturing. However, it is clear that increased production in China also reflects increased integration into regional supply chains: total value added in manufacturing continues to exceed domestic final demand for manufactured goods, both in levels and as a share of the region. Further, over the first half of the 2000s, total manufacturing value added grew faster than domestic final demand for manufactured goods, suggesting that China's production growth represents an increased importance in regional supply chains within this period.

The decline in Japan's share of the region's total value added and the rising share of China can also be seen in the total value added data for the region's two largest industries, transport equipment and electronics. Japan accounted for around 70 per cent of regional total value added in each of these industries in the mid 1990s, while China accounted for around 8 per cent (Table 3). By the mid 2000s, Japan accounted for around 55 per cent of total value added in the transport industry and 40 per cent of total value added in the electronics industry. This suggests that the shift of production locations in the electronics industry has led to a larger relative decline in Japanese manufacturing than the shift in the transport industry.[8]

Japan's share of total value added in the transport industry is noticeably larger than its share of gross output, highlighting its important role in supplying regional production networks with high-tech components. Reflecting this, Thailand's share of total value added in the transport industry is below its share of regional gross output. This owes to the large share of intermediate inputs from other economies in the region used by manufacturers in Thailand, particularly from Japan.

Most economies' domestic content of production has declined over time (Graph 4). This reflects the specialisation in parts of the value chain in each country and the growth in intraregional production links. Japan's total domestic value added content in a unit of final demand for manufactured goods remains the highest in the region, at around 80 per cent, but this has declined from around 90 per cent in the mid 1990s. While China's total domestic value added content was quite high in the mid 1990s, at around 80 per cent, this has since fallen to around 70 per cent. Thailand and Malaysia have the lowest total domestic value added content of production, at around 40 per cent. Relative to the other lower-income economies (outside China), Indonesian production has high domestic content, which may be due to its low trade openness, as measured by its low and declining level of trade as a share of GDP, and its lesser integration in regional supply chains.

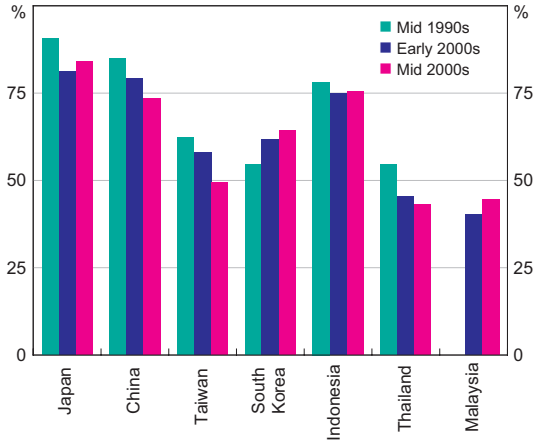
8 This may or may not be true for Japanese firms, since firms could have increased profits by shifting production offshore.

Table 3: Domestic Value Added for Final Demand by Industry

	Transport Equipment Share of region, per cent		
	Mid 1990s	**Early 2000s**	**Mid 2000s**
Japan	68.1	62.9	54.9
China	9.4	18.2	21.3
South Korea	10.4	10.1	14.6
Thailand	2.8	1.9	3.0
Indonesia	2.1	1.5	3.0
Taiwan	4.9	3.0	2.2
Malaysia	2.4	2.4	1.0
	Electronics Share of region, per cent		
	Mid 1990s	**Early 2000s**	**Mid 2000s**
Japan	74.5	57.0	40.2
China	6.8	20.2	27.7
South Korea	8.9	12.3	15.0
Taiwan	6.6	6.6	10.4
Thailand	2.0	2.2	3.4
Indonesia	0.5	0.9	1.8
Malaysia	0.7	0.7	1.4

Sources: Bank of Korea; Department of Statistics (Malaysia); IMF; National Economic and Social Development Board (Thailand); OECD; RBA

Graph 4
East Asia – Domestic Content of Production
Manufacturing, share of total domestic value added in final demand



Sources: Bank of Korea; Department of Statistics (Malaysia); IMF; National Economic and Social Development Board (Thailand); OECD; RBA

Input-output data also allow us to decompose total domestic value added into its industry sources for each unit of production for a particular industry. Using this information, we can gain further understanding of how economies specialise in the production process. Across the major industries, Japan has the largest share of manufacturing total value added that comes from research and development, at between 6 to 7 per cent. This share has increased over time, suggesting that Japan has specialised in research and development, while moving lower-skill tasks offshore.

On the other hand, in China, Malaysia and Thailand the own-industry value-added contributions from the electronics and transport industries were the lowest in the region, and have been declining since the mid 1990s. This suggests that lower-skill tasks in these industries, such as final assembly, have

been moved to these countries. Further, in the transport equipment industry, around 25 per cent of Thailand's total value added comes from basic metals.

The input-output methodology can also be used to examine the total value added for exports of goods in a particular industry.[9] Looking at production for export, China's share of the region's total value added in the transport equipment industry has remained low, growing from around 6 per cent in the mid 1990s to 12 per cent in the mid 2000s. In contrast, Korea's share has doubled from 10 per cent to 20 per cent, and Japan's share, though still high, has decreased from 75 per cent to 60 per cent of the region (Table 4). This suggests that the strong growth in Chinese manufacturing of transport equipment has been largely to keep up with growing domestic demand. Conversely, in the electronics industry, Japan's share of total value added in the region that is exported has halved, from 60 per cent in the mid 1990s to 30 per cent in the mid 2000s. This fall has been mostly offset by larger increases in the shares of South Korea and Taiwan, which have smaller, but more export-oriented electronics industries than Japan. China's share of electronics production that is exported is broadly in line with its share of production for final demand (Tables 3 and 4).

Table 4: Domestic Value Added that is Exported by Industry

	Transport Equipment Share of region, per cent		
	Mid 1990s	**Early 2000s**	**Mid 2000s**
Japan	75.7	82.7	61.5
South Korea	10.5	0.2	19.9
China	6.4	9.9	12.3
Thailand	2.2	1.7	2.5
Taiwan	3.8	3.8	2.4
Indonesia	0.7	1.2	0.9
Malaysia	0.6	0.6	0.5
	Electronics Share of region, per cent		
	Mid 1990s	**Early 2000s**	**Mid 2000s**
Japan	61.6	50.0	31.6
China	8.2	18.6	27.3
South Korea	11.3	6.3	16.1
Taiwan	10.5	11.9	14.1
Malaysia	8.1	8.1	6.1
Thailand	0.4	3.5	3.7
Indonesia	0.5	1.5	1.1

Sources: Bank of Korea; Department of Statistics (Malaysia); IMF; National Economic and Social Development Board (Thailand); OECD; RBA

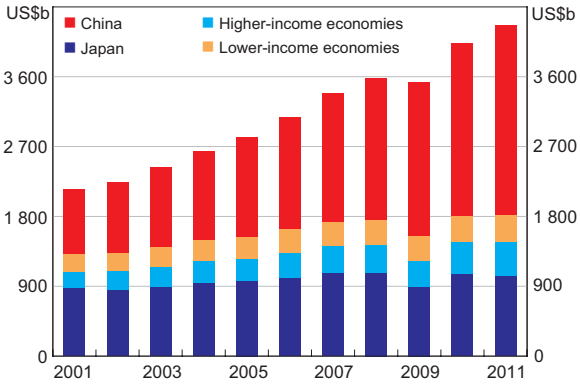
9 This is calculated by multiplying the total value added in an industry by the share of final demand for exports, which assumes that manufactured goods for export and for domestic use are produced using the same production technology. This is quite a strong assumption, particularly for countries such as China, Indonesia and Malaysia which have special economic zones where export-oriented production takes place.

Recent Developments

Input-output data are published with a considerable time lag, so a comprehensive analysis of recent trends in value added in the region is not possible. However, at an aggregate level, industry value added data are available in national accounts. While these data only capture value added directly by an economy's manufacturing industry, giving a different measure of the size of the manufacturing sector in each economy, the same trends are evident. This implies that the national accounts data are likely to provide a good indication of recent trends.

National accounts data show that the same trends described above have continued since the mid 2000s. In particular, China's share of manufacturing value added in the region has continued to increase, and this has been largely due to strong growth in China and no growth in Japan (Graph 5). Manufacturing value added in other economies in the region has also grown, but very strong growth in China has meant that their share of the region has decreased.

Graph 5
East Asia – Manufacturing Production
2009 prices



Sources: CEIC; IMF; RBA; Thomson Reuters

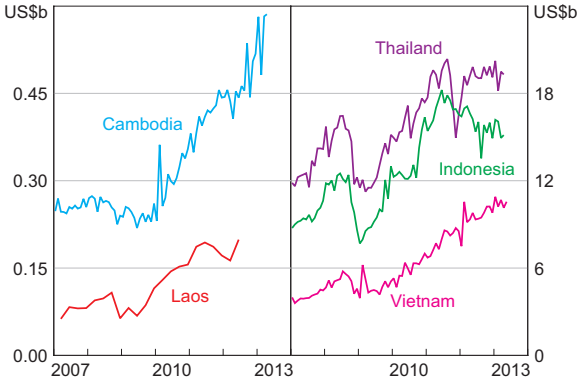
The continued shift of production into China is remarkable, both in recent years and over a longer horizon. While this can largely be seen as a continuation of the development process in China, it is interesting that the shift has been much more pronounced in the electronics industry than in some other industries such as transport equipment. This is likely to reflect the rapid changes in technology and associated changes in consumer preferences in the ICT industry, which have been faster and more widespread than changes in many other industries. When there is a high degree of 'creative destruction' in an industry, there is some evidence that incumbent firms are less able or willing to innovate, and thus new products from smaller, less dominant firms become a substitute for existing products (Igami 2013). Even when incumbent firms are driving the technological changes, more of the value of a product is likely to be added in the most competitive country in the region when that product is new, since there is no legacy of existing supply chains. The emergence of electronic tablets is a good example of this, with anecdotal evidence suggesting that a large share of this product is assembled in China. Other changes that have benefited China's ICT industry are the growing market share of Apple smartphones, from 9 per cent in 2008 to 19 per cent in 2012, which reportedly have more components made in China than some other previously popular brands, and the switch in preferences from desktop computers to laptops, since around 80 per cent of global laptop exports are from China. With many electronic components also increasingly coming from China, China's total value added in the electronics industry is expected to continue to increase.

Future Trends

The past two decades have seen an extraordinary expansion of production in China, increasing that country's share of regional value added from around 15 per cent in the mid 1990s to 35 per cent in the mid 2000s. Strong growth in the rest of the region and a contraction of the manufacturing total value added in Japan has meant that Japan's share of regional value added has declined since the mid 1990s. The extent to which this shift can continue remains an open question. As coastal regions in China have developed, and wages and other costs have started to rise, production has gradually moved inland. Given China's size, in terms of both its population

and geography, there is still some way to go for this move of industry into regional areas. There also appears to be some shift of production into other low-cost economies in the region. High inflows of FDI into Cambodia, Laos and Vietnam in recent years have been accompanied by rapid growth in exports, although in absolute terms these flows are still very small (Graph 6). As costs increase in China, it seems likely that this shift into other low-cost economies in the region will continue.

Graph 6
Asia – Exports



Sources: CEIC; RBA

In contrast to the broader trend for production to move where costs are lower, there have been some recent anecdotal reports of firms moving production back to higher-income economies. For example, in the United States, General Electric reopened local facilities to produce water heaters and refrigerators last year, while Apple has announced plans to move production of an existing product to the United States. Firms cite increasing transportation costs, lower energy costs in the United States and increasing wages in China as reasons for such moves. Also, some claim that significant efficiency gains can be made by locating production closer to research and development centres. So far, this has only occurred for certain high-tech, capital-intensive products, and it is difficult to know how widespread this practice may become. Reflecting similar factors, there is some speculation that firms will also move more production to lower-cost countries closer to home than Asia, such as Mexico for US firms. Nonetheless, it seems likely that Asia (and particularly China) will remain the world's factory for some time yet, at least as long as it retains its low-cost advantage.

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Banking Fees in Australia

Jessica Pratten*

The Reserve Bank has conducted a survey on bank fees each year since 1997. The results of the most recent survey suggest that banks' fee income from households continued to decline in 2012, but fee income from businesses increased substantially.

Overview

The Reserve Bank's annual bank fee survey provides information on the fees that banks earn from their Australian operations.[1] It focuses on fee income generated by banks in the process of taking deposits, making loans and providing payment services. The 2012 survey included 17 institutions, which together account for around 90 per cent of the total assets of the Australian banking sector. Other forms of non-interest income, such as income earned from funds management and insurance operations, are excluded from the survey. This article provides a summary of the results of the latest survey covering the banks' financial years ending in 2012.[2]

Since 2010, fee income from businesses has risen while banking fees collected from households have fallen. This trend continued in 2012, during which total domestic fee income grew by 4¼ per cent to $11.4 billion (Table 1, Graph 1).

Table 1: Banks' Fee Income

	Households		Businesses		Total	
	Level $ billion	Growth Per cent	Level $ billion	Growth Per cent	Level $ billion	Growth Per cent
2009	5.2	1.5	5.8	10.1	11.0	5.9
2010	4.3	–16.6	6.5	12.1	10.8	–1.4
2011	4.1	–5.7	6.8	4.8	10.9	0.6
2012	4.1	–0.3	7.3	7.0	11.4	4.3

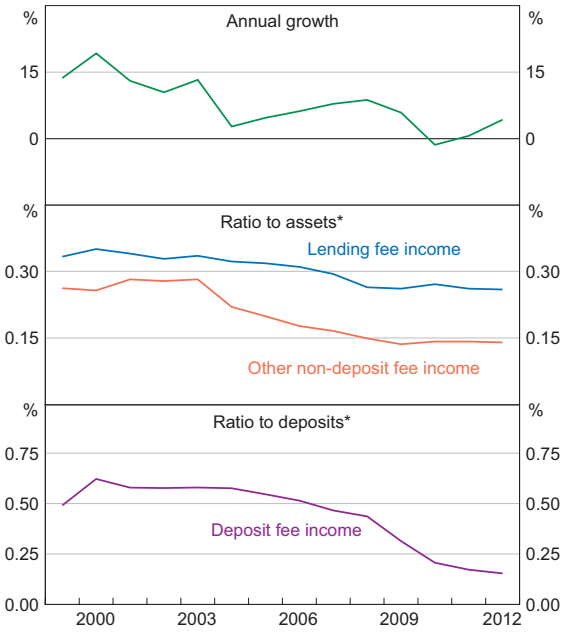
Source: RBA

* The author is from Domestic Markets Department.

1 The data from the survey are published in the Reserve Bank's Statistical Table F6, 'Domestic Banking Fee Income'.

2 All data in this article are based on individual banks' financial years, which differ between banks, apart from data presented in Tables 4 and 5.

Graph 1
Banks' Fee Income



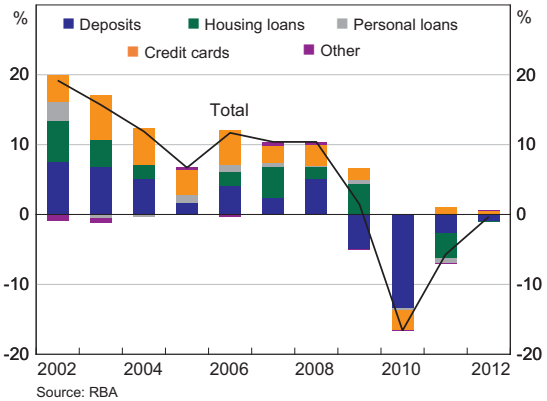
* Adjusted for breaks in series in 2002 due to a change in banks' reporting; financial-year average assets and deposits have been used
Sources: APRA; RBA

Households

After declining significantly in each of the past two years, banks' fee income from households fell a little further in 2012 (Graph 2, Table 2). Although credit card fee income grew slightly, this was offset by a fall in deposit fee income. Fee income on housing and personal loans remained at around 2011 levels.

The fall in deposit fee income in 2012 was mostly driven by a decrease in account servicing and transaction fees on transaction deposit accounts. This fall occurred despite a significant increase in household deposits over the year, reflecting both

Graph 2
Growth in Household Fee Income
Contribution by product



Source: RBA

Table 2: Banks' Fee Income from Households

	2010	2011	2012	Growth 2012	Average Growth 2006–2011
	$ million	$ million	$ million	Per cent	Per cent
Loans:					
– Housing	1 377	1 222	1 218	–0.3	6.5
– Personal	345	317	317	0.0	1.8
– Credit cards	1 244	1 293	1 312	1.5	3.8
Deposits	1 250	1 140	1 105	–3.0	–9.3
Other fees	94	91	97	6.0	6.4
Total	**4 311**	**4 064**	**4 051**	**–0.3**	**–0.6**

Source: RBA

continued competition in the deposit market and the sizeable inflows into at-call savings accounts and term deposits, which are less likely to be subject to fees than transaction accounts. For the household sector, the ratio of deposit fee income to deposits has fallen from 0.6 per cent in 2008 to 0.2 per cent in 2012.

The fall in deposit fee income was partially offset by a slight increase in exception fee income from deposits, which rose for the first time since 2008 (Table 3). Exception fees are charged when there are insufficient funds in an account to cover certain transactions, such as a direct debit payment or a mortgage repayment, or when the credit limit is exceeded on a credit card. The increase in deposit exception fees, which was reported by a limited number of banks, was accounted for by an increase in the number of times that fees were charged, rather than the level of fees. This growth was likely to have been due to the increase in the number of deposit accounts during the year.

Fee income from housing loans fell marginally in 2012. Account servicing fee income from housing loans increased in the year but was offset by a fall in other fee income (which includes security fees, exception fees and fees for breaking fixed-rate loans). In the year to September 2012, the growth in housing loan approvals, and therefore establishment fee income, may have contributed to the growth in account servicing fees. Exception fee income from household loans was little changed in 2012 after falling significantly over the previous two years.

The slight decline in housing loan fee income occurred despite the 5 per cent increase in mortgage lending over the year. This divergence partly reflected the decision by a number of banks to waive application and other fees. It also resulted from a continued fall in exit fee income following the Federal Government's ban on exit fees on variable rate home loans in July 2011.[3] In the lead-up to the ban there had been speculation that lenders would increase other fees to compensate for the potential loss of income. However, average fees (excluding exit fees) charged on variable rate mortgages discharged after three years have declined slightly for both bank and non-bank lenders since the ban was implemented (Table 4).[4]

Fee income earned from personal loans was flat, despite a contraction in personal credit over 2012 (Table 2). Increases in account servicing and other fees contributed to a 1½ per cent increase in credit card fee income. The increase in account servicing fees was due to a small rise in the number of credit cards on issue; annual fees on credit cards were little changed over the year (Table 5). There was also a slight fall in transaction fees in line with a fall in the value of cash advances in the year.

Table 3: Exception Fee Income from Households

	2010	2011	2012	Growth 2012
	$ million	$ million	$ million	Per cent
Loans	370	315	312	–1.2
– Housing	44	36	35	–2.4
– Personal	33	24	25	4.1
– Credit cards	293	255	251	–1.5
Deposits	299	235	261	11.0
Total	**669**	**550**	**572**	**4.0**

Source: RBA

3 For more information on the effect of the exit fee ban in 2011, see Rudd and Stewart (2012).

4 Average fees were calculated over a three-year period as exit fees did not generally apply if a borrower exited the loan after three years.

Table 4: Average Fees on Variable Housing Loan Products[a]

Current level and change since October 2010;[b] $

	Establishment fee		Service fee (over three years)		Discharge fee[c]		Total	
Lender type	Level	Change	Level	Change	Level	Change	Level	Change
Major banks	449	8	398	–89	255	62	1 102	–19
Other banks	389	–68	557	81	213	–83	1 160	–70
Credit unions and building societies	546	–49	198	76	59	–47	803	–19
Other lenders	477	–106	249	–5	280	–83	1 006	–194
All institutions[d]	**442**	**–16**	**416**	**–42**	**239**	**20**	**1 098**	**–37**

(a) Average across institutions, based on a $250 000 loan to owner-occupier discharged after three years; includes standard variable and package products
(b) Current level is as at September 2012; October 2010 was the latest date prior to the ban for which data were available
(c) Does not include mortgage exit fees
(d) Weighted average based on the share of housing credit for each type of institution
Sources: ASIC; InfoChoice; RBA

Table 5: Unit Fees on Credit Cards[a]

	2010	2011	2012	Change 2012	Average Change 2006–2011
				Per cent	Per cent
Annual fees ($)[b]					
Low-rate cards	53	54	55	2.1	5.5
Standard cards	29	29	29	0.0	0.6
Standard rewards-based cards	80	80	80	0.0	0.0
Gold rewards-based cards	151	137	128	–6.1	–0.5
Platinum rewards-based cards	283	283	246	–12.8	2.7
Cash advance fees[c]					
Own bank's ATM ($)	1.1	1.1	1.1	0.0	–4.7
– Per cent of value	1.8	1.8	1.8	0.0	10.0
Other institutions' ATM ($)	1.1	1.1	1.1	0.0	–8.1
– Per cent of value	1.8	1.8	1.8	0.0	4.7
Overseas ATM ($)	3.6	3.6	3.1	–15.5	0.0
– Per cent of value	1.7	1.8	1.8	3.6	4.0
Foreign currency conversion fee (per cent of value)	2.6	2.9	2.9	0.0	3.4
– Late payment fee ($)	15	14	14	0.0	–15.5
– Over-limit fee ($)	14	10	10	0.0	–20.1

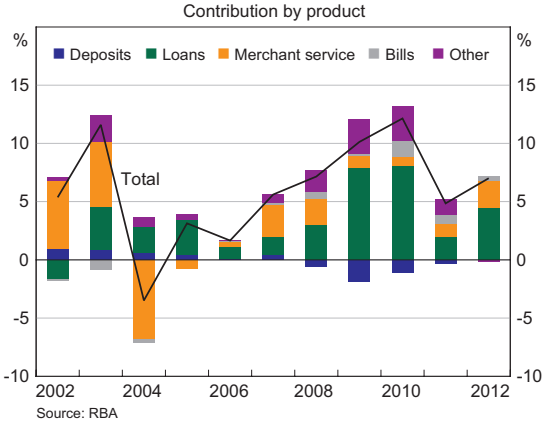
(a) Simple average of fees for cards with interest-free periods issued by major banks, except for the annual fee on no-frills cards, which is based on a wider sample of banks; note that changes in the sample affect the average fee; as at June
(b) Includes fees for membership in rewards program where charged separately
(c) Most banks charge the greater of a flat fee or a percentage of the cash advance
Sources: RBA; credit card issuers' websites

Businesses

Total fee income from businesses increased by 7 per cent in 2012 (Graph 3, Table 6). Much of this growth was due to fee income from business loans, which increased by 11 per cent. This rise was largely the result of an increase in the account servicing fees charged to businesses and reflects modest growth in the number and value of new loans as well as an increase in the fees themselves. Fee income from bank bills (which includes charges for arranging bank bill facilities and accepting or endorsing bank bills) also increased slightly in the year; however, this was not broad based across banks.[5]

Another driver of growth in business fee income was the increase in fees earned from providing merchant services. These fees are charged by banks for providing merchants with credit and debit card transaction services, with around 70 per cent of these fees paid by small businesses. The increase was the largest since 2007 and reflected growth in the number of transactions, particularly debit card transactions, and changes in the pricing for some services (partly as a result of the pass-through of changes to interchange fees). Since the introduction of the Reserve Bank's credit card interchange fee

Graph 3
Growth in Business Fee Income
Contribution by product



Source: RBA

Table 6: Banks' Fee Income from Businesses

	2010	2011	2012	Growth 2012	Average Growth 2006–2011
	$ million	$ million	$ million	Per cent	Per cent
Deposit accounts	646	624	623	–0.1	–5.1
– of which: exception fees	*60*	*50*	*46*	*–8.2*	*na*
Loans	2 708	2 837	3 144	10.8	12.1
– of which: exception fees	*52*	*38*	*36*	*–5.6*	*na*
Merchant service fees	1 839	1 910	2 067	8.2	4.9
Bank bills	187	236	262	11.0	28.2
Other	1 135	1 222	1 212	–0.8	12.5
Total	**6 514**	**6 830**	**7 308**	**7.0**	**7.9**
– of which: exception fees	*112*	*88*	*81*	*–7.1*	*na*

Source: RBA

5 Note that this year, one bank reclassified fee income from bank bills as interest income in their statutory reports and no longer includes them in the survey; as a result, previous years' figures for bank bills fee income have been revised down to make them comparable to data for 2012.

reforms in 2003, total merchant service fee income has grown by just 13 per cent (the value of card transactions has more than doubled) (Graph 4).

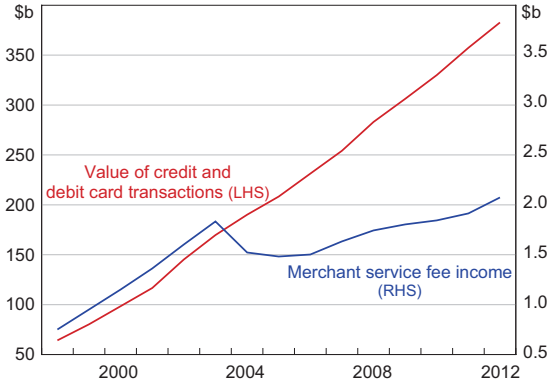
Business deposit fee income was little changed in the year, despite growth in business deposits. This mirrors the development in household deposit fees, where continued strong competition for deposits contributed to the fall in fees charged on deposit accounts. Exception fee income from businesses declined slightly over the year; however, this fall was smaller than in the prior two years.

Reference

Rudd S and C Stewart (2012), 'Banking Fees in Australia', RBA *Bulletin*, June, pp 43–47.

Graph 4

Merchant Service Fee Income and the Value of Transactions



Source: RBA

Mapping the Australian Banking System Network

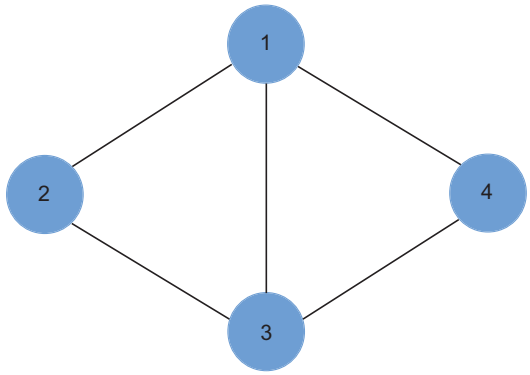
Eduardo Tellez*

An important aspect of the banking system is the network of exposures between individual financial institutions. Using regulatory data, this article maps the network of large bilateral exposures between Australian financial institutions and then analyses its basic features using the tools of network theory. Many of the features of the Australian network are consistent with those of financial networks in other countries. In particular, most institutions in the network are only linked to a small number of other institutions, while a few, typically larger, institutions are linked to a large number of other institutions. An understanding of the banking system network can assist in identifying contagion risks and assessing financial stability.

Introduction

Many systems are composed of individual parts linked or connected in some way.[1] The pattern of these links can be represented as a network, that is, a set of nodes joined together in a particular way (Figure 1). Well-known examples are the internet and friendship networks. Studying complex systems as networks is useful because the particular pattern of connections – the structure of the network – can affect the behaviour of the whole system.[2] In particular, the complex interactions of the financial system can be modelled as a network where nodes represent financial institutions and links represent exposures between them.

Figure 1
A Simple Network
Four nodes and five links



Source: RBA

* The author is from Financial Stability Department. He would like to thank Luci Ellis for her contribution.

1 The terms 'links' and 'connections' are used interchangeably in this article.

2 See Newman (2010) for a comprehensive treatment of networks.

The analysis of financial networks, though still in its infancy, is receiving increasing attention following the global financial crisis. For example, Haldane (2009) argues that the global financial system became increasingly complex and homogenous before the crisis, which increased its fragility as a network. From a financial stability perspective, network analysis can enhance policymakers' understanding of the interconnectedness of the financial system and its implications for the transmission of shocks and contagion.

This article presents an approximation to the network of exposures between Australian authorised deposit-taking institutions (ADIs) (banks, credit unions and building societies). While the data available are far from comprehensive, they highlight the basic features of the network.

Large Exposures

The available data provide a useful, albeit only partial, view of the bilateral exposures between financial institutions in Australia. These data are the 'large exposures' that ADIs report quarterly to the Australian Prudential Regulation Authority (APRA).[3] Smaller exposures are not individually reported to APRA and, therefore, are not available. Large exposures include on-balance sheet items such as loans or holdings of debt securities as well as off-balance sheet positions such as those related to financial derivatives.

Locally incorporated ADIs (including foreign-owned bank subsidiaries) are required to report their 10 largest exposures and all exposures that individually exceed 10 per cent of their regulatory capital. Foreign-owned bank branches, which do not hold capital locally, are required to report their 20 largest exposures. The exposures reported are to counterparties unrelated to the reporting ADI. For example, exposures of a foreign-owned bank in Australia to its overseas parent are excluded.[4]

In aggregate, ADIs reported large exposures to other Australian-owned ADIs and foreign-owned banks of about $210 billion as at December 2012 (or around 6 per cent of ADIs' aggregate consolidated group assets) (Table 1). On-balance sheet exposures comprised over two-thirds of the total, while off-balance sheet exposures, mostly interest rate and foreign exchange derivatives, represented less than a third. While the average large exposure was about $180 million, most large exposures were much smaller, with a median value of about $9 million, reflecting the fact that the majority of ADIs are small credit unions and building societies.

More than half of outstanding ADI large exposures were to the four major Australian banks (Table 2). In part, this could reflect the 'tiered' nature of the inter-ADI market, where a small number of large banks transact with each other and a large number of small institutions place funds with the large banks. However, this also partly reflects the nature of large exposures reporting. If a large ADI and a smaller ADI have exposures to each other of a similar size, it is more likely that the smaller ADI's exposure to the larger one will qualify as a large exposure.[5]

The foreign-owned banks are an important part of inter-ADI exposures both as borrowers and lenders (Table 2).[6] As borrowers, the foreign-owned banks represented about 40 per cent of ADIs' large exposures, partly because the data include exposures to the foreign-owned banks' wider international financial groups.[7] As lenders, the foreign-owned banks represented about 20 per cent

3 The sample data used in this article include large exposures for banks, credit unions and building societies between March 2010 and December 2012.

4 See APRA (2008).

5 For example, most credit unions and building societies have total liabilities below 10 per cent of the major banks' regulatory capital. Therefore, it is very unlikely that a loan from a major bank to a credit union or building society will be considered as 'large' from the point of view of the major bank.

6 The terms 'lending' and 'borrowing' are used in a general sense to include not just loans but also debt securities and derivatives transactions.

7 In APRA's large exposures form, ADIs report the identity of their large exposures counterparties in a free-text field. Often, a counterparty is identified as an international banking group, but the location of the particular entity is not disclosed. For consistency, all exposures reported to foreign-owned banks (including those explicitly not in Australia) are attributed to the Australian entity if there is one.

Table 1: Inter-ADI Large Exposures[(a)]
Consolidated group, December 2012, $ billion

	On-balance sheet	Off-balance sheet	Total
Major banks	75	58	133
Smaller Australian-owned banks	23	2	25
Foreign-owned banks	39	5	44
Credit unions and building societies	9	0	9
Total	**146**	**65**	**211**

(a) Includes exposures of Australian-owned ADIs to the wider financial group of those foreign banks with subsidiaries or branches in Australia but excludes exposures to foreign banks that do not have a branch or subsidiary in Australia; exposures of foreign-owned banks in Australia to their wider financial groups are excluded
Sources: APRA; RBA

Table 2: Inter-ADI Large Exposures by Counterparty[(a), (b)]
Consolidated group, December 2012, $ billion

	Borrower				
Lender	Major banks	Smaller Australian banks	Foreign-owned banks	Credit unions and building societies	**Total**
Major banks	72	0	60	0	133
Smaller Australian-owned banks	15	3	6	0	25
Foreign-owned banks	28	3	13	0	44
Credit unions and building societies	3	5	1	1	9
Total	**118**	**11**	**81**	**1**	**211**

(a) Includes exposures of Australian-owned ADIs to the wider financial group of those foreign banks with subsidiaries or branches in Australia but excludes exposures to foreign banks that do not have a branch or subsidiary in Australia; exposures of foreign-owned banks in Australia to their wider financial groups are excluded
(b) May not sum to total due to rounding
Sources: APRA; RBA

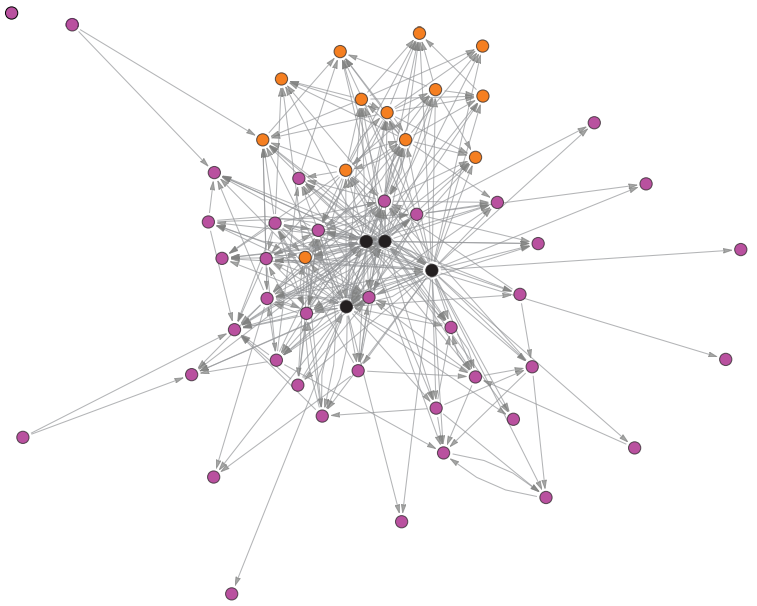
of ADI large exposures. While this substantial share may arise in part because branches do not face local regulatory limits on the size of their exposures, it also reflects the fact that they are required to report their 20 largest exposures, compared with a minimum of 10 for other banks.[8]

Network Structure

The network of large exposures between Australian banks can be depicted graphically by representing banks as nodes and large exposures between borrowing banks and lending banks as links between nodes (Graph 1). The greater the number of links related to a given node, the closer the node is to the centre of the network. This network is 'directed', with links drawn as arrows flowing from borrowers to lenders, thereby indicating the possible path of contagion in case of financial distress of the borrower. The arrows are unweighted, indicating the existence of a link, but not its size, given that all exposures are

8 Locally incorporated ADIs are subject to a prudential limit of 50 per cent of their regulatory capital in their individual exposures to other ADIs. Exposures to individual non-ADI corporations and other businesses are limited to 25 per cent of capital.

Graph 1
Australian Interbank Network of Large Exposures*
Consolidated Group, December 2012



● Major banks ● Smaller Australian-owned banks ● Foreign-owned banks

* Arrows flow from borrower to lender; sample of 56 banks and 335 exposures; placement of banks is related to the number of links
Sources: APRA; RBA

large from the perspective of the lender. Additionally, the network is incomplete, since not all banks are directly linked to each other, and is disconnected, since there is one bank that is not linked to any other banks (at least via large exposures).

This depiction of the network highlights the fact that the major banks, which are placed at the centre of the graph, are linked to many other banks in the network. In contrast, most of the foreign and smaller Australian-owned banks are linked to only a few other banks. Also, the smaller Australian-owned banks tend to be more connected with other Australian-owned banks, while the foreign-owned banks tend to be more connected with other foreign-owned banks and the major banks.

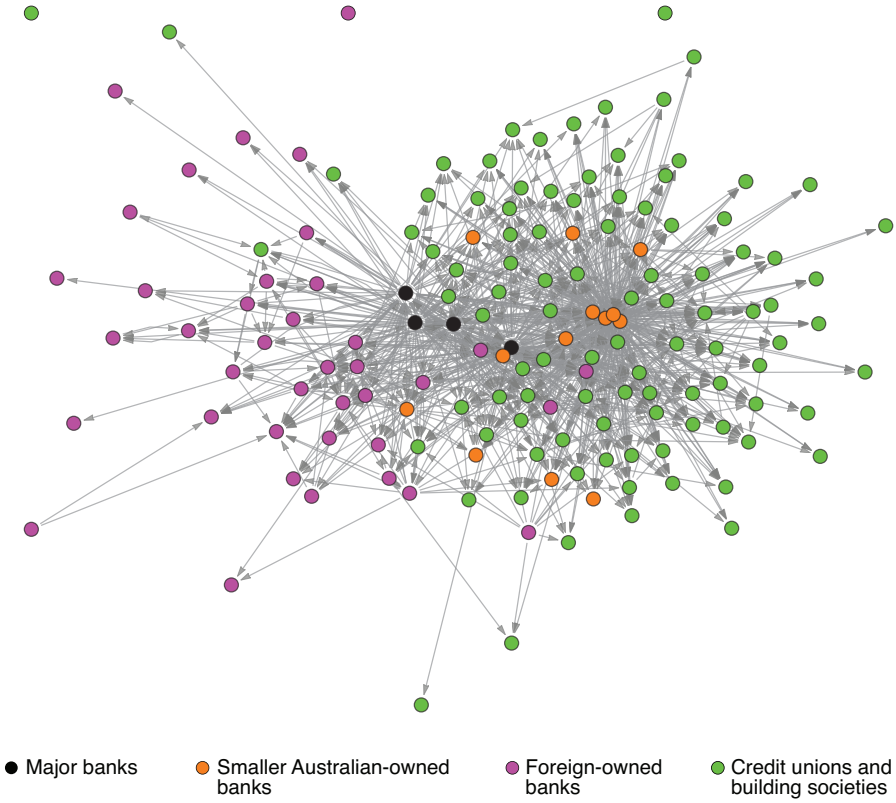
This interbank network can be expanded by including the credit unions and building societies, which are generally smaller than the banks (Graph 2). In this more comprehensive depiction of the network, the major banks remain highly connected to other institutions, but some smaller institutions become highly connected as well. This graph illustrates the fact that, in the extended banking system network, the major banks tend to be more interconnected with the foreign banks and the smaller Australian-owned banks tend to be more interconnected with the credit unions and building societies.

The visual representation of the network also highlights the complexity of the system of financial connections created by large exposures between ADIs. Despite this complexity, however, even the comprehensive version of the Australian banking system network is not very dense, with only about 5 per cent of all possible pairs of ADIs having direct links between them. Financial networks tend to have low density as they are generally comprised of a few

Graph 2

Australian Banking System Network of Large Exposures*

Consolidated Group, December 2012



* Arrows flow from borrower to lender; sample of 155 ADIs and 1 119 exposures; placement of ADIs is related to the number of links

Sources: APRA; RBA

well-connected institutions and a large number of sparsely connected institutions.[9] While the number of links between established institutions has tended to rise over the past few years, this has been offset by the entry of new institutions with few initial links, leaving the overall density of the network roughly unchanged.

Despite the low density of the network, about 30 per cent of pairs of ADIs are indirectly connected to each other through paths of links – that is, by following links according to the direction of the arrows. For example, if bank A borrows from bank B and bank B borrows from bank C, then there is a path of 2 steps in length between bank A and bank C. Across the network, these directed paths have an average length of 2.2 steps.[10] This small average 'distance' between pairs of nodes is a common feature of many networks and is generally known as the 'small-world phenomenon'.[11] This effect can increase contagion in financial networks since a

9 For example, studies for the Italian, Swiss and German interbank networks find ratios of actual connections to all possible connections of between 0.5 per cent and 1.5 per cent. However, these studies include a very large number of small credit institutions; for example, in the German case there are about 1 200 credit unions in the sample. See Müller (2003), Lazzeta and Manna (2009) and Craig and von Peter (2010).

10 There can be many possible different paths between two nodes. The average is based on the *shortest* path between each pair of nodes.

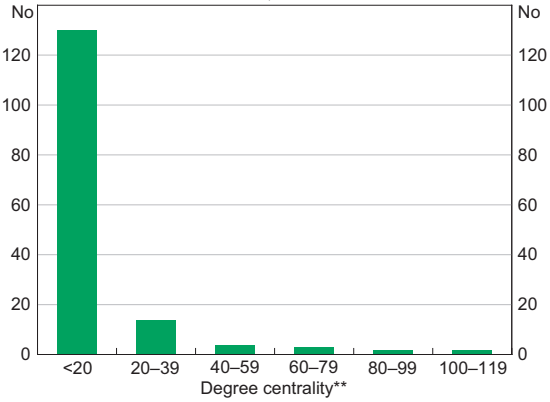
11 The small-world phenomenon, also known as the 'six degrees of separation', was the object of experimental studies about social networks in the United States in the 1960s (see Milgram 1967).

shock to a particular node can spread to many other (seemingly unrelated) nodes in only a few steps.[12]

The Degree of Centrality

A key aspect of network analysis is to determine how important different nodes are in a network. A simple measure of importance is 'degree centrality', that is, the total number of links attached to a node, regardless of their direction. For a particular ADI, this includes links to institutions that it has borrowed from and links to institutions to which it has lent. Most ADIs in the Australian banking system network have low degree centrality, meaning that they are only linked to a few other institutions, while a few have very high degree centrality, with links to many other institutions. As at December 2012, the bulk of the sample of 155 ADIs had degree centrality below 20, while only a few had degree centrality greater than 100 (Graph 3).[13]

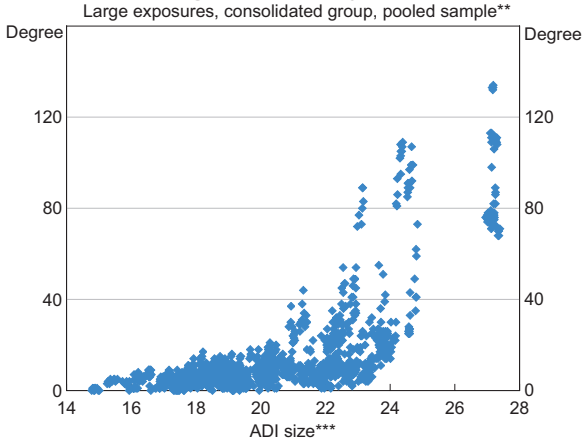
Graph 3
ADI Degree Centrality*
Number of ADIs, December 2012



* Large exposures; consolidated group; sample of 155 ADIs
** Degree centrality is the number of links (exposures) attached to a node (ADI)
Sources: APRA; RBA

Larger ADIs tend to have higher degree centrality (more links) than smaller ones (Graph 4). This is not surprising because size can offer a number of advantages in a financial network. For example, larger institutions are more likely to have issued debt securities that are rated, which other institutions can hold for the purposes of investment or liquidity management. Nevertheless, there are a few smaller ADIs that have degree centrality much higher than their size would suggest. This high degree centrality mainly reflects many other smaller institutions placing funds with them either through direct deposits or purchases of debt securities. This is presumably because these deposits or securities offered more attractive yields than other comparable products in the market.

Graph 4
ADI Degree Centrality and Size*
Large exposures, consolidated group, pooled sample**



* Degree centrality is the number of links (exposures) attached to a node (ADI)
** March 2010–December 2012; excludes individually identifiable institutions
*** Log of total assets ($)
Sources: APRA; RBA

Differences in the Degree of Centrality

The extent of connections between ADIs implies that most are linked into the network in a minor way (low degree centrality), while a few ADIs have very extensive connections (high degree centrality). These large differences in degree centrality across institutions are usually illustrated using the rank-degree relationship, that is, the relationship

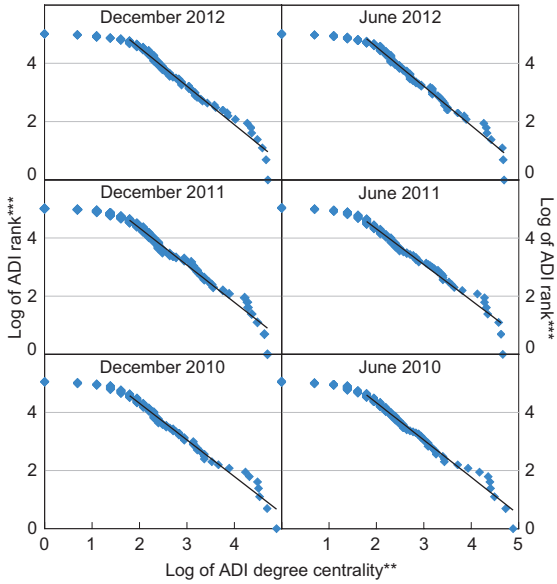
12 Similarly, infectious diseases are predicted to spread more quickly in small-world networks (see Watts and Strogatz 1998).

13 High centrality reflects ADIs' borrowing (out-degree) more so than lending (in-degree), particularly for those institutions with the highest centrality. The high out-degree arises from an institution being reported by many other different institutions as a large exposure. In contrast, the low in-degree centrality mostly reflects the fact that, in general, ADIs only report their 10 largest exposures (20 for foreign-owned branches).

between the rank of each institution and its degree centrality.[14] When plotted on a logarithmic scale, part of the rank-degree relationship appears to follow a straight line (Graph 5).[15] Broadly speaking, this indicates that, as an institution's ranking increases (moving down the line) its degree centrality increases disproportionately. Therefore, those institutions with the highest rankings (towards the lower end of the line) have degree centralities that are an order of magnitude greater than those institutions with the lowest rankings (towards the top end of the line). As a result, there are ADIs with degree centrality many times greater than that of the average ADI. For example, as at December 2012 the highest-ranked ADI had a degree centrality of 111, while the average degree centrality was about 14. Notably, the rank-degree relationship appears to follow a straight line at different points in time, suggesting that this is an enduring feature of the network.

Empirical studies of financial and payments networks often find very large differences in the degree centrality of institutions.[16] These large differences are likely to arise from a 'preferential attachment' process, where the network grows by the addition of new nodes, which tend to attach themselves to existing nodes that are already well connected.[17] In a financial network, a new institution is likely to find it more advantageous to link to a well-connected bank that acts as a 'hub' for financial flows. Since connectivity is strongly correlated with size, a well-connected bank might offer services or products that other smaller, less-connected institutions do not. For example, larger banks usually offer derivative products that smaller institutions can use for hedging interest rate risk.

Graph 5
ADI Network Degree Centrality*
Large exposures, consolidated group



* Trend line fitted on nodes with degree centrality greater than 5
** Degree centrality is the number of links (exposures) attached to a node (ADI)
*** Rank of ADIs according to their degree centrality
Sources: APRA; RBA

Networks with very large differences in the degree centrality of nodes generally exhibit a so-called 'robust-yet-fragile' property.[18] These networks are resilient to the failure of random nodes, since most of them do not have extensive connections, but they are very sensitive to the 'targeted' failure of the few nodes that are extensively connected. In a financial network setting, this suggests that the failure of an institution with minimal connections is less likely to generate contagion than the failure of an institution with extensive connections. In particular, the failure of an institution that has borrowed from many other institutions could generate losses across the system. However, this is mitigated by regulatory limits on large exposures, so the default by one institution should not by itself generate losses large enough to put its lenders in default.

14 The rank is simply calculated by sorting institutions by their degree centrality. The institution with the highest degree centrality has a rank of one, the institution with the second highest degree centrality has a rank of two and so on.

15 Distributions that follow this pattern are generally known as 'power laws' (see Clauset, Shalizi and Newman 2009).

16 For example, see Boss *et al* (2004), Soramäki *et al* (2006) and Bastos e Santos and Cont (2010).

17 See Barabási and Albert (1999).

18 See Albert, Jeong and Barabási (2000).

Clustering

Many networks display transitivity – that is, if node A is linked to node B, and B is linked to C, then there is a relatively high probability that A and C are also directly linked.[19] Colloquially, a friend of my friend is also likely to be my friend. Groups of nodes that are highly interconnected, displaying high transitivity, are generally known as clusters.

A common measure of overall transitivity in a network is the global clustering coefficient. Broadly speaking, the coefficient relates the number of triangles in the network to the number of 'open triangles' (ignoring the direction of links).[20] For the Australian banking system network, based on large exposures, the global clustering coefficient is 0.22, meaning that if institution A is linked to institution B, and institution B is linked to institution C, then there is a 22 per cent probability that A is also directly linked to C.[21]

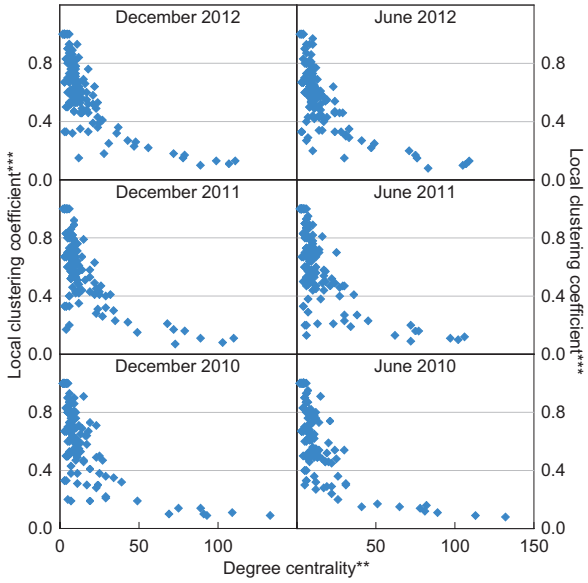
A related measure is the local clustering coefficient, which represents the average probability that any two of a node's neighbours – those nodes linked to it – are neighbours themselves (ignoring the direction of links). Intuitively, it quantifies how closely a node's neighbours approximate a complete sub-network. If a node's neighbours are all neighbours themselves, its clustering coefficient is one and if no links exist between them, the coefficient is zero. In the Australian banking system network, most institutions have a clustering coefficient between 0.5 and 0.8 with an average of about 0.6. Generally, this means that the neighbours of a node are themselves highly likely to be directly connected.

ADIs' local clustering coefficients are negatively correlated with their degree centrality (Graph 6). Institutions with low degree centrality (few links) tend to have neighbours that are extensively linked to each other (high clustering) while institutions with high degree centrality (many links) tend to have neighbours with sparse links to each other (low clustering). This occurs because nodes with large clustering coefficients belong to tightly knit groups, which are likely to be small. This inverse relationship between clustering and degree centrality has been relatively stable over time, suggesting that it is an enduring, structural feature of the network. The inverse relationship between clustering and degree centrality is also consistent with empirical findings for financial networks in other countries.[22]

Graph 6

ADI Network Clustering and Centrality*

Large exposures, consolidated group



* Excludes ADIs with local clustering coefficients of zero
** Degree centrality is the number of links (exposures) attached to a node (ADI)
*** Probability that a node's neighbours are neighbours themselves
Sources: APRA; RBA

19 The probability is high relative to that of a network with the same number of nodes and links, where the links are *randomly* allocated across nodes (see Newman 2010, p 200).

20 A triangle is a set of three nodes connected by three links. For simplicity, the term 'open triangle' is used to refer to connected triples, that is, three nodes that are connected by two links. The global clustering coefficient is three times the ratio of the number of triangles to the number of connected triples (for more details, see Newman 2010, p 200).

21 For a comparably sized random network with the same number of nodes and links, the global clustering coefficient converges to around 9 per cent.

22 For example, see Bastos e Santos and Cont (2010) for the Brazilian case. More generally, this is also a property observed in many non-financial networks (see Newman 2010, p 265).

Conclusion

Financial institutions frequently interact with each other, for example, by borrowing from one another or entering into derivatives transactions. This generates complex interconnections that can be analysed using the tools of network theory. While the data available on large exposures of Australian ADIs provide only a partial view of these connections, they are still useful for understanding the general structure of the banking system network.

In the Australian banking system network, based on large exposures, only a small share of pairs of institutions have direct links between each other, although many pairs of institutions are indirectly connected to each other following paths of links. Consistent with the 'small-world' effect identified in many networks, these paths of links are, on average, very short.

Most institutions in the network are linked to a small number of other institutions, while a few institutions are linked to a large number of other institutions. This is likely to be the result of a process whereby new institutions that enter the network tend to form links with others that are already well connected. Since most institutions are only linked to a small number of other institutions, the network can be robust to random shocks, although it can be more sensitive to disruptions at the most connected institutions.

The Australian banking system network displays a relatively high degree of clustering, with institutions forming small subgroups that tend to be highly interconnected. As a result, the neighbours of an institution are highly likely to be connected among themselves. Since these subgroups of highly interconnected institutions are usually small, the institutions belonging to them are generally linked to only a few other institutions.

Many of the attributes of the Australian banking system network have also been identified in empirical studies of financial and payments networks in other countries. This suggests that there might be a common process underlying the evolution of financial networks in different countries.

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OTC Derivatives Reforms and the Australian Cross-currency Swap Market

Ivailo Arsov, Greg Moran, Ben Shanahan and Karl Stacey*

Reforms to improve the management of counterparty credit risk in over-the-counter (OTC) derivatives markets are underway globally. A key pillar of the reforms is the migration of these markets to central counterparties (CCPs), while higher capital charges and increased collateralisation will apply to derivatives that remain non-centrally cleared. One class of OTC derivatives that could be significantly affected by these reforms are cross-currency swaps. These instruments are particularly important to the Australian financial system because Australian banks raise a significant proportion of their funding by issuing foreign currency bonds in offshore markets and using cross-currency swaps to hedge the associated foreign exchange (FX) risk. No CCP yet offers a central clearing solution for cross-currency swaps, which means that Australian banks will continue to manage counterparty credit risk in this market on a bilateral basis for the time being. Regardless of whether cross-currency swaps are centrally or non-centrally cleared, it is important when implementing the reforms in this market to examine how market participants will adjust to the new environment.

Introduction

The use of OTC derivatives has grown considerably in recent decades, in part reflecting the flexibility of these instruments in hedging risks in specific ways. Cross-currency swaps have become an important hedging tool for the Australian financial system, with Australian banks using these derivatives extensively to hedge the FX risks associated with their offshore borrowing.

Although commonly used to hedge a specific risk, OTC derivatives also introduce counterparty credit risk. In the event that a counterparty to a derivative contract defaulted, obligations due under the contract to the non-defaulted counterparty might not be met. Moreover, the non-defaulted counterparty could incur additional costs in replacing the contract that it had with the defaulted counterparty, most likely by having to enter into a replacement contract at a less favourable price.

Users of OTC derivatives are currently facing significant reforms to these markets. These stem from regulatory concerns regarding transparency and counterparty risk management practices in OTC derivatives markets, including insufficient collateralisation of exposures.[1] These concerns intensified following the onset of the global financial crisis. Following commitments by the leaders of the G20 group of countries (G20 2009, 2011), regulators are in the process of migrating standardised OTC derivatives to CCPs and introducing mandatory requirements for the collateralisation of derivatives that remain outside CCPs.

CCPs have been used for well over a century to concentrate and manage counterparty credit risk centrally and thereby facilitate anonymous trading

* The authors are from Domestic Markets, International and Payments Policy Departments. They would like to thank Mark Manning, James Whitelaw, Michelle Wright and Mark Wyrzykowski for their valuable contributions and insightful discussions in preparing the article.

1 Some collateralisation of exposures is commonly performed under credit support annexes (CSAs) in the legal documentation that governs the obligations between counterparties. This collateralisation typically only covers 'current exposure' arising from observed price movements, and rarely involves the posting of collateral to cover further losses incurred during the closing out of positions in the event of a counterparty default.

on exchanges. Through the process of novation, a CCP assumes the obligations associated with individual transactions, effectively becoming the buyer to every seller, and seller to every buyer. CCPs use a number of controls to manage the resulting credit risk exposure. These include marking to market cleared positions at least daily, and requiring participants to post both variation margin and initial margin against their cleared positions. Typically, the size of this initial margin requirement is calibrated to cover the loss that could be incurred in replacing the position should a participant default in normal market conditions, while the variation margin reflects observed price movements during the life of the contract. For losses in extreme scenarios, a CCP can access a pool of financial resources to which all participants have contributed (i.e. a default fund). A CCP's procedures for managing a default and accessing margin and other default resources are transparent and enforceable. As a central hub for participants, a CCP also promotes transparency and standardisation in a market, and provides a focal point for regulation and oversight.

In a number of jurisdictions, mandatory central clearing requirements are being imposed through legislation. Incentives for central clearing are also being established through higher prudential capital charges on bilateral derivatives exposures relative to centrally cleared derivatives exposures. In respect of collateralisation of bilateral exposures, the Working Group on Margin Requirements (WGMR) – a joint group of the Basel Committee on Banking Supervision (BCBS) and the International Organization of Securities Commissions (IOSCO) – is developing principles for margin requirements on non-centrally cleared derivatives, while the United States and the European Union have already made provisions for such requirements in their respective legislative frameworks.

In Australia, legislation has been put in place to allow the Australian Government, under advice from regulators, to impose mandatory central clearing requirements on prescribed classes of OTC derivatives.[2] The Australian Prudential Regulation Authority (APRA), the Australian Securities and Investments Commission (ASIC) and the Reserve Bank of Australia (RBA) are periodically assessing Australian OTC derivatives markets and making recommendations about the need for mandatory requirements to the Australian Government.[3] The regulators' first assessment under this framework was published in October 2012. It concluded that there are strong in-principle benefits from the use of CCPs, particularly in systemically important OTC derivatives markets such as those for single-currency interest rate swaps and, potentially, cross-currency swaps (APRA, ASIC and RBA 2012). It also concluded that an industry-led move to central clearing is preferable to mandatory requirements in the first instance.

The market assessment also acknowledged, however, that central clearing solutions for cross-currency swaps did not exist at present. As a consequence, the benefits of central clearing may not be realised in this market, at least in the short term. Instead, users of these derivatives will have to meet new capital and collateral requirements for non-centrally cleared derivatives.

This article describes the mechanics of cross-currency swaps and their role in the Australian financial system. It also discusses some of the issues arising from the application of the OTC derivatives reforms to cross-currency swaps markets, including the amenability of cross-currency swaps to central clearing.

2 The framework also allows for the imposition of mandatory trade reporting and trade execution requirements.

3 The regulators have also released a policy statement on their approach to considering mandatory central clearing requirements. See APRA, ASIC and RBA (2013).

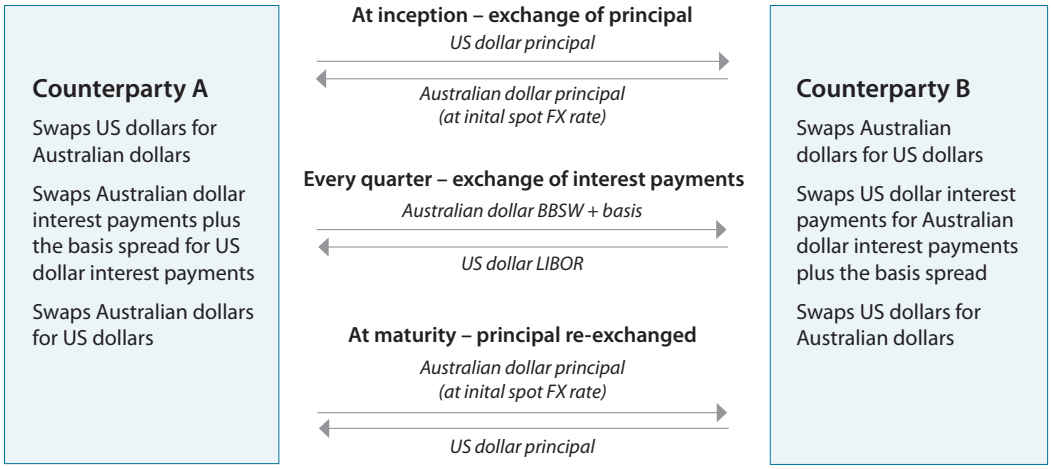
What are Cross-currency Swaps?

Cross-currency swaps are OTC derivatives that involve the exchange of principal in different currencies and the payment of interest in one currency and the receipt of interest in another currency at a fixed exchange rate determined at the contract's initiation. These interest payments occur at specified intervals over the term of the swap. Due to their structure, cross-currency swaps are ideally suited to hedging the FX risk associated with longer-term debt securities issued in foreign currencies. FX swap and forward contracts are generally used to hedge FX risk at shorter maturities (typically less than 1 year).[4]

Cross-currency swaps come in a number of forms, but the most prevalent contract is the cross-currency basis swap where counterparties exchange floating interest rate payments, tied to benchmark money market rates, at set intervals over the term of the swap. For example, in an Australian dollar–US dollar cross-currency basis swap, the counterparties initially exchange principal in the two currencies at the spot exchange rate (Figure 1). The counterparties then regularly exchange interest payments of Australian dollars linked to the bank bill swap rate (BBSW) and interest payments in US dollars linked to the US dollar LIBOR rate. Along with these regular payments, the counterparties exchange what is known as the cross-currency basis swap spread, which is the cost of entering into the contract. By market convention, the basis spread is added to the reference benchmark rate used to determine the regular interest payments by the counterparty making non-US dollar payments. The basis spread is determined in the market by the balance between demand and supply for cross-currency swaps for the relevant currency pair. Typically, the basis spread in Australian dollar–US dollar cross-currency basis swaps is positive and is therefore paid by the counterparty making the regular Australian dollar payments, although this counterparty receives the basis spread on those occasions when it is negative. At the end of the swap's term, the two counterparties

Figure 1

Cash Flows in a Stylised Cross-currency Swap



Source: RBA

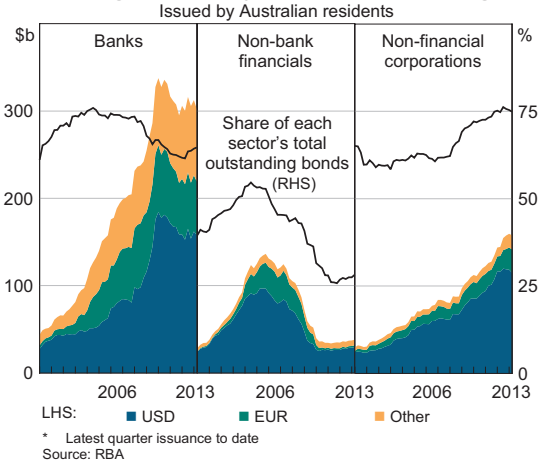
4 The focus in this article is on cross-currency swaps because they are likely to be significantly affected by the OTC derivatives reforms and are a major tool for managing longer-dated FX risk in the Australian financial system. FX swaps and forwards are also used extensively, with a focus on hedging shorter-term FX risk, but are likely to be less affected by the reforms – see 'Implications of OTC Derivatives Reforms' below for more detail.

return the principal to each other at the exchange rate that had prevailed at the initiation of the contract.[5] An Australian resident issuing a floating rate US dollar bond offshore can enter into a cross-currency basis swap (with maturity and frequency of regular payments matching that of the bond) to eliminate the interest rate risk and FX risk associated with the stream of coupon payments on the bond and the FX risk on the repayment of the principal at maturity.[6]

How are Cross-currency Swaps Used?

Australian resident non-government entities raise a significant portion of their wholesale long-term funding by issuing foreign-currency denominated bonds offshore (Graph 1). Foreign currency bonds account for around 60 per cent of the outstanding bonds issued by Australian non-government resident entities. This share has remained largely unchanged for most of the past decade. The majority of these bonds are issued in US dollars, with euro-denominated issuance comprising most of the remainder. Australian residents also issue Australian dollar bonds in offshore markets, although these only make up around 3 per cent ($23 billion) of offshore bonds outstanding. Most foreign-held Australian dollar-denominated debt liabilities are issued in the domestic bond market (a large share

Graph 1
Foreign Currency Bonds Outstanding*
Issued by Australian residents



* Latest quarter issuance to date
Source: RBA

of these are bonds issued by the Australian and state governments).

The issuance of foreign currency debt into offshore bond markets broadens Australian entities' funding base. This provides them with important diversification benefits and gives them access to markets that can absorb large issues at relatively attractive prices.[7] However, it also exposes them to FX risk because the revenue streams of the Australian issuers are predominantly denominated in Australian dollars, while the interest and principal repayments that arise from their foreign currency bond issuance are not. FX derivatives – and more specifically, cross-currency swaps – allow this risk to be effectively eliminated and have become a key element of the offshore funding of Australian issuers. Furthermore, this hedging allows Australian residents to raise funds in the currency they require – Australian dollars – while accessing liquid and deep foreign bond markets. The evidence indicates that the vast bulk of the FX risk from the foreign currency issuance is indeed hedged (D'Arcy, Shah Idil and Davis 2009). According to the Australian Bureau of Statistics Survey of Foreign Currency Exposure, in 2009 around 95 per cent of Australian banks' foreign

5 Cross-currency swaps can also be structured with resetting principal. In this case, the principal of the cross-currency swap is adjusted periodically at the times of the regular exchanges of interest payments between the counterparties (the reset dates) to reflect movements in the exchange rate. Typically, the principal on the US dollar leg of the swap is the one that is reset. The counterparty against which the exchange rate has moved since the previous reset date pays the other counterparty a cash flow equal to the value of the change in principal. At maturity, the principal is exchanged at the prevailing exchange rate. This practice partially mitigates the counterparty risk in a cross-currency swap because, rather than waiting for the swap maturity to realise the gains or losses arising from exchange rate movements, the exchange rate gains or losses are transferred between the counterparties periodically. Counterparty risk is also managed through posting of collateral; however, without the principal resets (and the associated cash flows) the posted collateral can accumulate significantly over the life of the swap.

6 Other cross-currency swaps can be deployed, such as those with fixed interest rate payments. These are effectively combinations of a cross-currency basis swap and single-currency interest rate swaps.

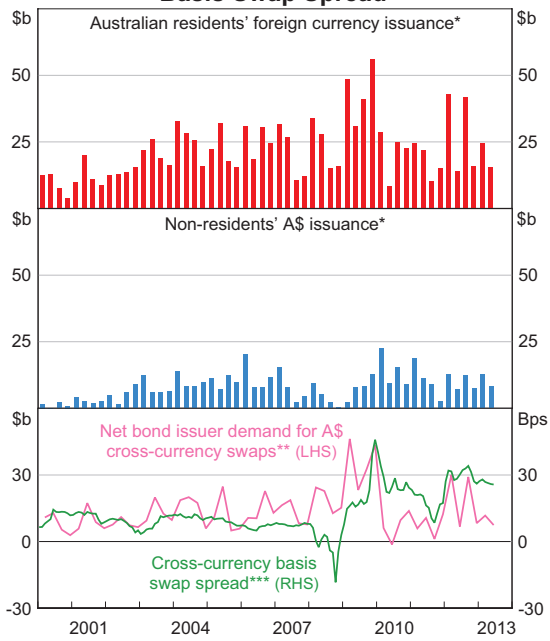
7 For a discussion on why Australian borrowers issue bonds in offshore markets, see Battellino (2002).

currency liabilities were hedged. Non-bank financial issuers, which, for the most part, are vehicles for asset-backed securities with Australian collateral, also employ a high degree of hedging to limit the FX risk associated with their foreign debt liabilities. This is because the foreign-currency denominated tranches of these asset-backed securities are typically fully hedged against FX risk to provide the investors with predictable cash flows. Non-financial corporations use derivatives for FX hedging to a lesser extent, with 60 per cent of their foreign currency liabilities hedged in 2009, because many of these issuers have a high proportion of foreign-currency denominated assets and revenue streams that they use as natural hedges.[8]

The other key users of Australian dollar cross-currency swaps are non-resident bond issuers that enter the market in the opposite direction of Australian residents – that is, they sell a foreign currency interest stream in order to buy an Australian dollar interest stream. These entities issue Australian dollar bonds both in the domestic market ('Kangaroo' bonds) and, to a much lesser extent, in offshore markets. They tend to be large and highly rated (typically AAA) sovereign-backed agencies and supranational institutions. While these entities have little requirement for Australian dollar funding, they issue in Australian dollars to diversify their investor base (aided by global investors' demand for Australian dollar exposure but without the associated credit risk of Australian entities). They also issue to take advantage of the revenue stream associated with the (typically) positive cross-currency basis swap (Graph 2). Non-resident issuers of Australian dollar bonds can receive this basis spread and raise funds at an attractive net cost by issuing a bond in Australia and entering into a cross-currency basis swap.

While Kangaroo issuers are a natural counterparty to Australian offshore foreign currency issuance and are active in the Australian dollar cross-currency swap market on the opposite side of Australian offshore

Graph 2
Bond Issuance and the Cross-currency Basis Swap Spread



* Latest quarter issuance to date
** Assumes bond issuance is completely hedged with cross-currency swaps in the month of issuance
*** Monthly average of 5-year USD/AUD cross-currency swap
Source: RBA

bond issuers, there are a number of other investors that gain long Australian dollar exposures through cross-currency swaps.

In general, cross-currency swaps are intermediated by a broad range of international banks. The latest available data indicate that around 90 per cent of the outstanding positions (based on notional amount) in cross-currency swaps of the main Australian banks, which are the largest Australian participants in the market, were with 20 large international banks with geographically diversified domiciles.[9] Around a half of the outstanding positions were with European and UK bank counterparties, and one third were with US banks. Australian banks also actively manage the credit risk associated with their positions through bilateral

8 See Becker and Fabbro (2006) for a discussion of hedging practices of Australian companies.

9 These data were collected by APRA as part of a survey conducted in November 2011 on the expected impact of the Basel III capital framework. The data cover the 40 largest OTC counterparties of each of the large Australian banks.

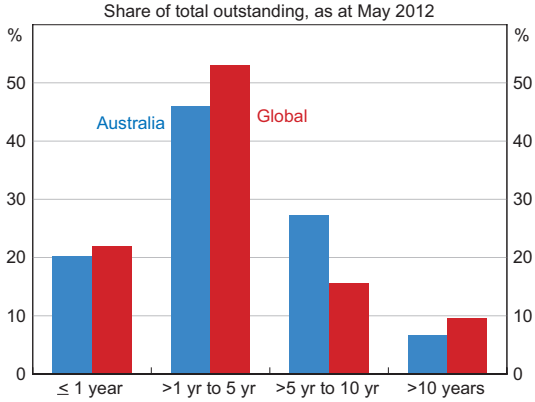
collateralisation under CSAs, although the extent to which exposures are covered by collateral varies.[10] Over 95 per cent of the cross-currency swaps (by notional amount) of the Australian banks were under contracts with CSAs. While large international banks may retain some of the risk associated with intermediating these cross-currency swaps, they pass nearly all of it on to foreign investors seeking Australian dollar exposure via derivatives markets or to Australian investors seeking to hedge their holdings of foreign currency assets.

Characteristics of the Cross-currency Swap Market in Australia

As at December 2012, the outstanding value of OTC derivatives in the Australian market was around US$12 trillion, with FX derivatives accounting for 31 per cent of this.[11] This was well above the global average of 10 per cent, consistent with Australian entities' greater propensity to utilise offshore funding markets and to hedge the resulting FX rate risk.[12] The key FX derivatives used by Australian entities are FX swaps and forwards, and cross-currency swaps, which each make up 47 per cent of FX derivatives outstanding.[13] This is above the international average of 38 per cent for cross-currency swaps and around the global average for FX swaps and forwards. As it is globally, the cross-currency swaps market in Australia is largely an interbank market, with financial institutions acting as counterparties for 90 to 95 per cent of the outstanding contracts by notional amount.

Australian entities tend to match the maturity of the hedging instrument and the foreign currency liability being hedged. Consistent with this, and given the maturity of foreign currency debt issuance, the residual maturities of cross-currency swaps outstanding are predominantly between one and five years. For cross-currency swaps entered into by Australian entities as at May 2012, around 17 per cent of maturities are less than one year, 53 per cent are between 1 to 5 years and 30 per cent are beyond 5 years. This is largely consistent with the maturity profile of these derivatives globally (Graph 3).

Graph 3
Cross-currency Swap Residual Maturities
Share of total outstanding, as at May 2012



Sources: Australian Financial Markets Association; Depository Trust and Clearing Corporation; RBA

Almost all cross-currency swaps, both in Australia and globally, involve at least one of the US dollar, euro, Japanese yen or British pound, while the majority has the US dollar on one side (Graph 4). Globally, the Australian dollar is the fifth most frequently used currency in cross-currency swaps, and is involved in around 15 per cent of transactions (by notional amount); an Australian dollar leg is part of almost all transactions (by notional amount) in the Australian market.

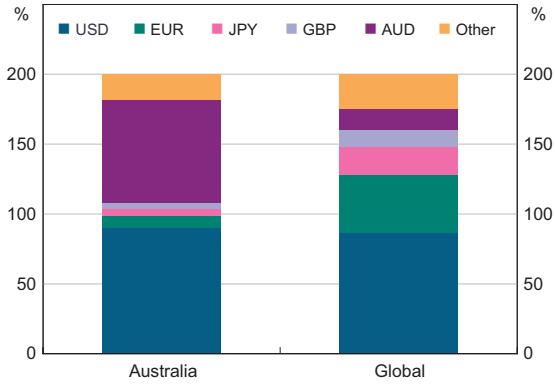
10 Market reports indicate that most cross-currency swaps entered into by Australian banks are structured with principal reset. In addition to this built-in mechanism for mitigating counterparty risk, collateralisation under CSAs is used to cover exposures between the reset dates.

11 BIS data on cross-currency swaps outstanding are reported on a global consolidated basis; that is, data for Australia include all branches and majority-owned subsidiaries of Australian-headquartered banks, but not Australian branches of banks with headquarters overseas. Data are also available on FX derivatives turnover; however, the notional amount of outstanding contracts provides a better measure of the importance of cross-currency swaps, which are generally longer-dated and less frequently traded than other FX derivatives such as FX swaps and FX forwards.

12 See Ahn, Matić and Vallence (2012).

13 Data collected via the BIS semiannual survey. The notional amounts for FX forwards are as at June 2012.

Graph 4
Cross-currency Swap Currency Breakdown*
Share of notional principal outstanding, as at December 2012



* Total share sums to 200 per cent as each swap involves two currencies
Sources: BIS; RBA

Implications of OTC Derivatives Reforms

There are a number of relevant factors to consider when implementing the OTC derivatives reforms in the market for cross-currency swaps.

- While CCPs currently operate for a number of classes of OTC derivatives, such as single-currency interest rate swaps, credit default swaps and non-deliverable FX derivatives, central clearing solutions have not yet emerged in deliverable FX markets.[14] A key barrier to the development of these solutions has been the need to use an appropriate mechanism for managing the settlement risk associated with the exchange of payments in two currencies (Manning, Heath and Whitelaw 2010). Since its establishment a decade ago, CLS Bank (CLS) has become the standard for settlement of deliverable FX transactions. CLS offers a 'payment-versus-payment' settlement service that eliminates so-called Herstatt risk: the risk that one leg of an FX transaction settles while the other does not, exposing the party that has paid to a loss of principal. However, CLS's gross, transaction-by-transaction settlement model could present challenges to CCPs' established systems for managing exposures and settling obligations on a net basis.
- Aside from the settlement issue, many of the other preconditions for central clearing (IOSCO 2012), including the degree of standardisation in the market and the availability of reliable pricing data, would seem to be met for cross-currency swaps. According to LCH.Clearnet Limited (2011), however, consensus would need to be reached on factors such as the currency of collateralisation and the valuation model. While consideration of these issues remains at an early stage, some CCPs are currently examining whether a cost-effective central clearing solution can be developed.
- FX forwards and swaps are exempt from central clearing and margining requirements in the United States. Among other things, this is because of the problems of linking with current market settlement arrangements and the high volumes and often short tenors of transactions. In announcing the exemption, the US Treasury noted that 'disruptions to [the market's] operations could have serious negative economic consequences' (US Treasury 2012). Following a similar rationale, the WGMR is considering exempting FX forwards and swaps from mandatory initial margin requirements. Cross-currency swaps, however, are not covered by the US Treasury's exemption, and are unlikely to be exempt entirely from the WGMR principles.

With cross-currency swaps unlikely to migrate to central clearing in the short term, additional requirements for non-centrally cleared derivatives will apply. These include:

- *Higher capital charges for non-centrally cleared derivatives*: under the Basel III capital framework, banks are required to hold more capital against non-centrally cleared positions (including cross-currency swap positions) relative to both previous levels and requirements for centrally cleared derivatives. The framework also

14 Deliverable FX derivatives involve the exchange of principal in two different currencies. Examples include FX forwards, FX swaps and cross-currency swaps. Non-deliverable FX derivatives are settled in cash in a nominated currency.

introduces a credit valuation adjustment charge that capitalises the risk of loss resulting from the declining creditworthiness of a counterparty (as opposed to loss due to a counterparty's default). The Basel III capital framework for counterparty credit risk was implemented in Australia in January 2013, and therefore Australian banks are already subject to these higher requirements.

- *Margin requirements for non-centrally cleared derivatives*: under the WGMR's proposed margining principles and requirements in the United States and European Union, banks are likely to be required to post variation and initial margin against cross-currency swaps. Although the payment of variation margin is already common among Australian OTC derivatives market participants, the posting of initial margin is rare (APRA, ASIC and RBA 2012). The amount of initial margin to be posted under the WGMR principles is to be determined either with reference to a standardised schedule of margin rates, or by a quantitative model that will have received regulatory approval.

While these requirements would be expected to contribute to the reduction of systemic risk where cross-currency swaps remain non-centrally cleared, there may nevertheless be some benefits from the development of a central clearing solution for cross-currency swaps. First, exposures relating to cross-currency swaps cleared through a CCP that met relevant international standards would face lower prudential capital requirements.[15] Second, depending on the final form of the WGMR principles, a CCP could impose more finely calibrated and risk-sensitive initial margin requirements than those that would be determined under the principles. This might reflect a CCP's use of netting and cross-product offsets (possibly with other interest rate or foreign exchange derivatives), although the scope for netting cross-currency swap exposures might be limited given that Australian banks typically take large 'one-way' positions in the Australian dollar versus other currencies to hedge their funding in those currencies.

A third and important benefit of a CCP would be the introduction of a centralised mechanism for managing the default of a participant in the market. In the absence of a CCP, in the event of a default, banks would have to hedge their exposures and replace their cross-currency swap positions with another counterparty. This would be likely to be difficult in a stressed market and, in the absence of a mechanism to coordinate the actions of counterparties to the participant in default, it could exacerbate disruption to the market. A CCP can typically handle the default of a counterparty in a more orderly manner via transparent, documented and enforceable procedures to close out or auction the defaulter's positions.

Irrespective of whether cross-currency swaps transition to central clearing or remain in a non-centrally cleared environment, requirements to post initial margin under the reforms are likely to increase the 'up-front' cost to Australian banks of using cross-currency swaps to hedge their overseas funding. In considering the implementation of the reforms in this market, therefore, it is important also to consider banks' incentives to continue to hedge their positions using cross-currency swaps. In particular, since FX forwards and swaps are likely to remain exempt from the reforms, there is a risk that banks may respond to an increased cost of using cross-currency swaps by engaging in less effective and more complex hedges, possibly involving a combination of FX swaps or forwards and single-currency interest rate swaps.

Conclusion

Cross-currency swaps are commonly used by Australian banks and play an important role in Australian banks' offshore funding practices. Although many classes of OTC derivatives are migrating to CCPs under global regulatory reforms,

15 Under Basel III, lower capital requirements are available only on exposures to 'qualifying' CCPs, defined as those that operate in jurisdictions that have implemented the *Principles for Financial Market Infrastructures* developed by the Committee on Payment and Settlement Systems and IOSCO (CPSS-IOSCO 2012).

the cross-currency swaps market is likely to remain non-centrally cleared for the near future since no central clearing solutions for this derivatives class have yet been developed. In the continued absence of an effective clearing solution for cross-currency swaps, there might be a case to examine whether certain aspects of a CCP's centralised default management could be replicated by the development of an enforceable mechanism through the collaboration of market participants, relevant trade associations (such as the International Swaps and Derivatives Association) and regulators. More generally, whether cross-currency swaps are centrally or non-centrally cleared, when implementing the reforms careful consideration needs to be given to the issue of how market participants will adjust to the new environment.

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Developments in Renminbi Internationalisation

Alexander Ballantyne, Megan Garner and Michelle Wright*

The 'internationalisation' of the Chinese renminbi (RMB) is proceeding at a measured pace, with a sequence of reforms designed to increase its use in international trade and investment. Over the longer term – as the exchange rate becomes more market determined and as capital account liberalisation progresses – the RMB has the potential to become a major global currency. This article builds on the work of Cockerell and Shoory (2012) by describing developments in the onshore and offshore RMB markets, and the linkages between them, over the past year. In light of China's position as Australia's largest trading partner, the article also discusses the implications of these developments for Australian firms, drawing on the results of a survey conducted for the inaugural Australia-Hong Kong RMB Trade and Investment Dialogue in April 2013.

Introduction

The Chinese economy has experienced rapid growth over the past decade, underpinned by a range of reforms that have seen the economy become more market oriented (see, for example, Sadeghian, White and D'Arcy (2013)). These reforms have included a gradual move towards a more market-determined exchange rate and incremental liberalisation of the capital account. Efforts to 'internationalise' the RMB through promoting its use as an invoicing currency for international trade and cross-border financial transactions have been an important aspect of managing this transition.

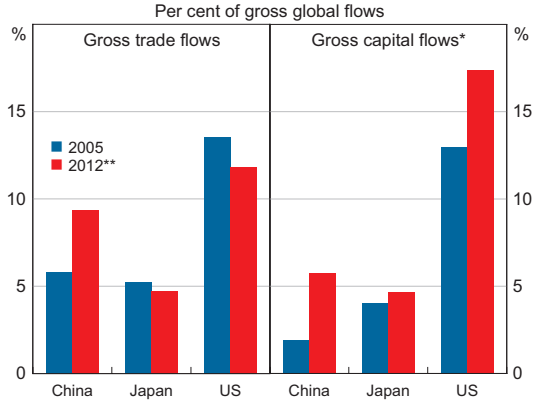
As China moves towards a more market-determined exchange rate regime, Chinese firms engaging in trade and financial transactions with the rest of the world will increasingly need to find ways to manage their foreign currency risk. This could be done through hedging, but local currency denomination of trade and financial transactions offers a simpler – and potentially less costly – alternative, particularly for small and medium-sized enterprises. Reforms aimed at increasing the use of the RMB in international trade and financial transactions serve to transfer the associated foreign currency risk to the foreign counterparties of those transactions that, at least at present, may be better able to manage it.

The increased use of RMB in trade and financial transactions between Chinese residents and non-residents can be thought of as initial steps in the longer-term process of internationalising the RMB.[1] The scope for the RMB to be used in international trade transactions is already significant: China accounts for around 9 per cent of global trade in goods and services, which is second only to the United States, which accounts for around 12 per cent (Graph 1). But there also appears to be scope for further growth in RMB-denominated cross-border financial transactions over time, with China currently accounting for around 6 per cent of gross global capital flows (of which a large portion is in the form of foreign direct investment), compared with around 17 per cent for the United States. From an Australian

* The authors are from International Department.

1 A useful definition of an 'international' currency is provided by Kenen (2011, p 9): 'An international currency is one that is used and held beyond the borders of the issuing country, not merely for transactions with that country's residents, but also, and importantly, for transactions between non-residents.'

Graph 1
Cross-border Flows
Per cent of gross global flows



* Excluding official reserve flows
** 2012 estimate based on first half of the year only
Sources: IMF; RBA

perspective, these developments are particularly relevant given the very strong trade linkages between Australia and China, as well as the potential for deepening financial linkages (Lowe 2013).

The extent to which the RMB is used in a broader range of international financial transactions, including in transactions between non-residents, will depend crucially on how the broader capital account liberalisation process unfolds. As the experience of many other countries (including Australia) attests, this is not without its challenges.[2] Nevertheless, the RMB clearly has the potential to become a major global currency over the longer term.

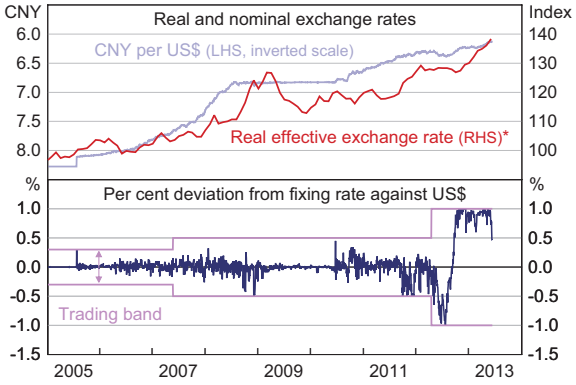
The Structure of Renminbi Foreign Exchange Markets

As discussed in detail in Cockerell and Shoory (2012), China's process of exchange rate reform and capital account liberalisation has resulted in the development of two markets for the RMB, which are separated by a set of regulations governing flows between them. Although there is only one Chinese currency, the onshore market in Mainland China is partly segregated from the offshore market, which is centred in Hong Kong. This gives rise to different RMB exchange rates in the onshore market (denoted CNY) and the offshore market (denoted CNH in Hong Kong).[3] While the differences tend to be minor, the two exchange rates have diverged on occasion.[4]

The onshore market

In the onshore market, the RMB has traded under a managed floating exchange rate regime since mid 2005. The China Foreign Exchange Trade System (CFETS), authorised by the People's Bank of China (PBC), sets the central parity rate (or 'fixing rate') for the RMB against the US dollar on a daily basis, with the exchange rate allowed to fluctuate within defined bands around this fixing rate.[5] Since mid 2005, the RMB has appreciated by 35 per cent against the US dollar and by 38 per cent in real effective terms (Graph 2). In April 2012, the PBC widened the RMB's daily trading band against the US dollar from +/–0.5 per cent to +/–1 per cent around its daily fixing rate. The RMB has remained in the upper part of this trading band since late 2012.

Graph 2
Chinese Renminbi



* Indexed to 2005 average = 100
Sources: Bloomberg; PBC; RBA

2 See, for example, Eichengreen (2013). Lowe (2013) discusses some of these challenges in the Australian context.

3 The renminbi (RMB) is the name of the Chinese currency, while the term 'yuan' refers to the units of the currency.

4 RMB in Taiwan is denoted CNT, although CNT quotes are not generally available publicly. As the CNT market develops, arbitrage is likely to ensure that the CNT rate is near-identical to the CNH rate, as there are no specific restrictions on flows of offshore RMB between Hong Kong and Taiwan (or any other offshore location).

5 While the market focus is on the USD/CNY rate, CFETS also sets a daily fixing rate for the RMB against eight other currencies (discussed below).

More recently, the Chinese authorities have indicated that the daily trading band could be widened further, citing a desire to move towards a more market-determined rate, including by increasing the flexibility of the exchange rate in both directions.

The onshore foreign exchange market has a two-tier structure, comprising the retail foreign exchange market between banks and their customers, and the interbank foreign exchange market. Trading in the interbank foreign exchange market is authorised by the PBC to take place through CFETS, which operates a trading platform that allows approved participants to trade in the interbank foreign exchange market, as well as in the interbank RMB lending and bond markets. Nine currencies are currently permitted to be traded against the RMB through CFETS, as well as nine other foreign currency pairs.[6]

For RMB currency pairs, spot foreign exchange (FX), FX forwards, FX swaps, cross-currency swaps and currency options are all able to be traded through CFETS, with institutions requiring separate approval to trade in each instrument (although not all instruments are available for all pairs). Turnover is largest in the spot market, although there is also sizeable turnover in FX swaps (Table 1).[7] The majority of trading in the RMB spot market currently occurs in the USD/CNY pair, while turnover in RMB FX swaps and FX forwards is almost exclusively in USD/CNY; however, this could change as the market develops further.

CFETS publishes the fixing rate for the nine currencies that are currently traded against the RMB before the start of each trading day. However, of these nine currencies, only the US dollar, Japanese yen, Malaysian ringgit, Russian rouble and, most recently, the Australian dollar, are permitted to be traded 'directly' against the RMB in the onshore market without the use of an intermediate third currency.

Direct trading between the Australian dollar and the RMB commenced on 10 April 2013, with quotes for the prevailing AUD/CNY exchange rate in the onshore market provided by licensed market makers. Direct trading of the Australian dollar against the (offshore) RMB is also possible in the Australian foreign exchange market, and all licensed foreign exchange dealers are able to

Table 1: Interbank Foreign Exchange Turnover in China[(a)]
Average monthly turnover in US$ billion equivalent

	Jul–Dec 2012		Jan–May 2013	
	All CNY[(b)] pairs	Of which: USD/CNY	All CNY[(b)] pairs	Of which: USD/CNY
Spot	272	250	317	292
FX swaps	230	230	249	249
FX forwards	4	4	1	1

(a) Excludes turnover in foreign currency pairs
(b) USD, EUR, JPY, HKD, GBP, MYR, RUB, AUD and CAD
Source: CFETS

6 The US dollar, euro, Japanese yen, Hong Kong dollar, British pound sterling, Malaysian ringgit, Russian rouble, Australian dollar and Canadian dollar can all be traded against the RMB on CFETS. The Thai baht can also be traded against the RMB, but only in the province of Yunnan. The nine permitted foreign currency pairs are: AUD/USD, EUR/JPY, EUR/USD, GBP/USD, USD/CAD, USD/CHF, USD/HKD, USD/JPY and USD/SGD.

7 Around 375 Chinese and foreign institutions are currently authorised to trade RMB currency pairs in the spot market, while the RMB FX forwards, FX swaps and cross-currency swaps markets each have around 80 authorised institutions and the RMB options market has around 35 authorised institutions.

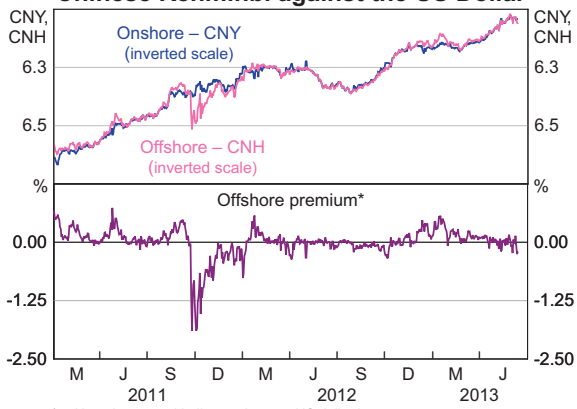
assume a market maker function without the need for formal regulatory approval. In time, direct trading between the Australian dollar and the RMB is likely to facilitate greater use of the RMB as an invoicing currency for bilateral trade and investment between Australia and China, including through potentially reducing the costs of currency conversion as market liquidity increases. In turn, the increased use of RMB in Australia–China trade and investment transactions is likely to create more demand for direct trading between the two currencies. Since direct trading commenced, trading between the Australian dollar and the RMB in the onshore spot market has increased substantially, with turnover rising from the equivalent of US$324 million in March 2013 to US$3.1 billion in May 2013.

The offshore market

The offshore RMB market has developed rapidly over recent years, facilitated in large part by the growth in RMB trade settlement, which is the main channel through which RMB is permitted to cross the border from Mainland China (discussed in more detail below). A number of reforms designed to liberalise the Chinese capital account have also supported the development of the offshore RMB market by expanding the range of channels through which offshore investors can direct funds obtained offshore back into Mainland China (also discussed below). The RMB is fully convertible within the offshore market, with RMB-denominated transactions largely unrestricted and participants able to access a range of RMB-denominated funding and investment products.[8]

Although the onshore and offshore markets remain distinct, arbitrage (for example, via trade flows between affiliated companies with operations in both Mainland China and Hong Kong) means that the onshore and offshore exchange rates tend to converge, notwithstanding some temporary periods of divergence (Graph 3).

Graph 3
Chinese Renminbi against the US Dollar



* Negative spread indicates that one US dollar buys more yuan (i.e. units of RMB) offshore than onshore
Sources: Bloomberg; RBA

RMB accumulated in the offshore market has been concentrated in four geographical locations known as 'RMB centres': Hong Kong (which is by far the largest), Macau, Singapore and Taiwan. These centres are characterised by a designated RMB 'clearing bank', which has an account with the PBC and is directly connected to the interbank market in Mainland China via the China National Advanced Payment System (CNAPS). RMB clearing banks are authorised to buy and sell RMB in the onshore market on behalf of offshore customers (subject to a quota), provided that the funds are used for a purpose approved by both the PBC and the authorities in the offshore centre.[9]

A number of other financial centres, including London and Paris, have established what is commonly referred to as an RMB 'hub', with these markets reporting RMB deposits of around RMB14 billion and RMB10 billion, respectively, in 2012. These hubs do not have a designated RMB clearing bank and instead rely on other offshore RMB centres to obtain RMB liquidity for their local interbank markets. Sydney can be thought of as an emerging RMB hub, with market support for efforts to increase the use of the RMB

8 RMB-denominated products in the offshore market include deposits, certificates of deposit, loans, trade finance, FX futures and forwards, non-deliverable forwards, FX options, bonds, exchange-traded funds, real estate investment trusts, commodity-linked products and insurance products.

9 There are currently four RMB clearing banks – Bank of China (Hong Kong), Bank of China (Macau), Bank of China (Taipei) and Industrial and Commercial Bank of China (Singapore). The RMB clearing banks in Hong Kong and Macau can also provide some services for personal RMB business. For a detailed discussion of how RMB can be transferred between Mainland China and the offshore market, see Cockerell and Shoory (2012).

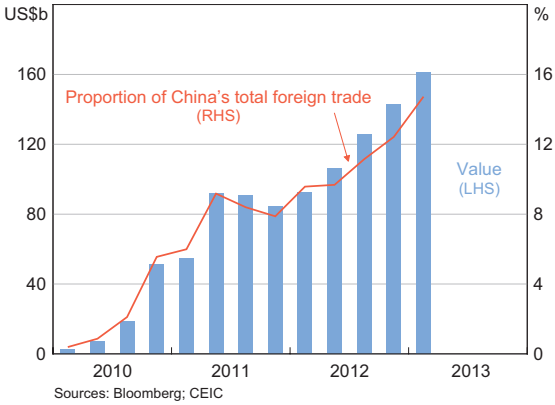
for trade and financial transactions. A joint research project funded by the Centre for International Finance and Regulation and the Shanghai University of Finance and Economics will examine the issues around Australia becoming an RMB hub in greater detail.[10]

Developments in RMB Trade Settlement and Investment

The RMB trade settlement scheme is the main channel through which RMB has been able to flow between Mainland China and the offshore RMB market. Since the expansion of the scheme in June 2010, data from the PBC show that RMB-denominated trade settlement has grown substantially, accounting for 15 per cent of China's total foreign trade in the March quarter 2013 (although in 2012 more than half of this was with Hong Kong) (Graph 4). Despite substantial growth in the value of China's trade settled in RMB, Australian Bureau of Statistics data on the currencies used to invoice Australian merchandise trade show that the take-up of RMB trade settlement by importers and exporters is still relatively low. Some of the reasons for this are discussed below.

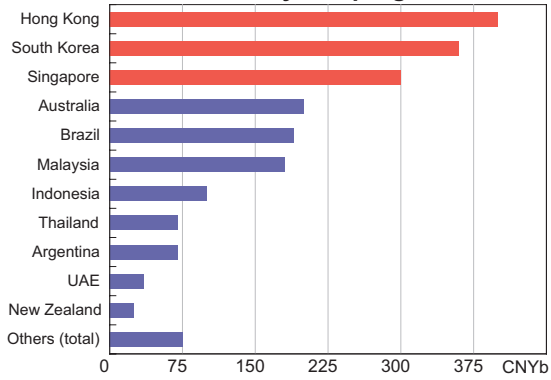
The PBC has sought to promote RMB trade settlement by signing bilateral local currency swap agreements with 19 central banks – including the RBA – with a key objective being to provide market participants with confidence that liquidity in the offshore RMB market will be sufficient to meet RMB-denominated payment obligations. Activation of these agreements results in the PBC depositing RMB into the foreign central bank's account at the PBC in exchange for the foreign central bank depositing its local currency into the PBC's account at the foreign central bank. These RMB funds can then be on-lent to commercial banks by the foreign central bank to finance trade – for example, to provide an importer of Chinese goods with RMB to pay its Chinese counterparty.[11] To date, the PBC's swap lines with the Hong Kong, Korean and Singaporean central banks – which are also the three largest facilities – have all been used by local commercial banks to some degree (Graph 5). Under the RBA's swap agreement (which is the fourth largest), RMB will be made available to commercial banks at the Shanghai Interbank Offered Rate (SHIBOR) plus a margin of 25 basis points. The pricing of the RBA facility is designed to ensure that it is only used as a 'backstop'; that is, it is intended

Graph 4
Renminbi Trade Settlement



Sources: Bloomberg; CEIC

Graph 5
PBC Local Currency Swap Agreements*



* A red bar indicates that some portion of the swap line has been used as at early June 2013

Source: central banks

10 This project will be overseen by a Steering Committee consisting of representatives from these two organisations, as well as the Reserve Bank of Australia and the Australian Treasury.

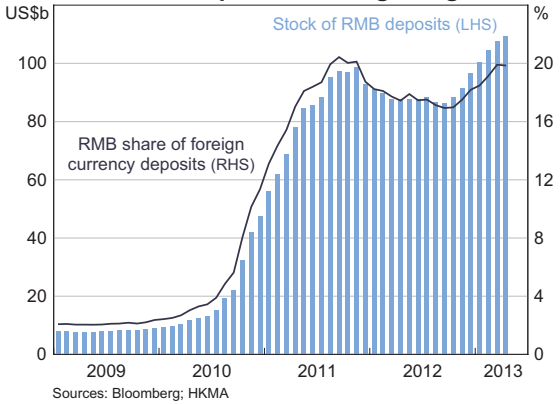
11 The RBA swap agreement with the PBC could also in principle be used to support financial flows between Australia and China – for example, to enable an Australian bank (and/or its clients) to fulfil an RMB-denominated financial obligation.

to only be an attractive source of RMB funding if liquidity in the offshore market is strained relative to the onshore market.

The growth in the RMB trade settlement scheme – and the associated outflow of RMB from Mainland China – has seen the offshore RMB market develop rapidly. RMB deposits in Hong Kong grew substantially through the second half of 2010 and 2011 and now account for 20 per cent of all foreign currency deposits in Hong Kong, compared with 4 per cent in July 2010 (Graph 6). Although the stock of RMB deposits has plateaued somewhat since mid 2011, the Hong Kong Monetary Authority (HKMA) has reported that the stock of RMB certificates of deposit (CDs) increased substantially from around RMB6 billion (equivalent to around US$1 billion) at the end of 2010 to around RMB127 billion (equivalent to around US$20 billion) at the end of February 2013, suggesting that the slower growth in deposits is also partly due to the development of alternative investment products in the offshore market.[12]

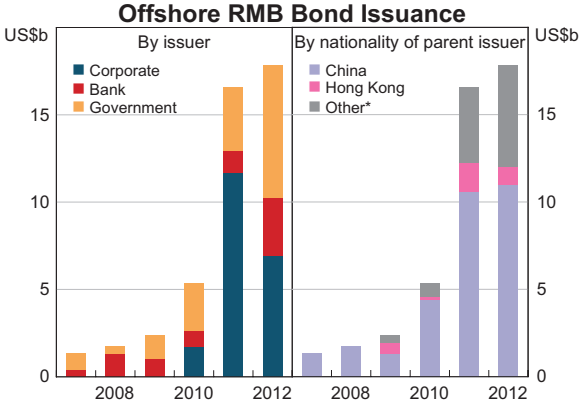
Issuance of offshore RMB-denominated bonds, which offer an alternative investment to deposits for holders of offshore RMB, has also grown strongly in the past two years, albeit from a very low base (Graph 7). Approximately US$18 billion of offshore RMB-denominated bonds were issued in 2012 and the total outstanding value as at May 2013 was the equivalent of around US$50 billion. However, this represents a very small share of global bond issuance, suggesting that there is considerable scope for the market to develop further. This is not only true in terms of the overall size of the market, but also in terms of its breadth. For example, the majority of issuers have been Chinese and a large share of non-resident issuers have been from Hong Kong, although this is changing. To date, most of the activity in the offshore RMB-denominated bond market has been in the primary market, with secondary market activity reported to have been relatively subdued.

Graph 6
RMB Deposits in Hong Kong



Sources: Bloomberg; HKMA

Graph 7
Offshore RMB Bond Issuance



* Includes Australia, Brazil, Honduras, India, Japan, Macao, Malaysia, Mexico, New Zealand, the Philippines, Russia, Singapore, South Korea, Switzerland, Taiwan, the United Arab Emirates, the United States and Venezuela

Source: Dealogic

Hong Kong authorities recently announced plans to introduce a CNH Hong Kong Interbank Offered Rate (HIBOR) fixing, which should further support development of the offshore RMB-denominated bond market by providing a benchmark for pricing floating rate bonds. The introduction of a CNH HIBOR curve should also support the development of a number of other RMB-denominated offshore products, including floating rate loan facilities and interest rate derivatives. While offshore RMB-denominated bonds have to date been issued almost entirely in Hong Kong (known as 'dim sum' bonds), there have been several issues of RMB-denominated bonds in London since early 2012, and more recently in Taiwan and Singapore.

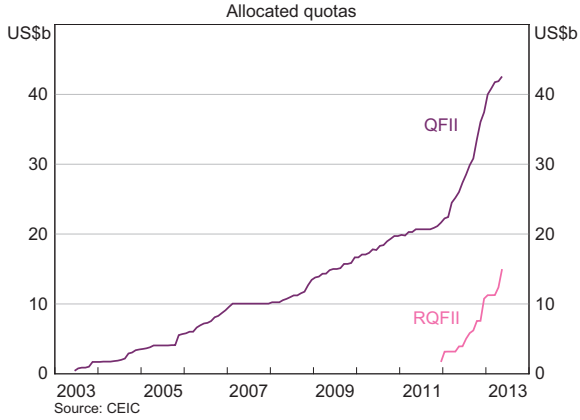
12 Figures on RMB-denominated CDs are as reported by the HKMA in various publications.

While trade in goods and services remains the main vehicle for cross-border RMB flows, the partial easing of restrictions on capital flows to and from China has also supported growth in the offshore RMB market (the key changes over the past year are set out in Appendix A). These policy developments have typically been implemented with the use of pilot programs, which are gradually expanded as authorities gain confidence in the arrangements.[13] Over time, as capital account restrictions are relaxed further, participants in the offshore market may be presented with further opportunities to invest RMB funds obtained offshore in Mainland China.

The RMB Qualified Foreign Institutional Investor (RQFII) scheme, which allows approved Hong Kong-based financial entities to invest RMB obtained in the offshore market in specified onshore financial assets, is a key channel through which RMB can flow to Mainland China in the form of private cross-border investment. In March this year, new rules governing the RQFII scheme were announced, expanding both the range of financial institutions that are allowed to access the scheme and the type of securities in which these institutions can invest. The scheme now covers Hong Kong subsidiaries of Chinese funds management companies, securities companies, banks and insurers, as well as other Hong Kong-based financial institutions. Approved investors can invest in individual equities, collective investment vehicles, interbank bonds and equity index futures; however, caps on foreign ownership of equities apply.[14]

RQFII quotas are allocated to individual institutions up to an aggregate limit. Allocated RQFII quotas reached their initial aggregate limit of RMB70 billion (equivalent to around US$11 billion) in January 2013, before this limit was expanded to RMB270 billion (equivalent to around US$43 billion) (Graph 8). In April and May 2013, additional quotas were issued, taking allocated RQFII quotas to RMB92 billion (equivalent to around US$15 billion), though this is still well below the expanded limit.

Graph 8
Foreign Investment in Chinese Assets
Allocated quotas



Source: CEIC

The RQFII scheme is the counterpart to the much larger Qualified Foreign Institutional Investor (or QFII) scheme, which allows approved institutions to use foreign currency to invest in approved RMB-denominated assets in onshore markets. In December 2012, the Chinese authorities removed the upper limit on QFII investments for central banks, sovereign wealth funds and state-owned investment vehicles, with six central banks now registered under the QFII scheme. The central banks of Hong Kong, Korea, Malaysia, Norway, Singapore and Thailand have a combined quota of around US$3.1 billion.

The China Interbank Bond Market (CIBM) program is a second channel through which offshore RMB can be invested in Mainland China. The CIBM scheme, which is operated and regulated by the PBC, provides approved investors with access to the Chinese interbank bond market. A number of central banks are reported to be participants in the CIBM scheme (in some cases in addition to the QFII scheme) including those from Austria, Hong Kong, Indonesia, Japan, Korea, South Africa and Thailand.[15] As announced recently, the RBA's current intention is to invest around 5 per cent of its net foreign currency reserves in RMB: this will take place under

13 For a detailed discussion of regulatory changes prior to June 2012, see Cockerell and Shoory (2012).

14 In addition to RQFII, which relates to portfolio investment flows, a further pilot scheme relating to cross-border banking flows is also underway. The scheme, which remains limited in scope, allows authorised Hong Kong-based financial institutions to provide RMB loans to entities in Mainland China, specifically for construction and development in the Qianhai region of the city of Shenzhen.

15 Note that central banks, like all investors, are currently free to invest in the offshore CNH market with no restrictions.

the CIBM scheme. In addition to providing scope for portfolio diversification benefits, the decision reflects the strengthening financial ties between Australia and China and should help to increase the RBA's understanding of Chinese financial markets through establishing relationships with local market participants.

RMB Internationalisation and Australia

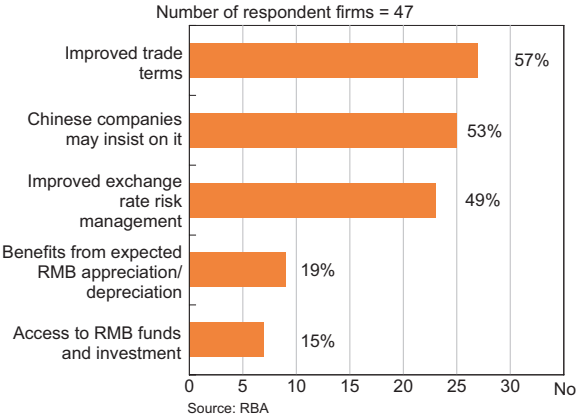
Australia's strong trade linkages with China mean that the progress towards a more internationalised RMB has important implications for Australian firms. As Australia's financial linkages with China develop over time, the RMB could also be expected to feature more prominently in cross-border capital flows. Both the introduction of direct trading between the Australian dollar and the RMB and the RBA's swap agreement with the PBC go some way towards facilitating this; however, private sector involvement will also be important if the Australian corporate and financial sectors are to be well prepared for these changes.

Against this background, the inaugural Australia-Hong Kong RMB Trade and Investment Dialogue (the Dialogue) was jointly hosted by the Australian Treasury, the HKMA and the RBA in Sydney on 12 April 2013. The aim of the Dialogue was to bring together senior banking and business leaders to raise awareness in the Australian private sector of RMB business opportunities, and to build closer collaboration between the Hong Kong and Australian banking sectors on the development of the offshore RMB market.

A key input to the Dialogue was a survey of firms' attitudes towards RMB trade settlement and investment, which was designed and coordinated by the RBA but conducted by a number of commercial banks. The survey covered 47 firms with Australian operations, each with an importing and/or exporting relationship with China, including firms in the resources, manufacturing and services sectors. The survey indicated that although the take-up of RMB trade settlement in Australia has been limited to date, around 60 per cent of surveyed firms expected their use of RMB trade settlement to increase in the future. However, these firms' interest in RMB investment and the offshore market was less well developed.

Based on the survey, Australian firms identified three key advantages to settling more of their trade with China in RMB (Graph 9). The first was the ability to negotiate improved trade terms with their Chinese counterparts, in particular by eliminating the foreign exchange risk margin that Chinese businesses currently price into foreign currency-denominated trade contracts. The second was related to their recognition that Chinese firms may soon begin to request greater use of RMB trade settlement, and that having the capacity to accommodate these requests could help to establish better trading relationships. The third advantage, which was most evident for firms with some experience with RMB trade settlement, was that settling trade in RMB could improve their ability to hedge their foreign currency exposure.

Graph 9
Potential Advantages of RMB Trade Settlement



However, the survey respondents also cited several potential impediments to the RMB trade settlement process. In particular, more than half of respondents cited shortcomings in the availability of instruments allowing them to hedge their RMB currency risk. In

contrast to firms that identified improved exchange rate risk management as a potential advantage, inadequate access to hedging facilities was most commonly cited among those firms that had not yet undertaken any RMB trade settlement. This apparent inconsistency could potentially be explained if those firms that had undertaken RMB trade settlement had done so to create a 'natural' hedge (for example, an exporter with RMB-denominated payment obligations). Around half of firms also noted that unfamiliarity or uncertainty around the RMB trade settlement process was a significant deterrent, and a sizeable proportion also cited administrative difficulties and concerns regarding payment delays and rejections. To this end, a significant outcome of the Dialogue was the establishment of a working group led by representatives from the Australian and Hong Kong banking sectors that will investigate these issues more closely (see ABA (2013)). Raising these issues with the Chinese authorities should also be beneficial.

In relation to RMB trade settlement and the offshore market, the survey indicated that around 75 per cent of firms (all of which currently trade with China) did not currently use offshore RMB products. This is consistent with the relatively limited uptake of RMB trade settlement by Australian firms and the fact that the majority of offshore RMB financial market activity to date has been centred in Hong Kong. Those Australian firms that did use offshore RMB products primarily used such products for RMB trade settlement purposes – predominantly deposits – with Australian firms' appetite for issuing offshore RMB-denominated bonds appearing limited at this stage. However, as RMB trade settlement between Australia and China develops, this could naturally support the increased use of the offshore RMB market by firms with Australian operations. Similarly, as the offshore market develops further, firms may also be more willing to settle trade in RMB.

The Future of RMB Internationalisation

Increasing the use of the RMB in international trade transactions has been a key focus of reforms undertaken so far. To date, the majority of RMB trade settlement has taken place between China and its near neighbours (predominantly Hong Kong), but given that China has important trading relationships with a range of other countries – including Australia – there is substantial scope for further growth, particularly as impediments to the trade settlement process are addressed over time.

The development of the offshore market, which has in turn been largely facilitated by the growth in RMB trade settlement, has gone some way towards increasing the RMB's use as an international investment currency, although progress on this front is at a relatively early stage. In part, this reflects the gradual pace at which restrictions on cross-border capital flows between Mainland China and the offshore market have been eased to date, although the Chinese State Council's recent announcement that it will set out a plan later this year for capital account convertibility indicates a commitment to take further steps.

Some central banks have either started to invest in Chinese assets or have indicated that they plan to, with these decisions likely to have been made for a number of reasons, including to diversify their portfolios. Notwithstanding this growing interest from central banks, RMB assets do not currently satisfy the International Monetary Fund (IMF) definition of 'official reserve assets'. This is because the RMB is not fully convertible and is therefore not sufficiently liquid to satisfy the requirement for these assets to be 'readily available' for 'meeting balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes' (IMF 2009, p 111). However, as capital account liberalisation progresses and Chinese financial markets deepen, the RMB is likely to become a major reserve currency.

Appendix A

Table A1: Recent Reforms to Chinese Capital Account Restrictions

Jun 2012	Outward flows	The State Administration of Foreign Exchange (SAFE) allows Chinese companies to obtain foreign currency loans from banks in Mainland China to fund the operations of their offshore affiliates.
Jul 2012	Inward flows	The China Securities Regulatory Commission (CSRC) relaxes eligibility requirements for Qualified Foreign Institutional Investors (QFIIs) and expands the range of authorised investment products under the QFII scheme.
Jul 2012	Inward flows	The State Administration of Taxation implements rules that have the effect of reducing withholding tax obligations for foreign investors from countries that have a double taxation agreement with China.
Dec 2012	Inward flows	Authorities abolish individual QFII quotas for central banks and sovereign wealth funds.
Jan 2013	Inward flows	The first cross-border RMB-denominated loans to companies registered in the Qianhai pilot zone (Mainland China) are approved.
Mar 2013	Inward flows	The CSRC releases revised regulations for the RMB Qualified Foreign Institutional Investor (RQFII) scheme, expanding the scope of approved investments and the range of investors that can access the scheme. The aggregate RQFII quota is formally increased from RMB70 billion to RMB270 billion.
Mar 2013	Inward flows	QFII rules are relaxed to allow all approved QFIIs to purchase bonds in the interbank market.
May 2013	Inward flows	The PBC releases guidelines on the implementation of the RQFII scheme, detailing the requirements needed to issue quotas.
May 2013	Inward flows	SAFE simplifies regulations covering inward foreign direct investment.

Sources: various official sources, media and market reports

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These reviews, issued in March and September, assess the current condition of the financial system and potential risks to financial stability, and survey policy developments designed to improve financial stability.

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