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Consumer Sentiment Surveys

Jin Cong Wang and Laura Berger-Thomson*

There are two main consumer sentiment surveys in Australia. The headline indices that summarise the survey results appear to provide relevant and timely information about economic developments, particularly around turning points. However, in some cases, particular components of the aggregate indices are more useful. This is true of the components that track households' perceptions of their current personal finances compared with a year prior and, to a lesser extent, the components tracking households' perceptions of buying conditions for major household items.

Introduction

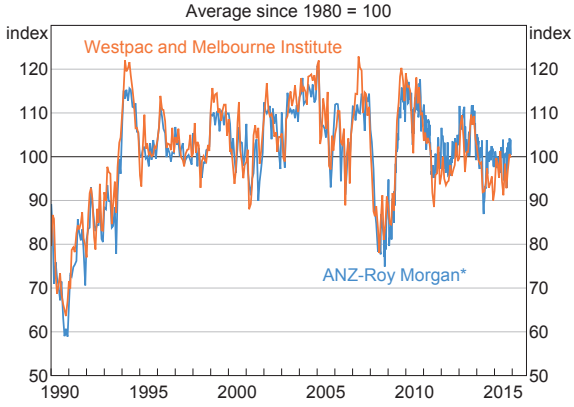
Accounting for a little over half of GDP, household consumption is the largest component of expenditure. It is also an important driver of business conditions and investment. As a consequence, having timely and reliable indicators for consumption is important for understanding developments in the wider economy. Consumer sentiment surveys help to fulfil this role because they provide more timely and frequent information about the state of the household sector than other indicators such as retail sales or household consumption from the national accounts.

The two main consumer sentiment surveys in Australia are provided by ANZ-Roy Morgan, and Westpac and the Melbourne Institute. This article outlines the different features of these surveys, followed by an investigation into the usefulness of the information contained in them.

Survey Features

The two main consumer sentiment surveys are very similar in scope and construction. Not surprisingly, there has always been a high degree of co-movement between the headline indices and, when divergences have occurred, they have rarely persisted (Graph 1).

Graph 1
Consumer Sentiment
Average since 1980 = 100



* Rescaled to have the same average as the Westpac and Melbourne Institute index since 1996

Sources: ANZ-Roy Morgan; RBA; Westpac and Melbourne Institute

Both surveys cover a similar set of five core questions. Two questions ask survey participants to assess the state of their current personal finances compared with a year prior, and their expected state a year ahead. A further two questions ask participants for their expectations about broader economic conditions one year and five years ahead. A final question asks survey participants whether they think conditions are favourable for the purchase of major household items. Responses to each question are summarised in net balance terms, which is the percentage of positive responses less negative responses. The five net balances are then averaged across questions to generate an overall

* The authors are from Domestic Markets and Economic Analysis Departments

net balance – the headline consumer sentiment indices shown in Graph 1.

Despite their similarities, there are some methodological differences between the two surveys (Table 1). For instance, the ANZ-Roy Morgan survey is conducted more regularly, but the Westpac and Melbourne Institute survey has a slightly larger sample size. There are also differences in how the surveys are conducted. The ANZ-Roy Morgan survey uses a brief questionnaire administered through face-to-face interviews, whereas the sentiment questions in the Westpac and Melbourne Institute survey are one part of a longer questionnaire that is conducted over the phone.[1] The methodological differences might affect the survey responses and, indeed, the two indices have different historical means. To address the latter, the Bank standardises the two indices to have the same mean.[2]

Information Content

The headline indices

While consumer sentiment surveys provide a timely read of household perceptions, an important consideration is whether this translates into useful information about economic developments.

Given that the survey questions focus on households' views, it is unsurprising that the headline sentiment measures appear to be a reasonable guide for the growth of consumption (Graph 2).[3] This is corroborated by correlation analysis (Table 2). Nonetheless, the headline sentiment measures appear to have slightly stronger relationships with the growth in durable consumption, gross domestic income, domestic final demand (an aggregation of household, business and government demand) and GDP than with consumption growth.[4]

However, the relationship between the headline consumer sentiment indices and these economic variables is unstable over time (Graph 3 and Graph 4).

Table 1: Consumer Sentiment Surveys

	ANZ-Roy Morgan	Westpac and Melbourne Institute
Frequency	Every Tuesday	Second Wednesday of each month[(a)]
Sample size	1 000	1 200
Sample period	Weekend before release	Week before release
Coverage	Respondents must be older than 14 years	Respondents must be older than 18 years
Interview method	Face to face	Over the phone
Commenced	Monthly since Mar 1973; weekly since Aug 2008	Sep 1974
Sample methodology	–	Stratified to reflect Australian demographics

(a) There are occasional exceptions, before the release of the Australian Government budget, and in January
Sources: ANZ-Roy Morgan; Westpac and Melbourne Institute

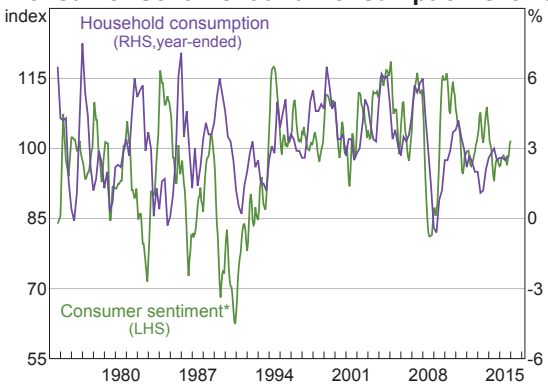
1 The Westpac and Melbourne Institute survey includes extra questions on a broader range of topics affecting households. On a monthly basis, respondents are asked about their unemployment expectations in a year's time, while on a quarterly basis they are asked about buying conditions for dwellings, the wisest places for their savings and their ability to recall certain news items.

2 The Westpac and Melbourne Institute index is standardised so that its average since 1980 is equal to 100. Component indices for the ANZ-Roy Morgan survey are only available from 1996 so the headline measure is indexed to have the same mean as the standardised Westpac and Melbourne Institute index for consistency.

3 Year-ended growth rates are presented as they are less volatile than quarterly growth rates.

4 To match the quarterly frequency of the National Accounts, consumer sentiment indices are calculated as in-the-quarter averages.

Graph 2
Consumer Sentiment and Consumption Growth

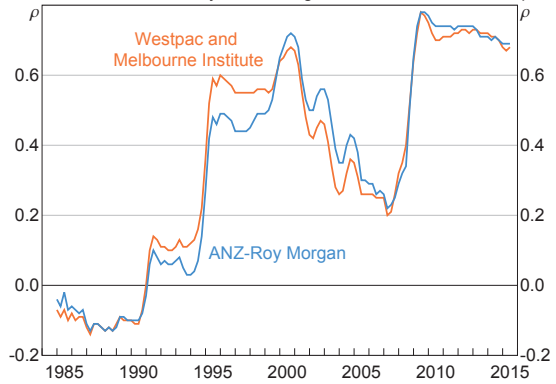


* Average between ANZ-Roy Morgan and Westpac and Melbourne Institute indices; average since 1980 = 100; three-month moving average

Sources: ABS; ANZ-Roy Morgan; RBA; Westpac and Melbourne Institute

Graph 3
Rolling Ten-year Correlation

Consumer sentiment* and year-ended growth in trend real consumption



* Sentiment index is averaged over each quarter

Sources: ABS; ANZ-Roy Morgan; Westpac and Melbourne Institute

Table 2: Correlation Coefficients[(a)]

Quarterly growth; trend; real terms

	Average of two consumer sentiment indices
Consumption	0.3
Durable consumption[(b)]	0.5
Gross domestic income	0.5
Domestic final demand	0.5
GDP	0.4

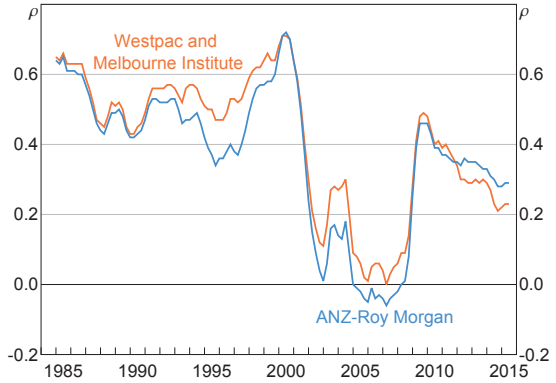
(a) Both sentiment indices are averaged over each quarter; correlations are calculated from 1974 to 2015; growth in trend measures are used as growth in seasonally adjusted measures are much more volatile

(b) Owing to data limitations, correlations are calculated from 1987 to 2015

Sources: ABS; ANZ-Roy Morgan; RBA; Westpac and Melbourne Institute

Graph 4
Rolling Ten-year Correlation

Consumer sentiment* and year-ended growth in trend real GDP



* Sentiment index is averaged over each quarter

Sources: ABS; ANZ-Roy Morgan; Westpac and Melbourne Institute

This is consistent with research from the Bank of England, which has found similar changes over time in the United Kingdom (Berry and Davey 2004). In Australia, at least, it appears that household sentiment is more highly correlated with other measures of economic conditions during major turning points, such as the global financial crisis, than during smaller fluctuations in conditions.

To examine these relationships more fully, we use regression techniques to test formally whether current and past values of consumer sentiment provide incremental information about selected economic variables beyond what past values of those economic variables contain.[5] Our preferred

5 The t-tests are used to assess the significance of consumer sentiment in explaining select economic variables. For example, the following model is estimated for $\Delta GDP_t = \alpha_0 + \sum_{i=1}^{2} \alpha_i \Delta GDP_{t-i} + \beta sentiment_{t-j} + u_t$ where ΔGDP_{t-i} is quarterly growth in GDP and $sentiment_{t-j}$ is either a contemporaneous ($j=0$) or lagged ($j=1$) in-the-quarter average for the series that averages the ANZ-Roy Morgan and the Westpac and Melbourne Institute headline sentiment indices. The t-test is conducted on the estimated coefficient β. These simple models explain less than one-third of the variation in selected economic variables.

specification uses an average of the two headline sentiment indices in the regressions, since this is likely to be less noisy than each of the individual series by themselves. However, tests using the individual measures yield similar results.

The results suggest that the headline indices contain statistically significant incremental information for all selected economic variables (Table 3). There also appears to be evidence that consumer sentiment survey measures from the previous quarter contain information about current economic variables. Despite some of the questions asking about conditions one and five years ahead, longer lag structures performed less well.

To assess whether the surveys contain incremental information apart from turning points, we run the same tests as above, but use dummy variables to exclude the recessions in the early 1980s, the 1990s and the global financial crisis period, which are major turning points in the sample. The results show that the surveys have been more useful around turning points, but they do still retain some incremental information once turning points are excluded from the sample.

Components of the headline index

The questions that make up the headline index all have a different focus and it is possible that some of them individually provide better information about economic activity than the headline index. To see if this is the case, we also examine the relationship between the surveys' component indices and the economic variables examined in the previous section using the same framework. The examination is restricted to the components of the Westpac and Melbourne Institute survey, as a sufficiently long time series of the ANZ-Roy Morgan components is unavailable.

The results show that the component tracking households' perceptions of their current personal finances compared with a year prior generally performs well in terms of statistical significance, even in the absence of turning points (Graph 5 and Table A1). In the tests assessing its relationship with growth of total and durable consumption, it actually performs better than the headline index. That said, even the personal finances component is not statistically significant in all possible specifications of the testing model, especially those that include all other components. The component tracking households' perceptions of their personal finances compared with what they expect a year ahead and the component tracking their perceptions of buying conditions for major household items are also particularly useful in predicting growth of durable consumption.[6] This is consistent with households planning their durable goods purchases.

Table 3: Estimated Consumer Sentiment Coefficients[(a)]

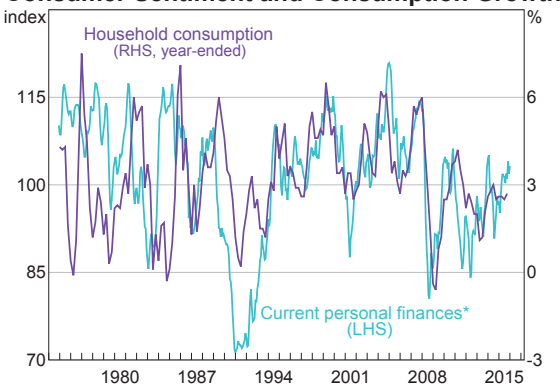
Percentage point change in quarterly growth associated with a 10 point increase in headline sentiment; figures in parentheses are for models that exclude major turning points

	Contemporaneous sentiment term		One-quarter lag	
Consumption growth	0.15***	(0.13**)	0.15***	(0.15**)
Durable consumption growth[(b)]	0.44***	(0.39***)	0.41***	(0.36**)
Gross domestic income growth	0.29***	(0.21***)	0.29***	(0.16*)
Domestic final demand growth	0.28***	(0.22***)	0.31***	(0.24***)
GDP growth	0.20***	(0.08)	0.18***	(0.02)

(a) Sentiment series used is the average of the two headline indices; estimated from 1974 to 2015; ***, ** and * represent statistical significance at the 1, 5 and 10 per cent level, respectively
(b) Estimated from 1987 to 2015
Sources: ABS; ANZ-Roy Morgan; RBA; Westpac and Melbourne Institute

6 Forecast evaluation showed that one-quarter-ahead forecasts were enhanced by taking into account consumer sentiment.

Graph 5
Consumer Sentiment and Consumption Growth



* Average since 1980 = 100; three-month moving average
Sources: ABS; Westpac and Melbourne Institute

Is the Information Content Unique?

While the surveys generally contain useful information about economic activity, it may be that they are informative only because they summarise information contained in other available economic variables, rather than providing unique information. Previous studies have found that only movements in sentiment that summarise other available economic information have value for gauging developments in economic activity (e.g. Roberts and Simon 2001; Berry and Davey 2004; Wheeler 2010).

We explore whether this is true in the Australian data using a model based on the methodology in Berry and Davey (2004). We use the model to try to predict changes in the headline, personal finances and buying conditions sentiment series using other data that are publicly available before the sentiment surveys are conducted, including the cash rate, the unemployment rate and changes in share prices. We also use quarterly variables that are publicly available with a longer lag, such as wage growth, growth in housing wealth and GDP growth (for more details, see Appendix B).

We estimate how much of the variation in the sentiment series can be explained by these variables. The predicted values from the model capture the component of the sentiment series that summarises the other data. The residuals are the 'unexplained' component, which includes changes in sentiment that may or may not capture information relevant to gauging developments in economic activity. Because the unexplained component is constructed to be uncorrelated with the other already-released data, the information contained in this component can be thought of as unique to the consumer sentiment release. The sentiment measure we use in this modelling exercise is the average of the two headline consumer sentiment measures (although, again, the results are similar if either survey is used on its own).

As found in other studies, the explained components of the various sentiment series appear to have a close relationship with growth in total and durable household consumption, gross domestic income, domestic final demand and GDP (Table 4). The unexplained components are more volatile, but do exhibit a degree of correlation with household consumption growth. This is particularly apparent for the unexplained components of the sentiment series that track households' perceptions of their current personal finances compared with a year prior and their perceptions of buying conditions for major household items.

We also use the decomposition of explained and unexplained sentiment in more formal testing. We augment the consumption growth models with all of the publicly available data used in the decomposition. For instance, we test whether the explained component of the headline sentiment index contains useful information for consumption, above and beyond what can be explained by publicly available outcomes for growth in consumption, GDP, housing wealth and wages in previous quarters, and the latest available outcomes for the unemployment rate, cash rate and share price growth preceding the survey period. In addition, we include contemporaneous and lagged terms of each unexplained component to avoid any omitted variable bias.

Table 4: Correlation Coefficients
Consumer sentiment and selected economic variables[(a)]

	Consumption	Durable consumption	Gross domestic income	Domestic final demand	GDP
Explained component					
Headline index	0.42	0.43	0.44	0.37	0.31
Current personal finances	0.42	0.38	0.35	0.21	0.11
Buying conditions	0.43	0.35	0.15	0.22	0.15
Unexplained component					
Headline index	0.28	0.21	0.12	0.22	0.09
Current personal finances	0.34	0.27	–0.06	0.18	0.19
Buying conditions	0.24	0.10	0.04	0.16	0.15

(a) All sentiment indices are averaged over each quarter and decomposed using the model based on Berry and Davey (2004)
Sources: ABS; ANZ-Roy Morgan; RBA; Westpac and Melbourne Institute

By construction, the explained components generally did not contain unique information. However, the unexplained portion of the component tracking households' perceptions of their current personal finances was found to contain some useful contemporaneous information for durable consumption. It also appears to be useful for explaining total consumption, although again this conclusion does not hold up in all possible specifications of the testing models. The unexplained portion of the component tracking households' perceptions of buying conditions for major household items is also found to contain some predictive information for durable consumption. Overall, the two measures do appear to be useful beyond just being a summary of other publicly available data. The unexplained portions of the other components were not found to contain useful information.

Conclusion

The two main consumer sentiment surveys in Australia are very similar in scope, construction and outcomes. They ask respondents about their personal finances, expectations for economic conditions and potential spending intentions. While the headline indices provide timely information about economic developments, the strength of their relationship with key macroeconomic variables varies across time. In particular, the survey measures of household sentiment seem to be more correlated with changes in broader measures of economic conditions during economic turning points.

Some of the components that make up the headline index seem to provide more information about specific economic variables than the headline index. This is true of the component that tracks households' perceptions of their current personal finances compared with a year prior, and the component tracking households' perceptions of buying conditions for major household items. Furthermore, these measures contain useful information that appears to be unique to the surveys, rather than just providing a summary of other publicly available data.

Appendix A

Table A1: Estimated Consumer Sentiment Coefficients[(a)]

Percentage point change in quarterly growth associated with a 10 point increase in headline sentiment; figures in parentheses are for models that exclude major turning points

	Contemporaneous term		One-quarter lag	
Current personal finances				
Consumption	0.22***	(0.23***)	0.20*	(0.18***)
Durable consumption	0.61***	(0.60***)	0.49*	(0.40***)
Future personal finances				
Consumption	0.18**	(0.18***)	0.12**	(0.21***)
Durable consumption	0.63***	(0.58***)	0.63*	(0.56***)
Buying conditions				
Consumption	0.12***	(0.09*)	0.13*	(0.10**)
Durable consumption	0.29***	(0.20*)	0.35*	(0.30***)

(a) Estimated from 1974 to 2015; ***, ** and * represent statistical significance at the 1, 5 and 10 per cent level, respectively
Sources: ABS; RBA; Westpac and Melbourne Institute

Appendix B

Below is the model used to decompose consumer sentiment into its explained and unexplained components. Both models were estimated using OLS and, where required, monthly frequency data were extrapolated from quarterly frequency data using a cubic spline. The consumer sentiment series is a point-in-time observation, which coincides with the average between the first ANZ-Roy Morgan observation of each month and each monthly Westpac and Melbourne Institute observation. The lags of all variables on the right-hand side were chosen such that they only capture information that was available to respondents at the time the survey was conducted.

Model

$$\begin{aligned} \textit{Consumer sentiment}_t = {} & \alpha + \beta_1 \textit{cash rate}_{t-1} + \beta_2 \textit{unemp}_{t-1} + \beta_3 \Delta\log(\textit{compensation of employees}_{t-1}) + \beta_4 \Delta\log(\textit{housing wealth}_{t-1}) \\ & + \beta_5 \Delta\log(\textit{share prices}_{t-1}) + \beta_6 \Delta\log(\textit{GDP}_{t-1}) + \gamma(\textit{turning points dummy}) + \varepsilon_t \end{aligned}$$

Adjusted $R^2 = 0.65$

Sample period: February 1990 to March 2015

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Wheeler T (2010), 'What Can We Learn from Surveys of Business Expectations?', Bank of England *Quarterly Bulletin*, Q3, pp 190–198.

Firm-level Capacity Utilisation and the Implications for Investment, Labour and Prices

Kevin Lane and Tom Rosewall*

Business surveys provide a timely read of the average rate of capacity utilisation at Australian firms. However, discussions with company managers in the Reserve Bank's business liaison program reveal considerable variation in how 'capacity utilisation' is interpreted. This variation is important, as it affects the interpretation of survey measures of capacity utilisation and their implications for firms' resourcing needs and pricing decisions. For firms in the more capital-intensive goods-related industries, a high level of capacity utilisation may reveal an impetus to hire more labour and to invest in the capital stock, while for services firms it is more likely to reflect an incentive to hire more labour only. Consequently, movements in aggregate measures of capacity utilisation are likely to contain information about the labour market, while the implications for business investment are likely to be identified at a more granular level. Much of the recent increase in survey measures of capacity utilisation has been driven by services firms. In contrast, capacity utilisation remains relatively low for firms in goods-related industries, which may help to explain why aggregate capital expenditure has remained subdued.

Introduction

Measures of spare capacity in the economy provide a gauge of price pressures and the outlook for demand for labour and capital inputs. Firms operating close to full capacity are more likely to invest in additional capital and/or employ more workers in order to increase their output, and may also be more likely to increase the prices of their output. In contrast, when capacity utilisation is low, a firm can increase output by utilising its existing labour and capital more intensively.

There are different ways of measuring spare capacity in the economy, such as the unemployment rate or measures of the output gap, which involves estimating the difference between actual and potential output in the economy. These measures can be complemented by measures of firm-level capacity utilisation from business surveys, which are often more timely. However, discussions with firms in the Bank's business liaison program suggest that the interpretation of 'capacity utilisation' is not straightforward and varies considerably across the different sectors of the economy.[1]

Survey Measures of Capacity Utilisation

Several private business surveys provide information on the rate of capacity utilisation in Australian businesses. The Reserve Bank monitors these surveys, since they each provide complementary

* The authors are from Economic Analysis Department and thank Alice Lam and Mike Major for valuable input to this article.

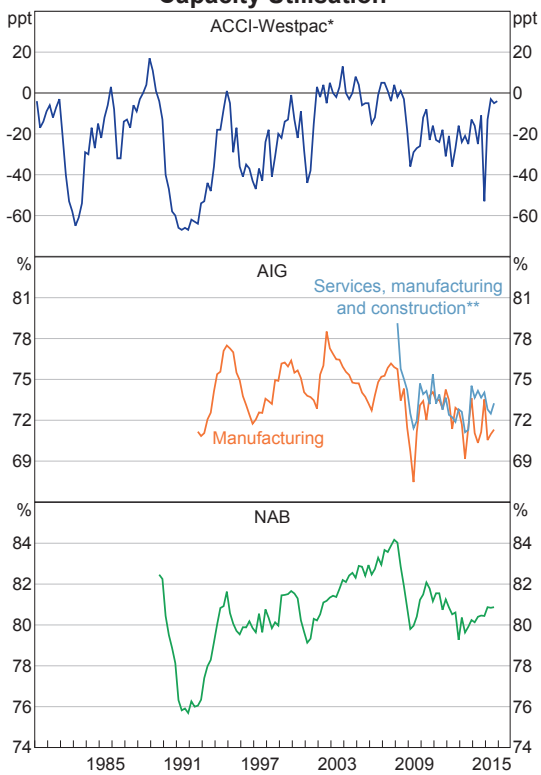
1 The Reserve Bank business liaison team conducts around 70–80 discussions with contacts on a monthly basis. Discussions with any individual firm typically occur around every 6 to 12 months, with Bank staff usually meeting the chief executive officer, chief financial officer and/or operations manager. Liaison meetings are held with firms of all sizes, although most discussions are with mid-sized and large firms where conditions are somewhat more likely to reflect economy-wide trends rather than firm-specific factors. For more information, see RBA (2014).

information on capacity pressures in different industries (Table 1). The Australian Chamber of Commerce and Industry-Westpac (ACCI-Westpac) Survey of Industrial Trends, which began in 1961, reports the average rate of capacity utilisation for a sample of manufacturing firms each quarter. The Australian Industry Group (AIG) reports capacity utilisation in the manufacturing, construction and service industries. The broadest survey is conducted by National Australia Bank (NAB), and covers all non-farm industries, including firms involved in the production and distribution of goods, as well as household and business service firms. In addition to questions about the rate of capacity utilisation, the ACCI-Westpac and NAB surveys ask respondents to identify the most significant constraint on business activity from a range of options related to demand, labour, capital and other factors. The NAB survey also asks about the extent to which these factors are a constraint on output.

Recent trends

Survey measures suggest that aggregate capacity utilisation has increased gradually over the past two years (Graph 1). Although an improvement in capacity utilisation is typically thought of as a

Graph 1
Capacity Utilisation



* Above average respondents minus below average
** Weighted average measure of services (50 per cent), manufacturing (30 per cent) and construction (20 per cent) capacity utilisation
Sources: ACCI-Westpac; AIG; NAB

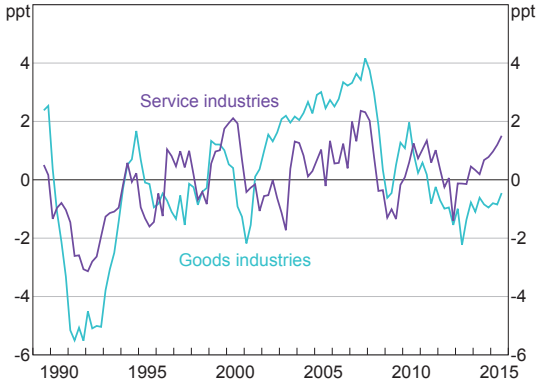
Table 1: Survey Measures of Capacity Utilisation

Survey	Industries	Sample size and frequency	Start of series	Questions
ACCI-Westpac Survey of Industrial Trends	Manufacturing	200–300 per quarter	September 1961	Rate of capacity utilisation Single most important constraint
AIG Performance of Manufacturing	Manufacturing	900 per quarter; 200 per month	Quarterly from September 1992; monthly from September 2007	Rate of capacity utilisation
AIG Performance of Construction	Construction	150 per month	January 2008	Rate of capacity utilisation
AIG Performance of Services	Services	200 per month	October 2007	Rate of capacity utilisation
NAB Quarterly Business Survey; NAB Monthly Business Survey	Non-farm	900 per quarter; 400–500 per month	Quarterly from September 1989; monthly from March 1997	Rate of capacity utilisation Single most important constraint Severity of constraints

Sources: ACCI-Westpac; AIG; NAB

precondition for an increase in business investment, information from the Australian Bureau of Statistics (ABS) capital expenditure survey, the relatively low level of non-residential building approvals and liaison with firms all suggest that the near-term outlook for investment remains subdued. Moreover, the industry-level data available from the NAB survey suggest that the recent increase in utilisation has been particularly pronounced in the services sector, which is relatively labour intensive (Graph 2). Capacity utilisation in goods-related industries remains low relative to its historical average.

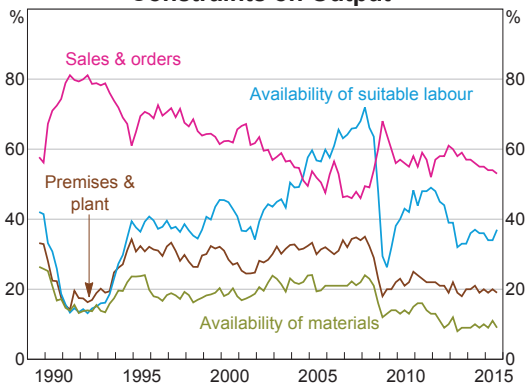
Graph 2
Capacity Utilisation by Sector*
NAB survey, deviations from long-run average



* Goods industries include manufacturing, construction, wholesale and retail; service industries include recreation & personal and finance, business & property
Sources: NAB; RBA

Although the NAB measure of capacity utilisation has increased of late, it suggests that most firms have adequate capital equipment available. Only around one-fifth of respondents reported that 'premises and plant' was a constraint on output in the September quarter, a share that has been broadly steady since 2008 (Graph 3). The availability of suitable labour is identified as a constraint by more firms, and in general this appears to have been an important driver of aggregate shifts in capacity utilisation through time. However, a lack of sales and orders is identified by most firms as a constraint on output at present. These observations are broadly consistent with the qualitative read provided by the business liaison program; many firms report that they have adequate plant & equipment to meet current and expected demand, while voluntary staff turnover is low and labour availability is good.

Graph 3
Constraints on Output*



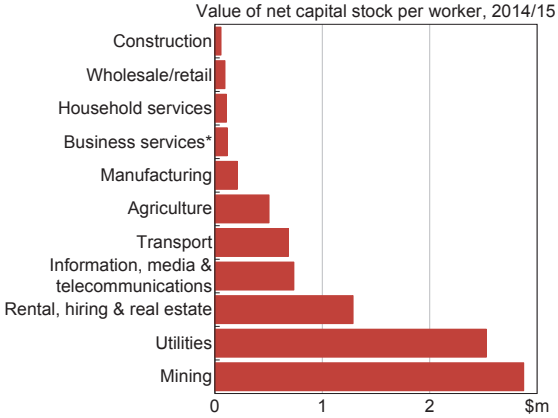
* Share of firms reporting a minor or significant constraint
Source: NAB

How Do Firms Interpret 'Capacity Utilisation'? Evidence from Liaison

It is intuitive to think of 'capacity' as some level of output that can be produced while fully utilising resources that cannot be varied in quantity within a short period. While this broad definition applies to all firms, discussions with business managers via the Bank's business liaison program have highlighted two key differences in the interpretation of capacity utilisation across firms.

First, there are differences in which factors of production are considered by managers when they assess both capacity and the utilisation of capacity. For example, it is common for firms in capital-intensive industries – such as manufacturing, mining and transport & storage – to consider capacity in terms of their current capital stock, while utilisation embodies some consideration of both the amount of labour required and the extent to which capital is being used (Graph 4). In contrast, much of the services sector primarily focuses on labour to assess both available capacity and utilisation rates. These differences are important, as they affect

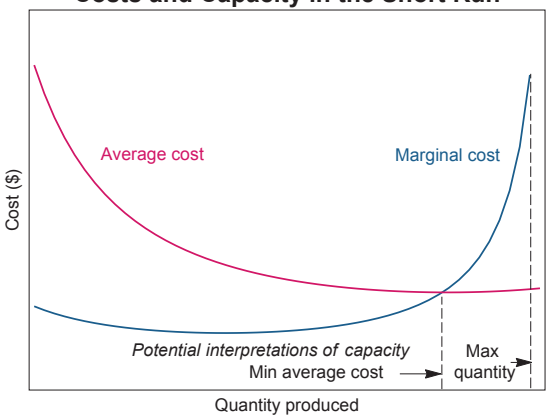
Graph 4
Capital to Labour Ratio
Value of net capital stock per worker, 2014/15



* Excluding rental, hiring and real estate services and information, media and telecommunications

Sources: ABS; RBA

Graph 5
Costs and Capacity in the Short Run



Source: RBA

the interpretation of survey measures of capacity utilisation and their implications for firms' resourcing needs and pricing decisions. For some firms, a high level of capacity utilisation may reveal an impetus to increase hours for existing workers and hire new staff, while for others it may reflect an incentive to accumulate more capital.

Second, the interpretation of the 'full capacity' level of output differs by firm. Some firms regard full capacity as the maximum level of output that can be produced with their existing capital and labour resources. Other firms regard full capacity as a desirable level of output, such as the point at which average costs are at a minimum (Graph 5).[2] This level of desirable 'full capacity' may be close to, or well below, the absolute maximum level of production.[3] Again, these differences affect the interpretation of survey measures of capacity utilisation. Under the first interpretation, survey reports of full capacity are more likely to be associated with more investment in capital and/or higher employment. Under the second interpretation, survey reports of full capacity might simply imply an increase in the utilisation of existing capital and labour, at least in the short run.

Some firms have shifted in their own thinking about utilisation over time. In particular, managers have observed a heightened focus on 'full' utilisation as a means of improving efficiency, suggesting that 'average' utilisation may have increased. In capital-intensive industries, for example, firms have used additional investment in technology to boost the utilisation of their existing physical capital stock. In the services sector, some managers explained that they had abandoned the practice of retaining 'fat' in their available capacity (say, 5 per cent of available hours) that was retained to meet periods of peak demand, in favour of running a 'lean ship' at all times. If this behaviour is widespread, comparisons of current utilisation rates with long-run averages may be misleading.

Furthermore, greater flexibility in the production process may mean the incremental response to a given change in utilisation has changed over time. This is partly due to the nature of information technology, which has become a central part of many firms' operations. Software is highly scalable and hardware is relatively cheap and increasingly

2 This ambiguity of capacity utilisation was discussed throughout the 20th century, including by Cassel (1937) and Friedman (1963). See Christiano (1981) or Nelson (1989) for a review.

3 Eiteman and Guthrie (1952) sent a survey to manufacturers in the United States presenting them with several depictions of average cost curves. Of the 366 respondents, the majority indicated that capacity output was at, or only a little above, the level of production where the curve was at a minimum. Capacity was defined in the survey as 'meaning the maximum output possible without the use of overtime payments for labor'.

accessible via options such as cloud storage technology and mobile devices. In liaison, some managers have observed that recent investment in information technology has delivered such flexibility in their business that most feasible changes in demand could be met with existing labour and physical capital inputs.

Observations by industry

Capacity utilisation is a key metric for most manufacturing firms in the business liaison program. Most use a standard form of the concept. Capacity is usually defined as the installed plant and equipment available for use and utilisation is defined as the time spent in operation (at least partly attributable to labour inputs) relative to the feasible maximum. Manufacturing firms typically qualified the 'full' rate of capacity as the maximum sustainable rate, recognising the costs of 'wear and tear'. Logistics firms and mining firms generally define capacity utilisation as the actual volume of production relative to the maximum throughput during a given period of time (which could be as short as one hour). Responses from these firms were generally framed in terms of each firm's capital stock, with limited reference to labour. To varying degrees, the rate of utilisation is related to the degree of labour required in these firms.

Within the services sector, utilisation is a core metric for professional consultancies (including legal, IT and engineering & design services) and both capacity and utilisation are most commonly defined in terms of labour inputs. Consultancies generally target billable hours as a share of total hours worked, typically reviewed by management frequently. For example, many firms will target a firm-wide charge-out rate of 85 per cent of available hours (akin to 'full capacity' under normal conditions), with 15 per cent allocated to professional and business development. Some in the services sector were more likely to define 'full capacity' as their optimal rate and judged that operating above this for a sustained period was as detrimental to the business as low rates of utilisation.

Although managers in the services sector generally agreed that some contribution from capital was required in the production process, including office space, equipment and software, it is often secondary and in many cases is not factored into the regular consideration of capacity. In service firms that do not bill by the hour, most managers still consider both capacity and utilisation in terms of labour inputs, although the rate of utilisation relates to a more loose definition of staff activity. The lack of consideration of capital by many services firms possibly reflects the small share of non-labour costs, or that incremental changes in billable hours effectively factor in a capital-service charge.

Firms in some other industries expressed mixed views on the relevance of the concept of capacity utilisation for their operations. For example, construction contractors generally regarded 'capacity utilisation' to be of some use, primarily citing some form of labour utilisation. The focus of a 'typical' construction contractor in the liaison program is the time spent on each project, particularly in the detached housing market. Construction subcontractors that provide and operate capital equipment (e.g. cranes) tend to measure utilisation as the share of time that their equipment is in use.

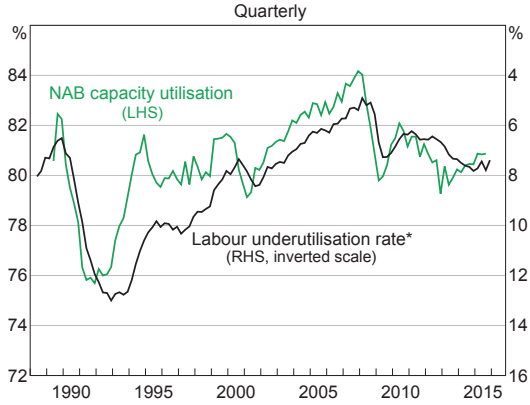
Retailers responded that capacity utilisation was a useful concept, but not in the 'traditional' sense, except for distribution centre operations. Retailers commonly use revenue-based metrics as the main means of evaluating operations, such as sales density (sales per square metre or sales per employee). Cost-based metrics are also used, often to compare labour utilisation. For example, wages as a percentage of sales may be used to evaluate within-store performance over time and relative performance against other stores or regions. Household-service firms that operate physical facilities, such as restaurants and gyms, use patronage as a share of maximum (perhaps at peak times) to measure utilisation. These firms often noted that the capacity of existing facilities could not easily be expanded.

Implications for Labour and Capital Demand

Evidence from liaison suggests that the assessment of utilisation in capital-intensive industries typically embodies some consideration of both labour and capital inputs, while much of the services sector primarily focus on labour to assess available capacity and utilisation rates. For firms in the more capital-intensive goods-related industries, a high level of capacity utilisation may reveal an impetus to increase employment and to invest in the capital stock, while for services firms it may reflect only an incentive to increase the use of labour. Consequently, movements in aggregate measures of capacity utilisation are more likely to contain information about the labour market than about the capital stock. Indeed, aggregate capacity utilisation is highly correlated with measures of labour market utilisation (Graph 6).[4] Meanwhile, measures of capacity utilisation are likely to contain a meaningful degree of information about the capital stock for a subset of industries that are capital intensive.

In order to meet fluctuations in demand, changes in labour input play a central role in the short run, including over periods of several months, and this was reflected in discussions with managers about their theoretical response to a strong increase in demand. Among a diverse set of responses, a relatively common approach was to employ additional hours for existing staff, then additional contract labour and then additional permanent staff. In contrast, there was a widespread reluctance to invest in capital in order to raise output to meet higher demand in the short run and even over a period of years. The increase in capacity utilisation in the services sector in recent years and the corresponding improvement in activity more broadly in this sector can partly help to explain why aggregate employment growth has picked up notably despite below-average GDP growth and weak investment.[5]

Graph 6
Capacity and Labour Utilisation
Quarterly



* Includes full-time underemployed workers, and part-time underemployed workers searching for more hours of work; estimates of some components are used from August 2014 (see footnote 4)

Sources: ABS; NAB

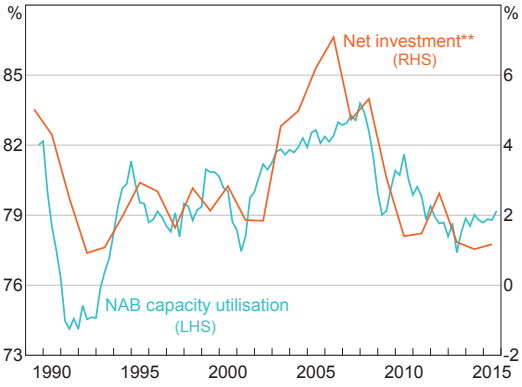
The rate of capacity utilisation is likely to have a more granular relationship with the need for new capital. Although an increase in headcount may require some capital expenditure in the services sector, the incentive to expand the capital stock can be more easily inferred from measures of capacity utilisation of firms in the goods industries. For these firms, high rates of utilisation are likely to imply a need for additional capital, leading to higher net investment (Graph 7).

Theory points to several reasons why firms may invest in additional capital only when utilisation of existing capital is very high. Firms often incur costs of adjusting to a higher capital stock, for example disruptions to business-as-usual operations. If these adjustment costs tend to be large even for small changes in the capital stock, firms are more likely

4 The underemployment measure used in Graph 6 comprises part-time workers who are actively looking to work more hours and full-time workers who have been temporarily put on shorter hours for economic reasons (such as insufficient work available), weighted by an estimate of the additional hours that they want to work; see RBA (2004). This measure differs from the ABS measure of underutilisation, in that it only includes part-time workers who are actively looking to work more hours, not those who prefer to work more hours but are not actively searching for more work. Some of the components published by the ABS are temporarily unavailable after May 2014, and thereafter it is assumed that full-time (or part-time) underemployed workers as a share of full-time (or part-time) employment remained around its average in the year to May 2014.

5 See RBA (2015) for details.

Graph 7
Net Investment and Capacity Utilisation – Goods Industries*



* Includes manufacturing, construction , wholesale and retail
** Growth in the net capital stock; chain volumes
Sources: ABS; NAB

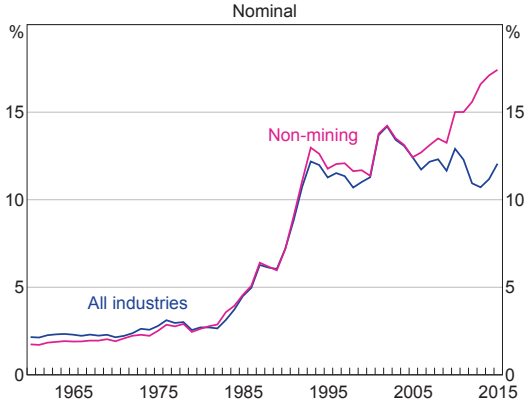
to wait until a substantial adjustment is needed.[6] Similarly, small incremental expansions in the capital stock may not be possible or practical due to the 'lumpy' nature of capital investment. Finally, managers may have concerns about the durability of any observed strengthening in demand. In the face of uncertainty and if investments are somewhat irreversible, waiting may be valuable since additional time affords managers the chance to avoid loss-making investments (Dixit and Pindyck 1994).[7]

These factors suggest that the distribution of survey responses about capacity utilisation may also contain information about the need for new capital.[8] In particular, firms in goods-related sectors operating at very high rates of utilisation are most likely to consider investing in additional capital. Since the global financial crisis, some liaison contacts have reported heightened uncertainty or aversion to risk, which suggests that full utilisation of available capacity may be a stronger-than-usual prerequisite for capital expenditure.[9]

Not all capital expenditure is motivated by the presence of capacity constraints. Firms can invest to increase the efficiency of current production. Many firms in liaison have described investment plans that are unrelated to the degree of spare capacity, including on software and R&D, which forms a growing share of aggregate business investment (Graph 8).[10] For example, expenditure on information technology has been described by some managers in the liaison program in the context of cost-cutting initiatives and by others as 'future proofing' the business, or streamlining existing operations in preparation for a possible future expansion.

Furthermore, liaison evidence does suggest that some investment is targeted at increasing utilisation of existing physical capacity. For example, a considerable volume of refurbishment work is under way in the short-term accommodation sector. The ongoing commitment to spending on technology

Graph 8
R&D and Computer Software as a Share of Private Business Investment
Nominal



Source: ABS

6 See Chirinko (1993) for a useful discussion.

7 McDonald (2000) suggests that this 'option value of waiting' may explain why many businesses tend to use hurdle rates for investment decisions that are above their cost of capital. Lane and Rosewall (2015) found that many Australian firms use relatively high hurdle rates, although they note that the value of real options was never invoked by liaison contacts as an explanation.

8 For a discussion of these factors, along with related evidence that higher moments of Tobin's *q* are likely to be relevant in explaining capital expenditure, see Eberly (1997), Caballero, Engel and Haltiwanger (1995) and Caballero and Engel (1999).

9 Lowe (2013) observed that business confidence and the willingness to take risk was subdued in Australia and partly attributed this to a 'legacy of the financial crisis'. Haldane (2015) suggests that the financial crisis may have caused heightened perceptions of, and aversion to, risk amongst managers in the United Kingdom.

10 The intellectual property component of capital expenditure has not exhibited strong cyclical patterns to date (Elias and Evans 2014).

by a broad range of firms may also partly be framed in terms of increasing utilisation of existing capital. An individual firm may also invest to expand into new markets, regardless of the utilisation of their capacity in existing markets.[11]

Implications for Consumer Price Inflation

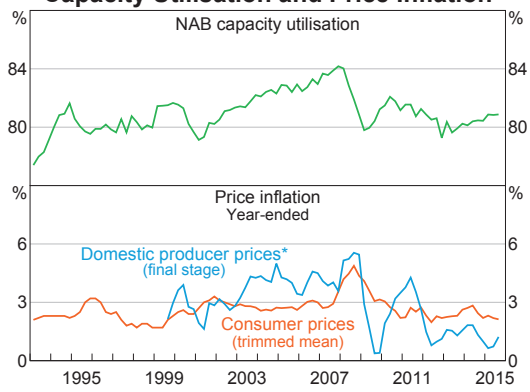
In principle, the rate of capacity utilisation should be positively related to the rate of inflation. At an aggregate level, inflationary pressure is likely to be greater in an economy operating at a high level of capacity utilisation than if it is operating at a low level. For example, firms may have a greater degree of pricing power and be able to expand their mark-ups in an economy experiencing strong growth in demand relative to available supply.[12] Cost pressures may also be elevated due to strong competition for available capital and labour inputs by firms seeking to expand production.

For individual firms, the mechanics of how capacity utilisation is related to cost and price inflation varies by industry. For example, a manufacturer may boost production by increasing the 'work week' of capital and by commensurately increasing the labour and production inputs. This may lead to higher or lower costs depending on the nature of the adjustment (Bresnahan and Ramey 1994); increasing output temporarily by paying staff overtime may lead to higher costs, whereas adding a new shift will generally lead to a decline in average costs as the additional output is generated from the same base of fixed costs.

For many service-producing firms, an increase in utilisation will be associated with an increase in the share of hours worked that are related to the provision of services. The implied increase in labour productivity will be associated with a decline in average costs unless the higher productivity is rewarded with higher remuneration. For firms in both goods-related and service industries, increasing output beyond some level without adding to capacity becomes very costly or impractical. For example, for a manufacturer running continuously with a given set of equipment, adding employees would have little effect on output. Therefore, at high rates of utilisation, a small increase in output would require a large increase in costs.[13]

Empirically, capacity utilisation has generally not had a strong concurrent relationship with consumer price inflation in Australia. (Although the very high rates of utilisation recorded before the financial crisis did coincide with rising wage growth and, in time, with a strong increase in the rate of underlying inflation.) Capacity utilisation does, however, appear to have been more closely correlated with growth of domestic producer prices (Graph 9). This is largely because consumer prices are more sensitive to the cost of imports, which reflect movements in the exchange rate and capacity pressures in overseas markets (Chung, Kohler and Lewis 2011). In addition, when inflation expectations are anchored, firms may

Graph 9
Capacity Utilisation and Price Inflation



* Excluding oil
Sources: ABS; NAB; RBA

11 It is possible that this type of speculative spending may be more palatable to firms when they observe others investing heavily: firms may fear losing market share if they invest less than their competitors; they might extract information from the behaviour of others; or they might consider the reputation damage from initiating failed projects to be less (Scharfstein and Stein 1990).

12 For example, in the United Kingdom, Weale (2014) found a positive relationship between margins and capacity utilisation. There is little evidence that mark-ups have been countercyclical in Australia; see Norman and Richards (2012).

13 The 'wear and tear' costs of running at high utilisation rates may also factor into the operational and pricing decisions of manufacturers and other capital-intensive businesses.

'look through' temporary changes in costs when setting final prices charged to consumers (Gillitzer and Simon 2015).[14]

Conclusion

Discussions with company managers in the Reserve Bank's business liaison program suggest that the interpretation of 'capacity utilisation' varies greatly across the economy. Managers consider a range of factors when assessing utilisation, and the interpretation of 'full' and 'optimal' capacity also varies across industries. These differences affect the interpretation of survey measures of capacity utilisation and their implications for firms' demand for labour and capital. Firms in capital-intensive industries, such as manufacturing, mining and transport & storage, tend to consider available capacity in terms of their capital stock, while the assessment of utilisation typically embodies some consideration of both labour and capital inputs. In contrast, much of the services sector primarily focuses on labour to assess capacity utilisation. Firms' responses help to explain why developments in the labour market are an important driver of overall trends in measured capacity utilisation. For investment, the rate of capacity utilisation at an individual firm is potentially a valuable indicator of their incentive to add to their stock of physical capital. In particular, firms in goods-related sectors operating at very high rates of utilisation are most likely to consider investing in additional capital. For other firms, capacity utilisation bears less direct relationship to subsequent changes in the capital stock. Finally, the relationship between capacity utilisation and consumer price pressures is weaker than it is with upstream domestic price pressures. This may, in part, reflect the effect of well-anchored expectations regarding consumer price inflation. ✠

14 Relatedly, Heath, Roberts and Bulman (2004) suggest that a decline in inflation expectations in the 1990s led to a slowing in the pace with which changes in import prices were passed through to final consumer prices.

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Assessing China's Merchandise Trade Data Using Mirror Statistics

Iris Day*

Given their timeliness, Chinese trade data have the potential to provide a useful early read on conditions in the Australian and global traded sectors. However, the reliability of China's merchandise trade data has come under scrutiny in recent years, particularly following reports of over-invoicing of exports to Hong Kong. This article considers the accuracy of China's trade data by comparing the merchandise trade statistics with the reciprocal trade statistics or 'mirror' statistics published by its major trading partners (MTPs). In broad terms, growth in trade suggested by the mirror statistics aligns relatively closely with published Chinese data, though the Chinese figures are found to imply more volatile and somewhat higher growth in exports over the past three years than the corresponding trading partner data. While this largely reflects differences with mirror statistics for Hong Kong, it is also due to discrepancies with data from other economies, primarily in the Asian region.

Background

There has been considerable debate about the accuracy of China's headline economic statistics for many years.[1] International trade is one area in which the Chinese data can be compared with statistics published by other economies to assess the validity of concerns about data quality. Accordingly, China's merchandise trade statistics have come under scrutiny in recent years, largely because China's reported exports to Hong Kong grew at a much faster pace than the corresponding statistics Hong Kong published on imports from China. This article seeks to assess the broader accuracy of China's merchandise trade statistics by comparing the data with the corresponding mirror statistics reported by a range of their MTPs.

The accuracy of China's merchandise trade data is of particular interest because of their potential to provide a timely read on global demand conditions, given the importance of China to regional and world trade. China's merchandise trade data are typically published less than two weeks after the end of the month and are available before most of China's MTPs publish their corresponding statistics. In the case of Australia, Chinese trade data are available about three weeks before Australian trade data.

Merchandise trade data do not feed directly into the estimation of headline GDP in China by the statistical authorities, since the national accounts are mainly compiled on a production, rather than an expenditure, basis. As such, this work cannot be used to draw broader implications for the accuracy of China's GDP data.

Sources of Discrepancies in Trade Data

China's merchandise trade statistics are reported by the customs authority on a monthly basis and include a detailed breakdown of the types of goods and the source or destination country of China's imports and exports. China's MTPs similarly compile international

* The author is from Economic Group.

1 For example Wu (2007) and Holz (2014) discuss the accuracy of Chinese gross domestic product (GDP) statistics.

trade statistics using administrative data collected by their respective customs authorities (IMF 2009, p 116). While China and its trading partners follow many of the recommendations in the United Nations (UN) guidelines for compiling trade statistics, there are a number of reasons to expect that the export data of one country will not align precisely with the corresponding import data of a trading partner (United Nations 2011). Some discrepancies reflect methodological differences, for which adjustments can be made, while others may reflect accidental or intentional misreporting of trade flows by firms.

Re-exports and transhipment

A considerable share of China's trade is exported to Hong Kong and then re-exported on to another destination without being substantially transformed in the process. Despite declining in recent years, this share was still around 12 per cent of total trade in 2014.[2] Re-exports can cause discrepancies between the data of China and its trading partners for several reasons. First, in general, the importer is more likely to know the origin of the goods than the exporter is to know the final destination. For example, an export from China to Australia via Hong Kong may be recorded by the Chinese authorities as an export to Hong Kong, but as an import from China by the Australian authorities. Second, even if the origin and destination are correctly identified by each country, the reported value of the transaction may be different if a significant mark-up has been applied by the re-exporting economy.

For Hong Kong, this issue can be addressed by using re-export statistics by destination and origin. However, these disaggregated data are not available for other economies, such as Singapore, which also re-export goods to and from China. Some discrepancies may also remain due to 'transhipment', whereby goods are shipped via a third country but without clearing customs (Ferrantino and Wang 2008).[3] Transhipments are not included in the re-export data, although they could cause similar problems in identifying the final destination of exports.

Valuation and timing

As recommended in the UN guidelines, imports are normally reported on a cost of insurance and freight (CIF) basis, while exports are reported on a free-on-board (FOB) basis (United Nations 2011). Therefore, import values are expected to be greater than the corresponding export values by an amount equal to shipping and insurance costs. Conversion of trade flows to a single currency by statistical agencies can also lead to differences when the exchange rates used relate to different time periods. In addition, shipping times can cause a difference between when exports and imports are recorded, because exports (imports) are recorded when goods leave (enter) the economic territory of the compiling country.[4]

Misreporting

The trading entity misreporting the origin, destination or the value of goods to the relevant statistical agency, either intentionally or accidentally, can cause discrepancies between the statistics reported by each trading partner. Incentives for misreporting include tax and tariff minimisation, circumvention of quotas or embargos, and evasion of capital controls.

2 One reason often given for substantial re-exports via Hong Kong is that Hong Kong has an informational advantage in matching buyers and sellers in different markets, and some quality-sorting and marketing services can be undertaken in Hong Kong (Hanson and Feenstra 2001). Similar arguments can be made for other economies that re-export goods, such as Singapore.

3 Transhipment allows for smaller shipments to be combined or large shipments to be divided, but avoids costs and time delays involved with customs processes.

4 For example, it takes about two weeks to ship iron ore from Port Hedland in Australia to the northern ports in China.

Comparing Trade Statistics

Data and adjustments

For this analysis, trade statistics were collected for more than 40 of China's trading partners, which together accounted for more than 70 per cent of the value of Chinese trade in 2014 (Table 1). Trade with economies in the Middle East, Africa and Latin America account for most of the remaining trade, and are not included in this analysis as complete and timely data are not generally available.[5]

To account for the known technical differences in import and export data described above, the following adjustments were made:

- Trade flows not reported in US dollars were converted using the month-average spot rate of the relevant currency pair to enable all comparisons to be made in US dollars.
- For imports reported on a CIF basis, the FOB value was estimated by assuming that the cost of insurance and freight accounted for 5 per cent of the value.[6]
- The quarterly sums of the monthly figures were examined to smooth volatile month-on-month movements and to help account for the timing difference in recording exports and imports. Using quarterly sums also minimises distortions due to Chinese New Year-related calendar effects in January and February.

Several adjustments were also made to account for Chinese exports and imports passing through Hong Kong, which can be explained using Figure 1. From the perspective of Chinese exports (represented by arrows pointing from left to right), data from China are unlikely to reflect the final destination of goods as a significant share are re-exported through Hong Kong. However, mirror statistics from economies importing Chinese goods are likely to record China as the origin. The same issue is present with data on

Table 1: China's Trading Partners
Share of 2014 trade

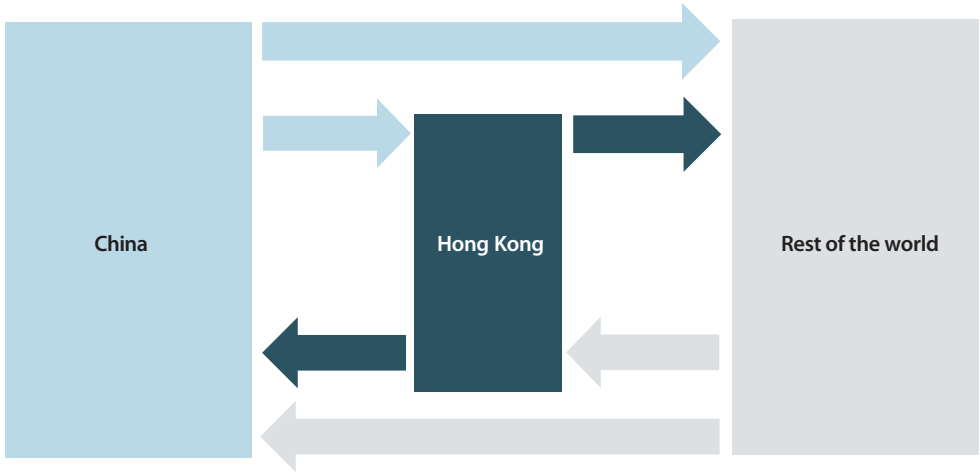
	Exports	Imports	Total trade
East Asia[(a)]	14.5	26.2	19.8
European Union (EU)	15.8	12.4	14.3
United States	16.9	8.1	12.9
Hong Kong	15.5	0.7	8.7
Japan	6.4	8.3	7.3
Australia	1.7	5.0	3.2
Russia	2.3	2.1	2.2
Brazil	1.5	2.6	2.0
India	2.3	0.8	1.6
Canada	1.3	1.3	1.3
Total	**78.1**	**67.6**	**73.3**

(a) Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan and Thailand
Sources: CEIC Data; RBA

5 Chinese and Hong Kong data suggest that there are considerable flows generated from Chinese exports to Hong Kong being re-exported to China (U.S. Department of the Treasury 2007). To the extent that this trade can be identified, it has been excluded from the analysis.

6 This is the sample average derived by comparing Chinese imports in China's balance of payments statistics, which are compiled on a FOB basis, with Chinese merchandise imports measured on a CIF basis. An estimate by the IMF (1993) suggests a larger proportion (10 per cent), although the authors recognise that these costs can vary.

Figure 1: Chinese Trade Flows



Source: U.S. Department of the Treasury (2007)

Chinese imports, which are represented by arrows from right to left. Chinese statistics should identify the origin of the goods regardless of whether they pass through Hong Kong, while mirror statistics are likely to report the destination as Hong Kong. As such, we make the following adjustments:

- To examine bilateral trade flows, China's exports to individual trading partners were added to Chinese re-exports via Hong Kong to that trading partner. This estimate of China's exports can then be compared with that trading partner's import data – which should already capture exports directly from China and re-exports via Hong Kong.
- In aggregate, Chinese exports are compared with the import data reported by the rest of the world plus an estimate of the portion of Hong Kong's imports from China which are retained in Hong Kong.[7]
- Total Chinese imports are compared with the sum of MTPs' data on exports to China and exports of goods produced or substantially transformed in Hong Kong plus re-exports from each economy to China via Hong Kong.[8]

China's exports

Data published by China and its MTPs show fairly similar growth in Chinese exports and the corresponding trading partners' imports for most of the period over the past decade (Graph 1). China's exports grew strongly prior to the global financial crisis, and then fell sharply before rebounding. However, the value of exports reported by China since 2012 has been higher and growth more volatile than the corresponding data reported by its trading partners (Graph 2).

The bulk of this discrepancy can be attributed to the growth in Chinese exports to Hong Kong, as reported in China's trade data. An adjustment to the Chinese export statistics can be made

7 However, China's exports to Hong Kong exclude the value of any mark-up applied in Hong Kong, which would be included in the corresponding MTP import data.

8 Total re-exports from Singapore to China are also included in the aggregate MTP data, along with its domestic exports. This assumes that the re-exports from Singapore originated in economies for which we are including the corresponding Chinese import data. This seems reasonable given that the MTPs examined account for around 70 per cent of Singapore's total imports.

Graph 1
China – Exports to MTPs
Year-ended growth in US$ trade values

* Hong Kong re-exports and domestically retained imports from China replace Chinese exports to Hong Kong

Sources: CEIC Data; Eurostat; RBA; Thomson Reuters

Graph 2
China – Exports to MTPs

* Hong Kong re-exports and domestically retained imports from China replace Chinese exports to Hong Kong

Sources: CEIC Data; Eurostat; RBA; Thomson Reuters

to exclude this discrepancy by replacing these data with the corresponding data reported by Hong Kong – namely, the sum of Hong Kong's domestically retained imports from China and Hong Kong's re-exports from China to other economies as reported in Hong Kong's trade statistics.[9] This adjusted estimate of China's exports to its main trading partners shows a much closer relationship with the trading partner import statistics than the unadjusted series.

The adjustment is likely to be accounting for a range of differences between the Chinese export data and the corresponding mirror statistics that result from the close trading relationship between China and Hong Kong.[10] However, the divergence between the adjusted and unadjusted series – at least in part – is likely to reflect false invoicing of exports from China to Hong Kong in order to circumvent controls on speculative capital inflows. These activities led Chinese authorities to introduce stricter requirements to verify the authenticity of trade documents in 2013.[11] The false invoicing was largely motivated by a positive interest rate differential between investments held in renminbi and in US dollars, and expectations of further appreciation of the renminbi against the US dollar.[12] As foreign exchange earned from exports can be freely converted to renminbi, firms had an incentive to overstate the US dollar value of exports (thereby enabling them to exchange US dollars for renminbi).

The data can be arranged to compare exports from China with imports reported by advanced economies, other east Asia, and other emerging economies. Advanced economies account for a large share of Chinese exports and movements in the Chinese data have aligned closely with the reciprocal data (Graph 3). In particular, trends in Chinese exports to Australia, Japan and the European Union are broadly in line with those in the mirror statistics. Yet the mirror data suggest a higher level of Chinese exports to North American economies than the Chinese data. While the reasons for this are uncertain, there does appear to be substantial transhipment of goods from China to the United States via Hong Kong. There could also be some double counting of imports from China because of re-exporting

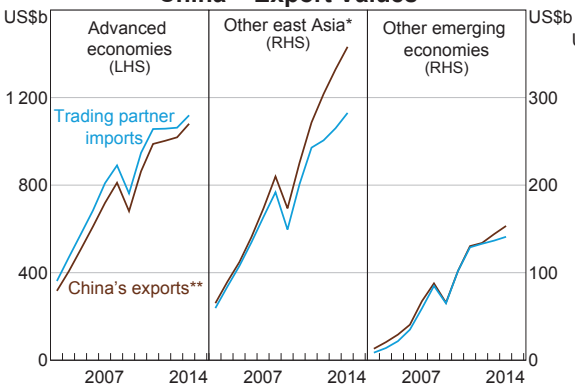
9 Re-exports from China to China via Hong Kong are not included in the adjusted Chinese export series since imports from China have not been included in the corresponding MTP import data. However, it is unclear if re-exports from China to China are included in China's data on exports to Hong Kong.

10 For a detailed discussion of these, see Liu *et al* (2008).

11 For example, see State Administration of Foreign Exchange (2013).

12 For more information on the role of expectations for the exchange rate in Chinese capital flows, see Hatzvi, Meredith and Nixon (2015).

Graph 3
China – Export Values

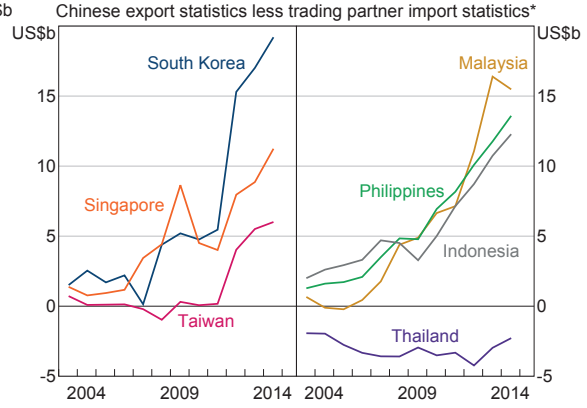


* Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan and Thailand

** China's export data includes re-exports via Hong Kong where available

Sources: CEIC Data; Eurostat; RBA; Thomson Reuters

Graph 4
China – Exports to Other East Asia
Chinese export statistics less trading partner import statistics*



* Chinese export data includes re-exports via Hong Kong where available

Sources: CEIC Data; RBA; Thomson Reuters

between close trading partners. This could help to explain the large discrepancy with Canada's import statistics: some Chinese exports to Canada are likely to be re-exported via the United States and would therefore be included in both countries' import statistics (Bohatyretz and Santarossa 2005). Chinese exports to a number of emerging economies (India, Russia and Brazil) also closely track data from those respective countries.

However, as with Hong Kong, there are noticeable divergences between the Chinese data and the mirror statistics published by the other east Asian economies. China's exports to these economies have been higher in the Chinese data than in the corresponding mirror statistics. Relative to each economy's trade with China, the discrepancies have generally been lower for the high-income economies than for the other economies in the region. The absolute size of discrepancies for South Korea, Taiwan and Malaysia has increased substantially since late 2012, showing a similar pattern to Hong Kong (Graph 4).

For Singapore, the discrepancy between the reported trade statistics has been relatively large since 2005. Since Singapore is a major international trading hub, this could reflect re-exports or transhipment of goods. As explained above, an export that travels via Singapore may be recorded in the Chinese statistics as an export to Singapore, but since the goods do not clear customs before being shipped to their final destination, they may not be recorded as an import from China by Singapore. Data on re-exports by origin and destination are unavailable for Singapore, unlike Hong Kong, so no adjustment can be made for this.

Imports (from China) reported by Indonesia and the Philippines have also been consistently lower than the corresponding Chinese export statistics. It is possible that this reflects under-reporting by importers in Indonesia and the Philippines in order to avoid import duties. One report has found that the value of imports recorded by the Philippines is typically lower than the mirror statistics reported by many of their trading partners (Wan 2014). By comparison, imports reported by Thailand have been consistently higher than the equivalent Chinese exports. At least in part, this could reflect Hong Kong re-exports from China to Thailand, but data on such activities are unavailable.

China's import data

The trends in China's import statistics line up fairly closely with the trends in exports reported by its MTPs at an aggregate level (Graph 5). Both data sources show a contraction in imports during the

Graph 5
China – Imports from MTPs
Year-ended growth of US$ trade values

Sources: CEIC Data; Eurostat; RBA; Thomson Reuters

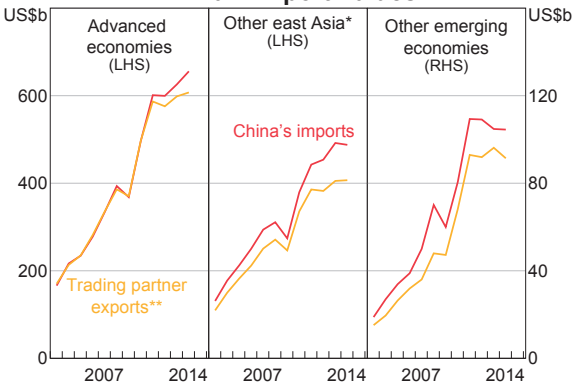
Graph 7
China – Imports from Other East Asia
Chinese import statistics less trading partner export statistics*

* Trading partner export data includes re-exports via Hong Kong where available
** Calculation uses Singapore's domestic exports but not re-exports
Sources: CEIC Data; RBA; Thomson Reuters

global financial crisis, followed by a strong rebound. The weakness in imports since 2014, which partly reflects declines in global commodity prices, is also reflected in both China's data and the mirror statistics.

When examined by region, however, there are some discrepancies, particularly for east Asia (Graph 6). The value of imports reported by China has been consistently higher than the corresponding export values reported by other east Asian economies (Graph 7). In part, this could reflect an underestimate of insurance and freight costs, although it seems unlikely that this can explain the large difference under reasonable estimates. Another possible cause of the difference is the transhipment and re-export of goods via major trading hubs (such as Singapore), which have not been adjusted for because the relevant data are not available. China's import statistics will be higher than the corresponding exports if trading partners record transhipment flows as exports to these intermediate destinations rather than China. In particular, a reasonable share of re-exports via Singapore to China is likely to have originated in the other east Asian economies.[13]

Graph 6
China – Import Values



* Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan and Thailand; trading partner exports includes domestic exports from Singapore
** Trading partner export data includes re-exports via Hong Kong where available
Sources: CEIC Data; Eurostat; RBA; Thomson Reuters

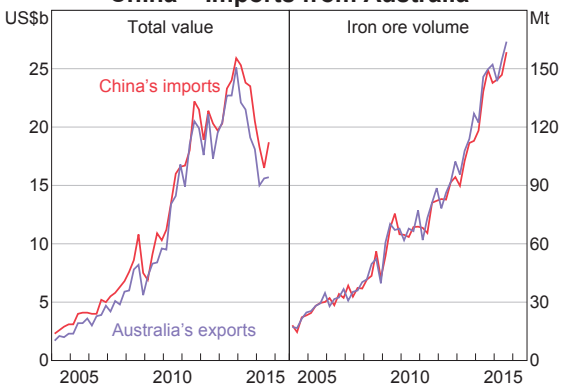
Malaysia's proximity to Singapore could help to explain the large discrepancy in the statistics reported for Chinese imports from Malaysia. Among the other east Asian economies, the statistics for the Philippines have shown the largest differences relative to the total value of bilateral trade. At times, Chinese import values have been more than double the corresponding Philippines export values. However, the difference is relatively small in absolute terms and could reflect issues with the reporting of trade flows in the Philippines. Since late 2012, a divergence has also emerged in the reported statistics for imports from Taiwan and South Korea.

13 Although data are not available on the original source of Singapore's re-exports, around one-third of Singapore's total imports are from other east Asian economies.

Since early 2014, expectations for a depreciation of the Chinese currency have increased and forecasts for economic growth in China have declined, prompting a rise in private capital outflows from China. This provides an incentive to over-invoice imports to disguise capital flows from China to trading partner economies.

The Chinese import statistics align relatively closely with the mirror statistics for imports from Australia (Graph 8). Chinese demand for iron ore and coal has driven the strong increase in imports from Australia over much of the past decade, with iron ore and coal accounting for around 60 per cent of Australia's exports to China over this period. However, over the past year the value of China's imports from Australia has fallen noticeably, largely reflecting lower commodity prices.

Graph 8
China – Imports from Australia



Sources: ABARES; ABS; Bloomberg; CEIC Data; RBA; Thomson Reuters

Conclusion

China's merchandise trade data can provide a timely indication of economic conditions in China. There have been doubts about the accuracy of Chinese statistics in recent years, but in many cases China's trade data can be reconciled with reciprocal data reported by its MTPs. Nevertheless, there is evidence that false invoicing of exports to Hong Kong has given rise to significant distortions and increased volatility in Chinese merchandise export data since 2012. As a result, trading partner import data – which have generally suggested growth has been less volatile and somewhat lower over the past three years – may provide a more reliable guide to Chinese exports than the Chinese data, at least for this period. By comparison, the growth rates of merchandise imports reported by China have generally been more consistent with the mirror statistics, although this could change if there continues to be an incentive to disguise capital outflows by over-invoicing imports. ☘

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Trends in Australian Corporate Financing

Ashley Fang, Mitch Kosev and David Wakeling*

The aggregate funding behaviour of the Australian non-financial corporate sector has been fairly steady over the period since the global financial crisis. However, this masks the quite divergent experiences of the resources and non-resources sectors. Substantial net investment by resources companies has been funded primarily by operating cash flows, while external funding has been modest, mainly comprising borrowing to offset the effect of movements in commodity prices on internal funding. Net investment by non-resources companies has been relatively subdued, with internal funds broadly sufficient to meet this expenditure. Overall, leverage for Australian-listed companies remains relatively low, internal funding continues to cover the bulk of financing needs and companies generally appear to retain good access to external finance in its various forms.

Introduction

The overall demand for finance reflects the investment decisions of the corporate sector. Companies finance their business activity from a mix of internal and external sources. Internal finance flows directly from company operating cash flows, while external funds are sourced from banks, or through the issuance of debt or equity securities. Internal finance is generally less variable compared with the use of external finance and tends to provide the bulk of funding for most activities. External finance is often used to facilitate larger, discretionary expenditures, including mergers and acquisitions (M&A).

Since the global financial crisis, investment and corporate funding trends in Australia have been characterised by the divergent experiences of the resources sector and non-resources companies.[1] Resources companies undertook a large increase in investment, which involved substantial long-term commitments to investment projects. In this environment, resources companies increased the share of debt in their funding during periods of weakness in operating cash flows. In contrast, investment in the non-resources sector has been much weaker, largely limited to maintaining the asset base rather than expansion. Internal finance has been adequate to meet non-resources companies' net funding needs and the sector's capital structure has remained more stable.

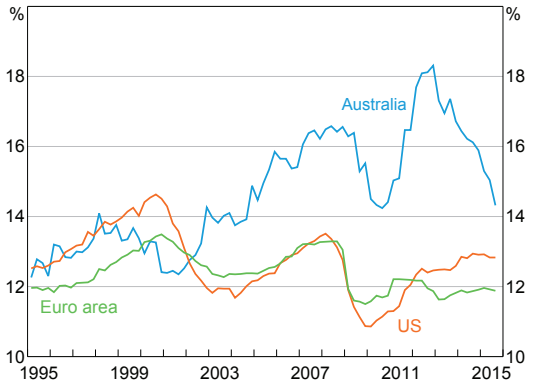
The resource investment boom contributed significantly to the relatively favourable performance of the Australian economy in the post-crisis period. Australian business investment increased considerably, unlike in many other developed economies where investment was more subdued (Graph 1). Consistent with this, leverage of the Australian corporate sector increased modestly after 2010, while leverage continued to decline in many other developed economies (Graph 2).

In aggregate, listed non-financial companies' sources and uses of funds have been relatively stable in the post-crisis period, generally close to 10 per cent of nominal GDP and only slightly below

* The authors completed this work in Domestic Markets Department. An earlier version was presented at the 19th Melbourne Money and Finance Conference 'Current Issues in Australian Financial Markets', 28–29 July 2014 (Fang, Kosev and Wakeling 2014).

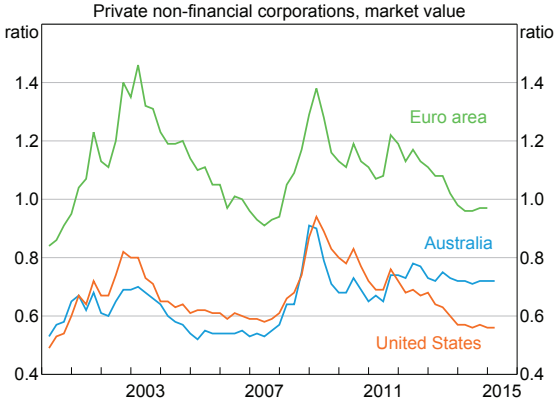
1 See Black, Kirkwood and Shah Idil (2009) for a detailed account of developments in the sources and uses of funds by Australian companies preceding and during the global financial crisis. For a more detailed account of the funding of the resource investment boom in Australia since 2003 see Arsov, Shanahan and Williams (2013).

Graph 1
Business Investment*
Share of nominal GDP



* Fixed gross private investment, excluding residential investment; excludes plants & livestock investment.
Sources: ABS; Eurostat; RBA; Thomson Reuters

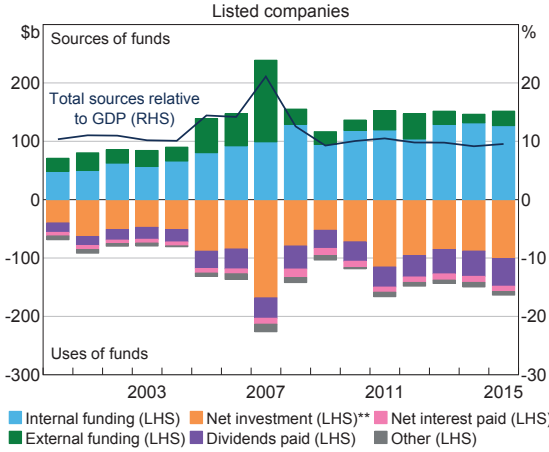
Graph 2
Debt-to-equity Ratios
Private non-financial corporations, market value



Source: OECD

the averages since 2000 (Graph 3).[2] Net investment has continued to be funded mainly through internal sources, while the use of external finance has remained limited.

Graph 3
Total Sources and Uses of Funding*
Listed companies



* Latest observations are annualised June half 2015 data
** Excludes the South32 restructure in June half 2015
Sources: Bloomberg; Morningstar; RBA

Companies' Uses of Funds

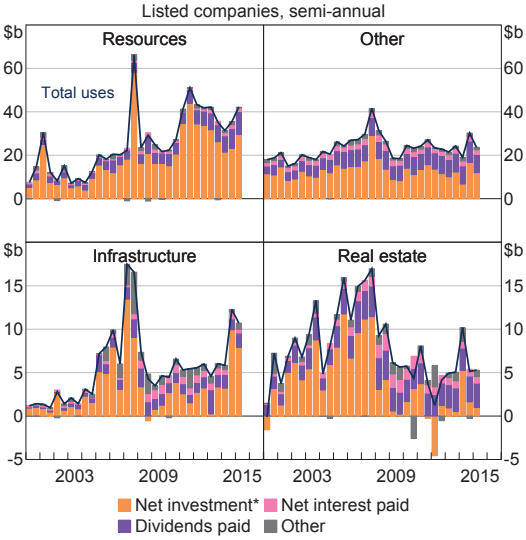
A modest increase in listed companies' uses of funds since the global financial crisis has occurred largely due to higher net investment (Graph 4).[3] The other main trends evident in the uses of funds data over the post-crisis period include lower net investment outside the resources sector, notably in the real estate and 'other' sectors, and an increase in dividends paid.[4] Interest payments remain a modest component of the uses of funds and have decreased in aggregate since the sharp deleveraging that occurred immediately following the crisis. Also, this decrease has been accentuated by the decline in borrowing costs.

2 Sources and uses data are compiled by aggregating the cash flow statements of listed Australian companies. Cash profits are not always the same as accrual-based accounting profits, which can be affected – at times significantly – by non-cash items such as asset revaluations. For more detail and background on the sources and uses of funds, see Black *et al* (2009).

3 This analysis discusses net investment categories in the context of a cash flow statement; net investment is net of asset sales but not depreciation.

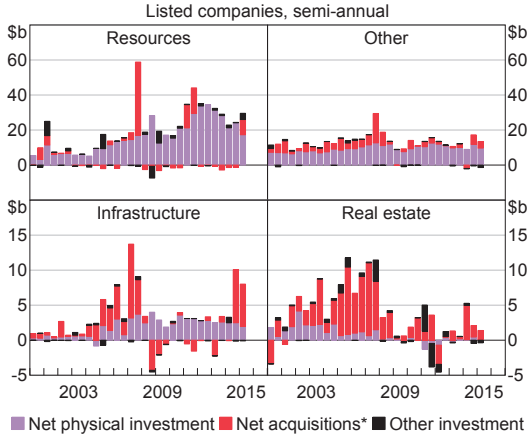
4 The broad sector classifications adopted in this analysis are resources, infrastructure (mainly industrials and utilities), real estate and other, which in aggregate allow for comparison with the Australian Bureau of Statistics' definition of private non-financial corporations.

Graph 4
Uses of Funds by Sector
Listed companies, semi-annual



* Excludes the South32 restructure in June half 2015
Sources: Bloomberg; Morningstar; RBA

Graph 5
Investment by Sector
Listed companies, semi-annual



* Excludes the South32 restructure in June half 2015
Sources: Bloomberg; Morningstar; RBA

Investments

Net investment comprises net physical investment, net acquisitions and other investment.[5] Prior to the global financial crisis, listed companies underwent a period of M&A-driven investment expansion, participating in the global wave of such activity (Graph 5). Much of the M&A activity was undertaken by non-resources companies, which were typically mature firms with fewer organic growth opportunities. M&A by companies within the other sector accounted for a lower share of investment than either the real estate or infrastructure sectors, but the transactions were large and occurred across many industries.[6] Net acquisitions by resources companies typically accounted for a much lower share of net investment, due to the availability of organic growth opportunities. Very large transactions occurred sporadically in the sector, including Rio Tinto's $44 billion acquisition of Alcan in 2007 – the largest by an Australian listed company.

The global financial crisis marked a shift in corporate attitudes towards expansion, owing to the heightened sense of uncertainty and weak economic outlook. This shift ushered in a period of restraint in capital and other expenditures resulting in a protracted period of subdued M&A activity by Australian companies. The most notable activity was a small number of resources-sector transactions over 2010–11.[7] Since mid 2014, there have been some signs of a return of M&A activity, but primarily among resources and infrastructure companies.

Physical expansion by diversified mining companies has been the major source of net investment by listed Australian companies since the crisis. The elevated level of commodity prices spurred mining companies to develop new projects and expand existing sites to upgrade production capacity, particularly for projects involving iron ore. Companies also invested to expand coal

5 In these data, net physical investment includes companies' purchases less sales of assets used in ongoing operations or which maintain or increase productive capacity, including property, plant and equipment and intangible assets (transactions in financial assets are not included). Similarly net acquisitions mainly includes purchases less sales of other companies (in whole, or in part), it does not include asset revaluations.

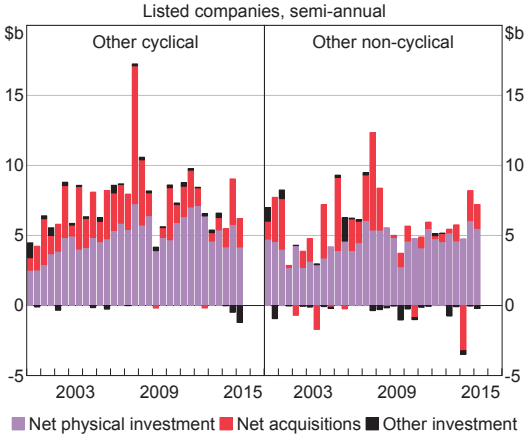
6 A number of notable transactions occurred during this time, including Toll Holdings' $6 billion acquisition of Patrick in 2006, Wesfarmers' $22 billion acquisition of Coles in 2007 and Primary Health Care's $3.5 billion acquisition of Symbion in 2008. The restructuring of the Australian media industry occurred in 2007/08, with the creation of Seven Group Holdings and the spin-off of its media assets, along with the demerger of Publishing and Broadcasting Limited into Crown and Consolidated Media Holdings.

7 These include Newcrest's $10 billion acquisition of Lihir Gold in 2010 and BHP Billiton's $11 billion takeover of Petrohawk Energy in 2011.

production capacity due to robust foreign demand for its use in the manufacturing of steel. Physical investment in large-scale liquefied natural gas (LNG) projects has been substantial, although the true scale of these investments is under-represented by these figures owing to foreign participation in the projects.[8] Over the past three years, however, investment in the resources sector has declined as existing projects moved into the production phase. Uncommitted expenditure has also been deferred in part as lower commodity prices have reduced the attractiveness of many projects. Shareholder pressure to exercise capital expenditure restraint may also have contributed to this trend, particularly as companies recorded substantial write-downs of many assets acquired over recent years.

Other companies (those not categorised within the resources, infrastructure or real estate sectors) have been the main source of net physical investment outside the resources sector since 2008, with much of this investment undertaken by companies with cyclical business activities (Graph 6).[9] This largely reflects net physical investment by resources-related industrials, with the expansion and subsequent contraction of activity in the resources sector driving investment decisions. Other non-cyclical companies remain the most significant source of investment not directly related to the resources sector, largely reflecting physical investment by consumer staples and telecommunications companies to maintain assets.

Graph 6
Other Sector Investment
Listed companies, semi-annual

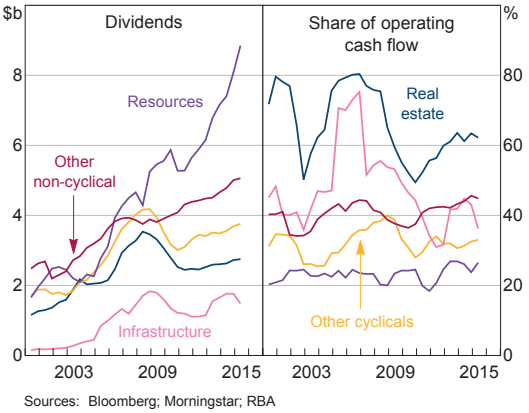


Sources: Bloomberg; Morningstar; RBA

Dividends

Companies have generally increased dividends over recent years, after the reduction in dividend payments immediately following the global financial crisis (Graph 7). Subdued investment by non-resources companies has coincided with an increase in dividend payments relative to total uses of funds, but dividends have generally moved closer to their average proportion of operating cash flows. The resources sector has raised dividends most sharply, despite substantial investment commitments. As a result, dividends have risen in aggregate as a share

Graph 7
Dividends by Sector
Listed companies; semi-annual four-period moving average



Sources: Bloomberg; Morningstar; RBA

8 Foreign-listed companies own large shares in many LNG projects run jointly with Australian companies. Around four-fifths of funding for physical investment has been sourced from offshore, meaning the associated investment outlays of foreign companies are omitted from this analysis.

9 The other cyclical sector includes companies from the industrial, consumer discretionary and information technology Global Industry Classification Standard (GICS) sectors; the other non-cyclical sector includes companies from the consumer staples, health care, telecommunications and utilities GICS sectors. For both categories, other excludes companies already captured within the infrastructure sector.

of operating cash flows (and earnings) but remain well within historical norms.

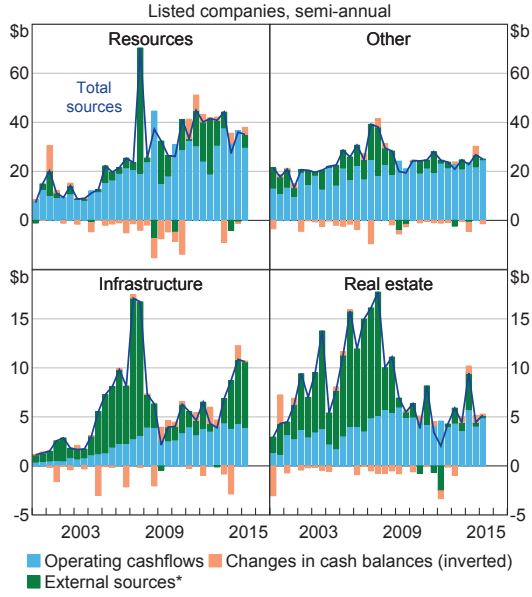
Funding the Listed Corporate Sector

As noted previously, the business activities of Australian listed companies are mostly funded from internal sources, effectively recycling returns on previously invested capital to sustain operations and undertake new investment. Internal funding has accounted for around two-thirds of total funding since 2000, although the pre- and post-crisis periods produced two distinct funding phases. The phase preceding the crisis was characterised by a steady increase in the availability of internal funding, particularly within the resources sector as rising commodity prices drove substantial growth in operating cash flows. Non-resources companies funded much of their acquisition-driven expansion through external sources, given that the transactions were large relative to internal funding.[10]

The post-crisis phase has been characterised by the modest use of external funding across listed companies (Graph 8). This has consisted mostly of resources companies sourcing external finance to meet committed physical investment outlays during periods when lower commodity prices reduced operating cash flows. Meanwhile, non-resources companies had little demand for net external funding. During the past two years, there have been tentative signs of a pick-up in the use of external funding reflecting a recovery in initial public offering (IPO) activity during 2014 and the use of debt to finance acquisitions particularly in the resources and infrastructure sectors.

10 Increased use of external financing in the pre-crisis period is also consistent with literature suggesting firms attempt to time their capital structure decisions to raise equity when market values are high relative to book values (Baker and Wurgler 2002).

Graph 8
Sources of Funds by Sector
Listed companies, semi-annual



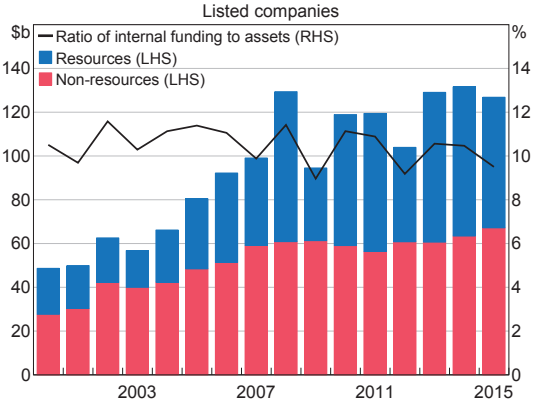
* Excludes South32 equity issued to BHP in relation to its restructure in June half 2015

Sources: Bloomberg; Morningstar; RBA

Internal funding

The ability of companies to fund themselves internally from current period operating cash flows has generally been quite stable at around 10 per cent of companies' total assets (Graph 9). This stability of internal funding has been particularly evident for non-resources

Graph 9
Internal Funding*
Listed companies



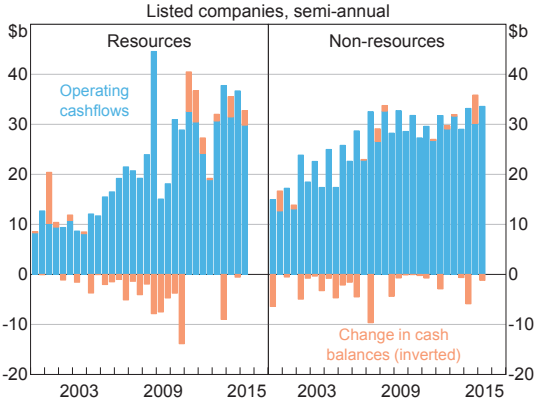
* Latest observations are annualised June half 2015 data

Sources: Morningstar; RBA

companies. At the same time, resources companies have become an increasingly important source of profits in the Australian listed sector over the past decade, growing to account for roughly half of total operating cash flows. This has added to the volatility of aggregate internal funds because resources companies' earnings have significant exposures to movements in commodity prices.

For both the resources and non-resources sectors, current-period operating cash flows comprise the bulk of internal funding (Graph 10). Companies may also use their cash balances as a source of internal funds.

Graph 10
Internal Funds
Listed companies, semi-annual

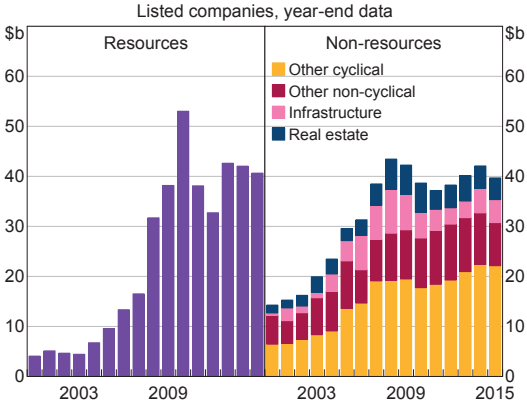


Sources: Morningstar; RBA

The intensification of the global financial crisis in late 2008 and growing concerns around European sovereign debt in 2010 coincided with a pronounced increase in cash balances for resources companies, consistent with decisions to curtail investment expenditure. The recovery in commodity prices in 2011 and the subsequent recovery in net investment was funded in part by a reduction in resources companies' cash balances, although cash holdings relative to assets remained above pre-2008 levels.

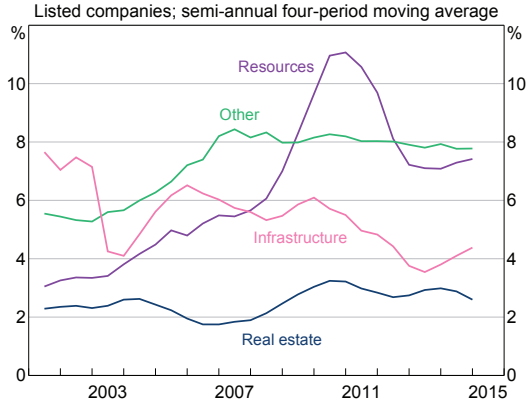
For non-resources companies, there was a smaller increase in cash balances immediately following the crisis and, over more recent years, balances generally declined or remained steady in dollar terms and as a proportion of assets (Graph 11 and Graph 12).

Graph 11
Cash Holdings by Sector*
Listed companies, year-end data



* Latest observations are to end-June 2015
Sources: Bloomberg; Morningstar; RBA

Graph 12
Cash Balances Relative to Assets
Listed companies; semi-annual four-period moving average

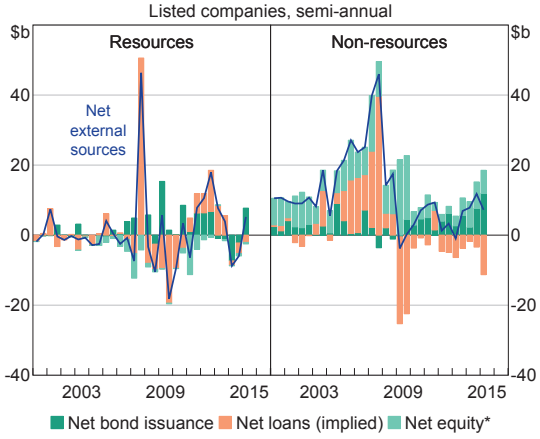


Sources: Morningstar; RBA

External funding

Use of external funding increased considerably during the pre-crisis phase but moderated over the post-crisis period (Graph 13). Debt is typically the preferred source of external finance and was used extensively to fund the wave of M&A activity prior to 2008, causing net debt cash flows reported by listed companies in aggregate to peak at 15 per cent of GDP in 2007. Since the financial crisis, the net external funding needs of listed companies have largely consisted of the debt raised by resources companies to fund committed physical investment, although this has slowed since 2013. Limited net

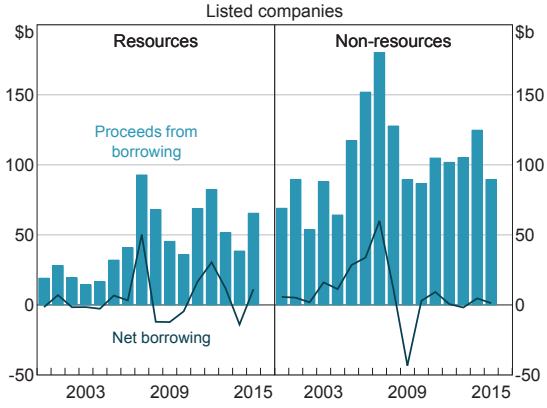
Graph 13
External Funding by Sector
Listed companies, semi-annual



* Excludes South32 shares issued to BHP in relation to its restructure in June half 2015

Sources: Bloomberg; Morningstar; RBA

Graph 14
Debt Proceeds by Sector*
Listed companies



* Latest observations are annualised June half 2015 data

Sources: Bloomberg; Morningstar; RBA

investment by non-resources companies has meant that internal funds have mostly been sufficient to meet expenditure, particularly given the low level of M&A activity between 2008 and 2014. Over the past year, non-resources companies obtained funds from debt markets, while in aggregate it is estimated that bank debt has been reduced.

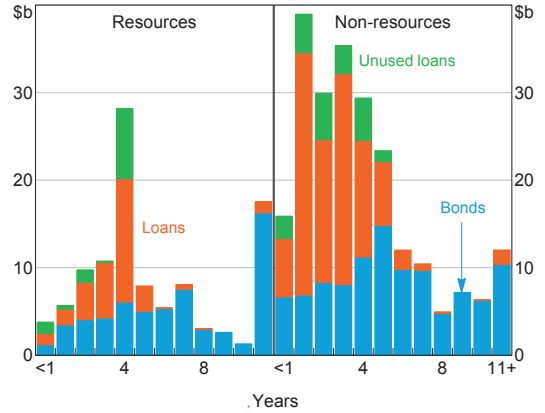
Net equity raisings have generally been modest, abstracting from the surge in issuance that coincided with the peak in equity prices prior to the global financial crisis and the subsequent equity-funded, market-wide deleveraging during 2008–09.[11] The past two years have seen some increase in net equity raisings, with much of this reflecting a return of IPO activity in 2014.

Debt funding

The level of debt of the resources sector is relatively modest compared with that for the non-resources sector. Notwithstanding the stability of net borrowing by non-resources companies, each year they refinance around $100 billion of debt (Graph 14).

Most corporate debt takes the form of loans, which comprise around three-quarters of economy-wide debt finance for non-financial companies, reflecting the dominance of the major Australian banks as suppliers of funding. The available data (as at mid 2015) for the debt structure for ASX 200 companies (which use bonds to a far greater extent than smaller and unlisted companies) suggest that loans tend to be used to complete funding requirements at shorter tenors (Graph 15). This is consistent with a preference of banks to lend for terms of between three and five years.

Graph 15
ASX 200 Companies' Debt Composition*
Face value by residual maturity, as at mid 2015



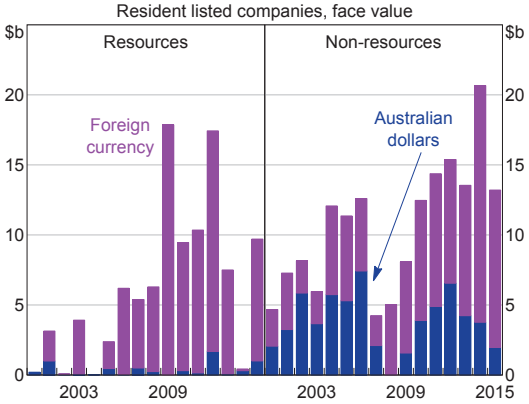
* Debt composition data is not available for all companies from Bloomberg

Sources: Bloomberg; RBA

11 For further discussion of the 2008–09 equity-financed deleveraging see Black *et al* (2009).

Many listed companies also find it attractive to issue bonds. Resources companies, particularly the major diversified mining companies, regularly raise debt through bond issuance due to their large borrowing requirements and relatively high credit ratings (Graph 16). Issuance by resources companies is typically offshore and mostly denominated in US dollars. Offshore issuance can access large markets where longer terms are more common than in the domestic bond market, allowing these companies to better match their funding term with the life cycle of investments in natural resources projects. Foreign-denominated bond issuance also serves as a natural hedge for commodity export revenues, which are typically denominated in US dollars.

Graph 16
Gross Bond Issuance*
Resident listed companies, face value



* Latest observations are to end-June 2015. Issuance by firms with an Australian primary exchange listing and where either the company or its parent is incorporated in Australia. Data are based on issuance recorded by Bloomberg, which may not capture all bond issuance, particularly in the pre-crisis period.

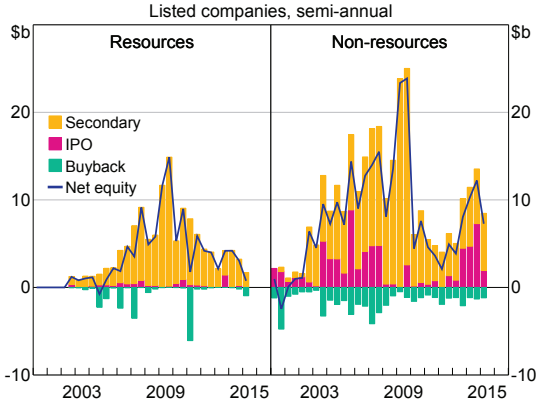
Sources: Bloomberg; RBA

Non-resources companies also access bond markets to refinance their outstanding debt, often using the domestic corporate bond market. The main issuers are large companies with lower earnings volatility, particularly those in the consumer staples, telecommunications and utilities sectors.

Equity funding

Net equity raisings are a modest component of listed companies' external financing mix and activity was very subdued for a number of years after the global financial crisis (Graph 17). The increase in issuance since late 2013 reflects a pick-up in IPOs in the non-resources sector, with 2014 the strongest year for IPO issuance since the Telstra float in 1997. Private equity interests have been involved in many of these IPOs, with owners taking advantage of favourable market conditions and resurgent appetite from institutional investors. Market conditions in the year to date have been less favourable and IPO activity has slowed. The amount of equity raised by the resources sector since the crisis has been modest. Issuance tends to be concentrated among junior exploration companies, which rely almost exclusively on equity financing due to the speculative nature of their activities (Williams 2012).

Graph 17
Equity Capital Raisings
Listed companies, semi-annual

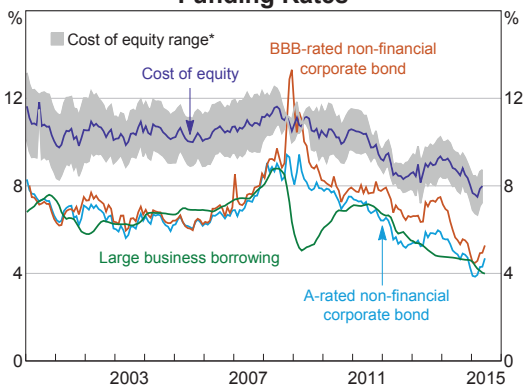


Sources: ASX; RBA

Costs of external finance

Companies' external funding choices are influenced by the relative costs of funding sources (Graph 18). A number of methods are used to approximate the cost of equity because it is not easily observable. However, these approximations generally imply a higher cost of equity than of debt, consistent with the existence of an equity risk premium. This is also

Graph 18
Funding Rates



* Cost of equity range implied from a dividend yield measure and a long-run constant equity risk premium (assumed to be 6 per cent) plus the risk-free rate

Sources: RBA; Thomson Reuters

consistent with a general preference for companies to raise debt before equity.[12] Graph 18 shows a range of estimates based on two simple approximations of the cost of equity, compared with observable costs of debt.[13] In general, the higher cost of equity funding has meant that companies have tended to raise equity sparingly, such as to reduce leverage or where access to debt markets is constrained due to unfavourable market conditions. This was evident in the 2009 equity-financed deleveraging, which occurred against the backdrop of a significant change in the relative costs of debt and equity.

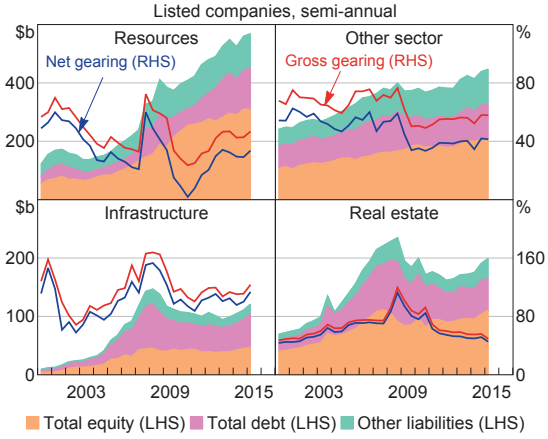
12 This outcome is also consistent with the pecking order theory of capital structure which suggests firms prefer internal funding, followed by debt, and lastly will raise equity if required to finance investment (see Myers 1984, 2001; Myers and Majluf 1984).

13 This analysis approximates an upper bound for the observed cost of equity using the long-run Australian historical equity risk premium of 6 per cent plus the risk-free rate approximated by the 10-year Australian Government bond yield (see Brailsford, Handley and Maheswaran (2012) for further detail on calculation of the equity risk premium). The lower bound for the cost of equity is implied from a simple dividend discount model (Gordon growth model), which approximates the equity risk premium using the dividend yield (for the MSCI Australia index), assuming a constant rate of dividend growth into perpetuity (Damodaran 2013). Many approaches exist for estimating the cost of equity and the measures shown in this analysis are purely for illustrative purposes.

Leverage and Capital Structure

The aggregate capital structure of Australian listed companies has varied considerably over time, reflecting the investment cycle and shifts in the use of the different forms of external funding. Nevertheless, listed companies have historically maintained aggregate gross leverage of around 60 per cent on a book-value basis, with considerable variation between sectors (Graph 19). Resources companies maintain relatively low levels of gearing, reflecting a desire by firms to ensure that they can service debts in the face of volatility in earnings. The use of debt to fund part of the increase in net investment by resources companies from 2010 saw leverage roughly double to around 47 per cent by 2013, which is around the long-run average for the sector. Over the same period, assets within the resources sector have increased by over 40 per cent, reflecting high levels of physical investment.

Graph 19
Corporate Gearing and Balance Sheets*
Listed companies, semi-annual



* The sum of total equity, total debt and other liabilities equals total assets, all items are measured in book-value terms

Sources: Morningstar; RBA

In contrast, modest net investment by non-resources companies has resulted in a period of relative stability in capital structure. Leverage of the other sector has remained around 55 per cent as many companies limited physical investment to levels just sufficient to maintain their asset base. The more highly leveraged companies in the real

estate and infrastructure sectors tended to maintain or reduce leverage in recent years. Infrastructure companies remain geared above 100 per cent of equity, consistent with the defensive characteristics of these firms' assets (including their long-term, tangible asset base and relative stability of expected earnings).

Conclusion

The experiences of the resources and non-resources sectors have produced distinct trends in the corporate financing of Australian companies since the global financial crisis. Resources companies have funded a large increase in net investment primarily through internal sources. Net external funding was generally used when resources companies increased debt to finance committed investment expenditure in the face of lower commodity prices, which reduced the availability of internal funding. The capital structure within the resources sector has changed modestly as a result, raising leverage to around its average level since 2000. Resources companies have also increased their dividend payments substantially. In contrast, net investment by non-resources companies has been mostly confined to sustaining the existing asset base. Internal funds have been sufficient to meet this expenditure and their capital structure has changed little as a result. These companies have also increased dividends, though not beyond historical norms as a proportion of earnings. Overall, leverage for Australian listed companies remains relatively low, internal funding continues to cover the bulk of funding needs and companies generally appear to retain good access to external finance in its various forms.

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Chinese Capital Flows and Capital Account Liberalisation

Eden Hatzvi, Jessica Meredith and William Nixon*

Chinese private capital flows are dominated by foreign direct investment and banking-related flows, with portfolio flows remaining relatively small (as a share of GDP). Of these components, banking-related flows account for the majority of the cyclical variation in total flows and seem to be driven by expected changes in the exchange rate. Both the composition of capital flows and the factors that drive their variation are likely to change as the Chinese authorities gradually open the capital account in line with their stated intention. Given the size of China's economy, the implications of a continued opening of its capital account and a significant increase in capital flows are potentially very large. They include a greater influence of global financial conditions on China (and vice versa), a change in the composition of China's net foreign assets, and a change in the nature of the economic and financial risks facing China.

Introduction

The Chinese authorities have been liberalising China's financial system since the 1980s. A significant aspect of these reforms has been a gradual opening of the capital account (alongside an opening of the current account). The Chinese authorities have stated their intention to continue this process alongside a more flexible exchange rate.

Given the size of China's economy, a more open Chinese capital account could have considerable implications for the global financial system. In particular, there is the potential for significant increases in portfolio investment by Chinese residents abroad and by foreign residents in China. While these flows could provide significant diversification benefits to China and the rest of the world, they could also expose economies to various risks associated with more volatile capital flows. The history of economies that have opened their capital accounts indicates the importance of managing and sequencing these reforms carefully.

This article discusses the progression of China's capital account opening to date, focusing on the different types of private capital flows – direct, portfolio and banking-related investment.[1] The outlook for future reforms is then discussed, along with the implications for China's financial system and global capital flows.

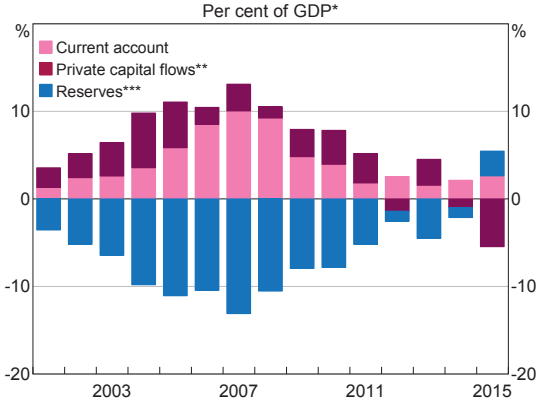
China's Capital Account Opening to Date

China has recorded persistent current account surpluses over the past two decades, with the size of these particularly large in the years following China's accession to the World Trade Organization (WTO) in 2001 (Graph 1). Such current account surpluses need to be matched by a net outflow of capital (that is, Chinese investment abroad). However, in net terms, private capital has tended to flow in to China rather than out. As a result, the public sector has generally been sending capital offshore, matching the sum of the current account surplus and net private

* The authors are from International Department.

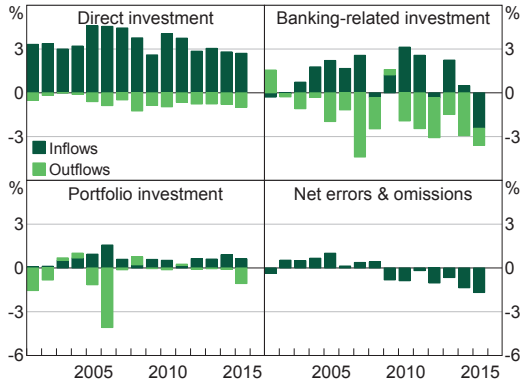
1 This article refers to 'other' investment flows as defined in the balance of payments as banking-related flows.

Graph 1
Balance of Payments
Per cent of GDP*



* Latest observations are year to September 2015
** Includes net errors & omissions
*** Negative numbers indicate net purchases of reserves, which are capital outflows from China
Sources: CEIC Data; RBA

Graph 2
Private Capital Flows
Per cent of GDP*



* Latest observations are year to June 2015
Sources: CEIC Data; RBA

capital inflow. These public sector capital outflows have mainly occurred through the People's Bank of China's (PBC's) accumulation of foreign reserves, which allowed it to maintain its desired level of the renminbi (RMB) against the US dollar. The stock of foreign currency reserves held by the PBC peaked at US$4 trillion in June 2014, compared with less than US$500 billion a decade earlier.

Foreign direct investment (FDI) flows have been the largest contributor to Chinese private capital flows over the past two decades, but banking-related flows have increased over this time and in recent years have accounted for most of the cyclical variation (Graph 2). In contrast, portfolio flows have remained modest.

Direct investment

The persistent inflow of private foreign capital to China over the past 15 years has been in large part due to sizeable FDI inflows, which have averaged 3½ per cent of GDP since 2001.[2] One reason why FDI has been so large has been expectations of high rates of return on investment in China (given its rapid productivity growth). In addition, FDI inflows are less restricted than other forms of capital inflows, particularly in the manufacturing industry. This followed an acceleration of FDI reforms in the early 1990s and China's accession to the WTO in 2001 (Walmsley, Hertel and Ianchovichina 2006). Nevertheless, China's FDI regulations remain somewhat more restrictive than those in other countries (OECD 2014). For example, China still prohibits foreign investment in a number of industries and requires some projects to have majority shareholding by Chinese parties.[3]

Chinese outward direct investment has been considerably smaller than FDI in China, amounting on average to only ½ per cent of GDP over the past

2 Intra-company loans are recorded as direct investment in the balance of payments. Such inflows are relatively large for China and may be more akin to portfolio investment than FDI (Avdjiev, Chui and Shin 2014).

3 For more details see the 'restricted' and 'prohibited' industries in NDRC (2015).

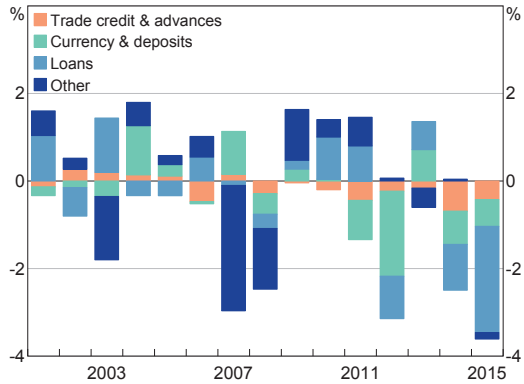
15 years. However, it has been increasing more recently, largely reflecting outward investment by state-owned enterprises (Wang, Qi and Zhang 2015). Data from China's National Bureau of Statistics (NBS) suggest that around two-thirds of this outward investment has been directed to economies in the Asia region, particularly Hong Kong, Singapore and Indonesia, although Australia and the United States have also been large recipients (NBS 2014). By industry, Chinese direct investment tends to be in resources, finance and services such as wholesale & retail trade. For example, 65 per cent of China's outwards direct investment in Australia is directed to the resources sector (ABS 2015).

Banking-related flows

Banking-related flows – mostly loans, currency & deposits and trade credit & advances – have become an increasingly important component of the capital account over recent years, reflecting both an expansion in the absolute size of such flows (in and out) and their greater volatility compared with other forms of capital flows. Indeed, banking-related flows have been the primary channel through which around US$660 billion of private capital has flowed out of China (in net terms) since early 2014.[4] The increasing importance of such flows in to and out of China has been in contrast to global trends since the global financial crisis (see James, McLoughlin and Rankin 2014), and partly reflects an easing of restrictions on Chinese enterprises' use of foreign currency deposits since 2007. Prior to this, firms were required to sell the vast majority of foreign currency receipts from trade to their banks.

Loans have been the largest component of banking-related capital flows over recent years (Graph 3). Banks located in China have increasingly lent money to foreign borrowers, including to Australian entities, though lending by banks located outside of mainland China to borrowers in mainland China has tended to be much larger. Data from the Bank for International Settlements (BIS) suggest that around half of claims

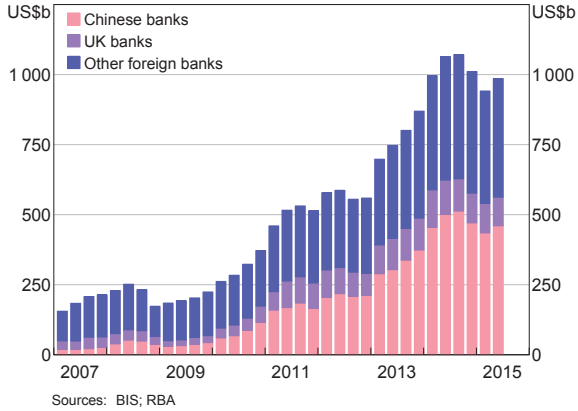
Graph 3
Net Banking-related Flows
Per cent of GDP*



* Latest observations are year to June 2015
Sources: CEIC Data; RBA

on China have come from banks that are located in Hong Kong. However, data based on the ultimate nationality of banks show that almost all of this is attributable to foreign-owned banks operating in Hong Kong. In particular, foreign subsidiaries of mainland China-owned banks account for a large share of the cross-border lending to China (Graph 4). Indeed, most of the cross-border lending by such banks' Hong Kong subsidiaries is to mainland China, mainly to banks (often their parent entity), and is typically denominated in currencies other than US or Hong Kong dollars (most likely RMB). It is likely that much of this activity reflects lending of RMB deposits

Graph 4
Cross-border Bank Claims on China
Stock outstanding by parent domicile of lender



Sources: BIS; RBA

4 See RBA (2015) for further details.

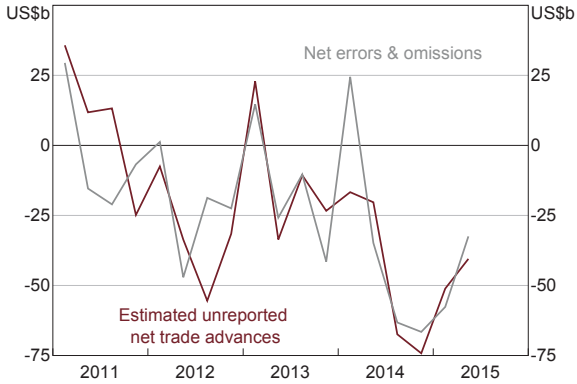
that have accumulated offshore back to mainland China, where returns have typically been higher.[5]

Currency & deposits have also been a large component of banking-related flows. The primary way in which currency & deposits flow out of China appears to be when Chinese entities acquire foreign currency deposits offshore. This is most easily done by Chinese firms that export retaining their revenue in foreign currency rather than converting this revenue into RMB. Since 2011, the authorities have also allowed Chinese firms to settle their trade using RMB, which has led to growth in offshore RMB deposits, which are counted as a capital inflow in the balance of payments.[6] Other transfers of currency across borders remain restricted, most notably as a result of a US$50 000 limit on the amount that Chinese residents can convert into foreign currency each year (without an underlying purpose such as trade).

A third component of banking-related flows is trade credit & advances, such as when foreign firms extend trade credit to Chinese firms (or vice versa). Trade advances can also be recorded in the balance of payments (without banking sector involvement) when a firm pays for goods and services either before or after the invoice date, which is typically when trade is recorded in the current account. For example, if a Chinese firm pays for its imports before the imports are recorded, the associated flow of money is counted as a private capital outflow (that is, the firm has a claim on its supplier).

While trade credit & advances have been an important component of China's banking-related flows, there is evidence to suggest that a majority of advances are recorded in net errors & omissions (the difference between the capital and current accounts in the balance of payments). Indeed, evidence suggests that unrecorded trade credit & advances are the main driver of net errors & omissions, not – as is often assumed – illicit capital flows arising from (among other things) 'fake trade' and the underground movement of capital out of mainland China.[7] Evidence that unrecorded trade credit & advances are driving net errors & omissions can be gained by comparing two sources of trade data from the State Administration of Foreign Exchange (SAFE), one of which records merchandise trade as it is invoiced (the balance of payments convention) and another that records trade as it is settled. The difference between these two series – which should correspond to net trade advances – is much larger than the trade credit & advances component in the balance of payments. In turn, the excess of this estimate of trade credit & advances over the balance of payments equivalent closely matches China's net errors & omissions (Graph 5).

Graph 5
Net Errors & Omissions



Sources: CEIC Data; RBA

5 UK-owned banks are relatively important among ultimately foreign-owned banks that lend to China. This likely reflects the operations of banks that have a presence in both Hong Kong and mainland China and may also relate to returning offshore RMB deposits to the mainland.

6 For more details on the offshore RMB market, see Hatzvi, Nixon and Wright (2014).

7 It has been widely reported that some Chinese firms have misreported their trade receipts over recent years to circumvent capital controls (see Day (2015) for more information). For example, a Chinese firm could overstate the value of its exports to invest offshore funds in higher-yielding RMB assets (for example, to fund portfolio inflows). Such transactions are therefore misreported capital account inflows and thus do not affect the difference between the net positions of the current account and capital account. In principle, this means they would not be recorded in net errors & omissions (unless there is an unrecorded difference between settlement and invoicing).

Portfolio flows

To date, portfolio flows have been a much smaller component of China's capital account than direct investment and banking-related flows, reflecting various controls on both debt and equity flows. In particular, portfolio investors moving money both in to and out of China must generally use various schemes that are all subject to quotas.[8]

The oldest of these schemes began in 2003 and enables authorised foreign institutions to invest in China's onshore financial markets subject to an allocated quota (known as the Qualified Foreign Institutional Investor (QFII) program). This program was broadened in 2011 when authorities launched a related scheme that allows authorised foreign institutions to invest in mainland China using RMB obtained in the offshore market. Quotas for this broadened program (known as the RMB Qualified Foreign Institutional Investor (RQFII) program) are set as country-specific limits and the Chinese authorities have authorised a total of around CNY1.1 trillion (US$175 billion) to be assigned to numerous countries (including US$8 billion for Australia), although the take-up in jurisdictions outside of Hong Kong has been relatively low so far (as discussed below).[9]

The outward portfolio investment counterpart to these inward investment programs is the Qualified Domestic Institutional Investor (QDII) program, which began in late 2004. The program enables authorised onshore asset managers to offer foreign equities and fixed income products to mainland investors using foreign currency, although heavy restrictions on the composition of investments remain in place.[10]

More recently, Chinese authorities have introduced two-way portfolio investment channels. One of these is the Shanghai-Hong Kong Stock Connect, which was launched in November 2014 and enables certain Chinese residents to invest in approved stocks listed on the Hong Kong Stock Exchange ('southbound' trading) and foreign investors to trade in approved equities listed on the Shanghai Stock Exchange ('northbound' trading). The scheme is subject to quotas on both total and daily usage, but these are granted on an aggregate basis such that individual investors do not need approval from the authorities to participate. In July 2015, the authorities also announced the Mutual Recognition of Funds (MRF) agreement between mainland China and Hong Kong, which allows investment funds domiciled in Hong Kong to be sold to retail investors in mainland China (once registered in the mainland) and vice versa. The MRF is the first program enabling offshore funds to be directly sold to Chinese investors.[11]

Drivers of Chinese capital flows

Given that direct investment flows are relatively liberalised, such flows appear to be driven by similar factors to those that drive these flows worldwide; namely, investors' assessments of the returns on investment in various economies. In contrast, the highly restricted nature of portfolio flows means that such flows are more likely driven by changes in quotas and the regulations of various programs (see below).

For banking-related flows, the primary driver seems to be firms' management of their foreign currency receipts and payments. This can be seen from the difference between firms' net sales of foreign currency to banks and the merchandise trade balance; this should measure the extent to which firms choose to convert their net foreign currency revenue into RMB and accounts for a very large proportion of net banking flows (Graph 6). For example, the recent net private capital outflow can be linked to firms' choice to hold on to their foreign currency receipts and repay foreign currency loans. Trade credit & advances are another method available to Chinese firms wanting to manage their

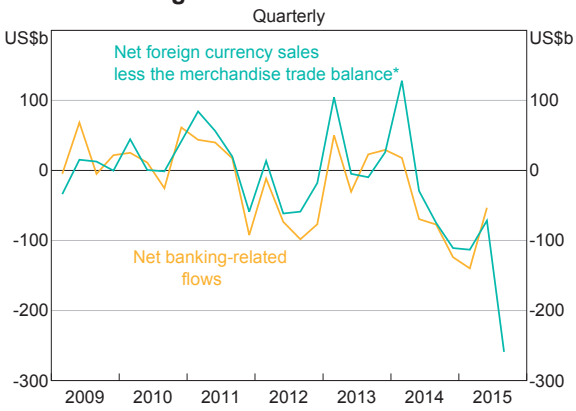
8 See Hatzvi *et al* (2014) for more details on many of the schemes discussed below.

9 The key advantage of the RQFII scheme over the QFII scheme is the greater flexibility it gives over investment decisions and repatriation.

10 The investment scope varies across approved QDII entities.

11 There are a number of criteria that funds must meet to be able to participate (Securities and Futures Commission 2015).

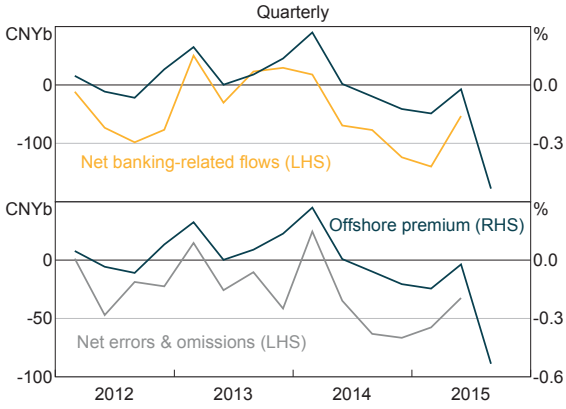
Graph 6
Banking-related Investment Flows



* Only includes foreign currency sales and purchases for merchandise transactions

Sources: CEIC Data; RBA

Graph 7
Capital Flows and RMB Expectations



* Premium of offshore RMB/USD exchange rate over onshore rate

Sources: Bloomberg; CEIC Data; RBA

export receipts and import payments (although these seem to mostly be recorded in the category of net errors & omissions).

For banking-related flows and net errors & omissions, the underlying driver of decisions by firms seems to be expectations for a change in the value of the RMB exchange rate against the US dollar. This can be seen from the correlation between both banking-related flows and net errors & omissions with the offshore RMB premium, which measures the difference in the value of RMB against the US dollar in the offshore market (mostly Hong Kong) and the onshore market, and tends to be positive when firms expect the RMB to appreciate (Graph 7). This relationship could arise because firms want to hedge against adverse movements in the exchange rate (by matching a US dollar revenue stream or cost with a US dollar loan or deposit, respectively, or by paying for goods in advance at the prevailing exchange rate).

The correlation of the offshore premium with banking-related flows and net errors & omissions suggests that exporters and importers are actively managing their balance sheets amid expected fluctuations in the RMB's exchange rate. For example, when the RMB has been expected to depreciate against the US dollar (that is, the offshore RMB premium has been negative), firms have tended to hold onto their foreign currency receipts rather than sell them to their banks, repay foreign currency loans and prepay for imports. This process was particularly pronounced following the August announcement of a change to the way China's central bank sets the fixing rate for the RMB against the US dollar, which led to an initial depreciation of the RMB and heightened expectations of further depreciation.[12]

Further Capital Account Liberalisation

Continued capital account liberalisation in China is likely to involve reforms within all the main components of the capital account. Chinese authorities have indicated that they will continue to gradually ease direct investment restrictions over time and recent reforms in China's free trade zones (FTZs) provide a preview of how such liberalisation may occur.[13] In particular, direct investment in these zones is permitted unless the investment is on a 'negative list' and the Chinese authorities have indicated they will progressively roll out this model to other regions as a trial, before implementing it nationwide in 2018 (State Council 2015). The Shanghai FTZ also provides an indication of how the

12 See RBA (2015) for further details.

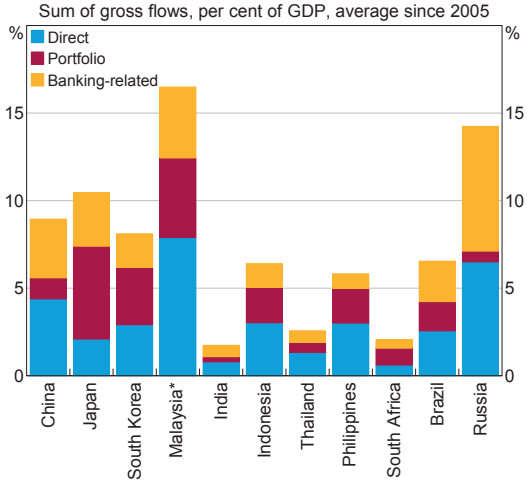
13 FTZs currently exist in Shanghai, Tianjin, Guangdong and Fujian.

restrictions on banking-related flows may be relaxed, with the authorities announcing their intention to increase the US$50 000 limit on the amount that Chinese residents in the Zone can convert into foreign currency.

There seems to be greater scope for future reforms to focus on further opening up portfolio investment, which is the most restricted component of the capital account. These restrictions result in China's gross portfolio flows being much smaller (relative to GDP) than those of many other developing economies (and lower still than advanced economies), while direct investment and banking-related flows have been of a similar magnitude (Graph 8). In total, the various portfolio investment schemes allow for only around US$345 billion (3.2 per cent of GDP) and US$175 billion (1.6 per cent of GDP) to be invested in to and out of China, respectively.[14]

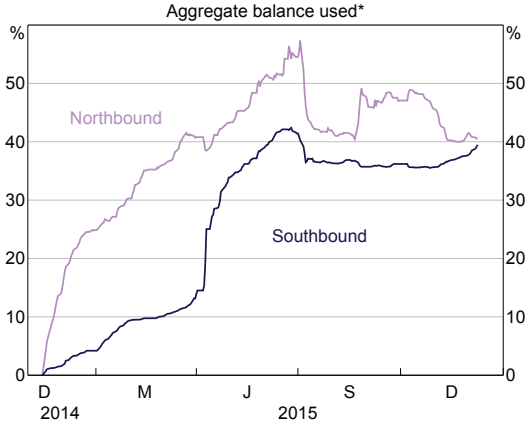
In practice, foreign and domestic residents do not fully use the quotas of the different schemes. For example, only around half of the overall quota under the RQFII program has been allocated to date, and usage of both the northbound and southbound quotas under the Stock Connect program has typically been lower (Graph 9). As a result, foreigners held only around US$200 billion (1.9 per cent of GDP) of domestic portfolio RMB-denominated assets at September 2015. This limited usage is likely to reflect a number of structural factors, such as unfamiliarity with the Chinese legal system, the application process for some schemes and repatriation restrictions.[15] Indeed such factors were cited by MSCI in its decision to not include China in its emerging markets index earlier this year.[16] In addition, the perception that China's financial markets are still developing may affect quota usage. Cyclical factors are also likely to have contributed to the relatively low quota usage of late, given the recent slowing in Chinese economic growth and volatility in the equity market.

Graph 8
Capital Flows To and From Select Economies
Sum of gross flows, per cent of GDP, average since 2005



* Banking-related flows are an RBA estimate based on BIS data
Sources: BIS; CEIC Data; IMF; RBA

Graph 9
Shanghai-Hong Kong Stock Connect
Aggregate balance used*



* Calculated on a 'net buy' basis after adjustments
Source: Bloomberg

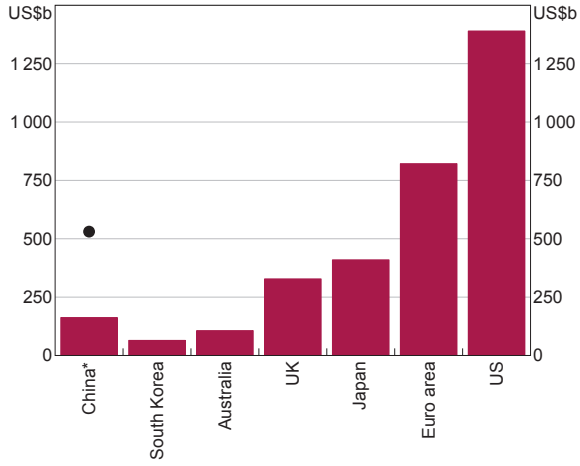
14 Central banks, sovereign wealth funds and supranational institutions have recently been given more open access to China's debt markets.

15 Applications for the RQFII and QFII programs can take up to six months. The MRF reportedly takes around 20 days while there is no approval required to participate in the Stock Connect. The MRF is only available to Hong Kong-domiciled funds and the (daily and aggregate) quotas on Stock Connect could be problematic for funds that rebalance their portfolios.

16 See MSCI (2015) for more information.

It appears that the Chinese authorities are likely to continue using different schemes to gradually open up portfolio flows, rather than immediately offering direct access to its financial markets. For example, the authorities have been developing an extension to the QDII program (known as QDII2) that will reportedly allow individual investors with at least CNY1 million in financial assets to directly purchase a broad range of overseas financial assets (up to 50 per cent of their net assets' worth). The government recently announced that it is considering launching a QDII2 pilot in the Shanghai FTZ. Other potential reforms include giving firms in the Shanghai FTZ greater access to domestic financial markets and a supplementary Stock Connect scheme between Shenzhen and Hong Kong.

Graph 10
Sum of Gross Portfolio Flows
Year to June 2015



* Dot represents value if portfolio flows were 5 per cent of GDP
Sources: CEIC Data; IMF; RBA

Implications of further liberalisation

As the Chinese authorities continue to gradually open the capital account, there could be a considerable increase in global portfolio flows. The size of these flows is difficult to predict but as one indication, China's gross portfolio flows would have been around US$530 billion in the year to June 2015 if they were equivalent to 5 per cent of GDP, which would be consistent with average flows in South Korea and Malaysia. This would have accounted for around 20 per cent of international portfolio flows in the year to June 2015 (rather than the 7 per cent that actually occurred), which would have made it the third largest economy in terms of portfolio capital flows, behind the United States and the euro area (Graph 10). It is unclear whether the expected increase in gross flows will be driven more by capital inflows or outflows, although some research has predicted that there will be a greater increase in flows out of China than in, given the greater incentive for Chinese investors to diversify their assets (Bayoumi and Ohnsorge 2013; He *et al* 2012; Hooley 2013). The destination of these possible portfolio outflows are also uncertain, although some research indicates that portfolio equity investment tends to flow towards major trading partners (Lane and Milesi-Ferretti 2008).

There are a number of implications that would arise from such a sizeable expansion of Chinese portfolio flows.

One implication is that a more open capital account will probably require China to allow its exchange rate to be more flexible to permit monetary policy independence. Indeed, the Chinese authorities have indicated that they aim to make the RMB more flexible over time and the recent changes to the fixing rate between the RMB and the US dollar are consistent with this aim. Even with a floating exchange rate, it may be that an open capital account results in domestic monetary conditions becoming more sensitive to global monetary conditions (Rey 2013). If true, this would imply that Chinese interest rates and financial markets will become more correlated with those of other economies as the capital account is opened.

Given that China is a large economy itself, the converse may also become true: other economies' financial conditions would become more sensitive to China's monetary policy and financial shocks. This is most likely to occur as Chinese banks expand or contract their foreign lending in response to domestic shocks, but could also happen via

fluctuations in portfolio flows from China as expected relative returns on securities change. South Korea and Malaysia are China's largest trade partners in Asia (other than Japan, Hong Kong and Taiwan) and portfolio inflows to these economies would approximately double if China's gross portfolio flows rose to 5 per cent of GDP and flows were directed in line with trade shares.

A second implication is that the composition of China's net foreign assets may change. Currently, official reserve assets comprise around three-fifths of China's foreign assets, reflecting many years of foreign reserve accumulation in order to maintain the authorities' desired exchange rate. A more flexible exchange rate implies that the importance of foreign exchange reserves in China's total foreign assets is likely to decline over time as the extent of intervention diminishes and private capital flows become more important in matching China's net current account position. That is, there would be a substantial shift in the share of ownership of China's foreign assets from the public sector to the private sector. As a result, there is also likely to be a significant shift in the nature of capital flows. This could have a large effect on global financial markets, depending on the difference in portfolio allocation between the public and private sectors.

A more open capital account could also increase financial stability risks in China, which would have global implications given the size of China's economy. Previous academic research on capital account liberalisation suggests that economies should consider liberalising domestic financial markets and develop risk management frameworks before opening up to capital flows (see Ballantyne *et al* (2014) and Eichengreen, Walsh and Weir (2014) for further discussion). This helps to ensure that domestic interest rates more accurately reflect the relative risk of borrowers, allowing domestic and foreign institutions to properly invest and intermediate additional flows. A number of economies that opened their capital account before risk management practices were appropriately developed subsequently experienced adverse outcomes – including Australia in the 1980s and many Asian economies in the 1990s. In both cases, the opening of the capital account was followed by banking crises that were precipitated in large part by the newly opened banking sectors of these economies misallocating capital inflows (with unhedged borrowing in foreign currency also a feature). It was only after the risks associated with these practices were realised that financial institutions and regulators developed more appropriate risk-management tools.

These challenges suggest there is merit to the gradual approach being undertaken by the Chinese authorities, which may make it more likely that China realises the benefits of a more open capital account without the associated costs. In addition to those discussed above, these benefits include greater financial integration, a more efficient use of capital and increased diversification of its assets. A more open Chinese capital account also raises opportunities for other economies, such as greater trade in financial services and access to one of the largest markets in the world.

Conclusion

The composition of Chinese capital flows is different to that in many other economies, mostly reflecting restrictions on portfolio flows. The Chinese authorities intend to continue gradually opening up China's capital account. This process is likely to encompass all of its components, although the greatest scope for liberalisation appears to be for portfolio flows. While this liberalisation could take some time, a cautious approach may be warranted given the experience of other economies that have liberalised their capital accounts. However, as the process of liberalisation occurs, there are likely to be sizeable changes in capital flows and stocks, particularly between the public and private sectors, which would have significant effects on global markets.

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US Dollar Debt of Emerging Market Firms

Sasha Kofanova, Aaron Walker and Eden Hatzvi*

US dollar-denominated borrowings by emerging market (EM) corporations have increased rapidly in recent years, raising concerns about possible currency mismatch risk. This article uses firm-level data from the top 100 EM corporate bond issuers and Bank for International Settlements (BIS) data on cross-border bank lending at the economy level to gauge such risk. These data indicate that around two-thirds of the largest issuers of US dollar-denominated corporate bonds are at least in part naturally hedged (based on company-specific information), and a significant share of the remaining borrowers are state-owned enterprises. The largest recipients of foreign currency bank loans by country also appear to derive significant US dollar export revenues. This suggests that most EM corporations that have borrowed in US dollars are well placed to weather an appreciation of the US dollar, particularly given the possibility that some have hedged their exposures via financial markets. However, Chinese property developers may be an exception and some EM resource companies may face difficulties as a result of the current low global commodity prices. Corporations will also face higher financing costs on their US dollar-denominated debt as the US Federal Reserve moves to increase its policy rate.

Introduction

EM corporations' US dollar-denominated external debt has risen substantially over the past decade, from US$0.8 trillion at the end of 2004 to US$3.1 trillion in mid 2015 (Graph 1).[1] An increasing share of this US dollar-denominated debt has been in the form of bonds rather than foreign bank loans, with bonds now accounting for 40 per cent of the outstanding debt compared with 25 per cent a decade earlier. US dollar credit is also sometimes extended by local banks, although this typically comprises a small proportion of their total lending; due to data limitations, the remainder of this article abstracts from such lending.[2]

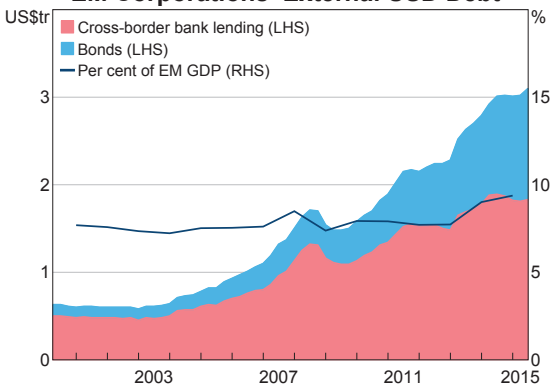
Much of the increase in US dollar debt of EM corporations can be explained by economic growth, with such debt as a share of GDP increasing only modestly over the past decade. It has also occurred alongside even stronger growth in local currency debt such that overall leverage has risen notably for many EM corporations since 2010. This increase in debt, both US dollar- and local currency-denominated, and the strong association of rising leverage and foreign currency risks with past financial crises, has prompted a large body of research into the drivers of such borrowings. According to the IMF (2015), the increase in total leverage cannot be adequately explained by firm- or country-specific factors, but instead largely reflects the increased

* The authors are from International Department. The authors would like to thank Murphy Lai and Anngalee Toth for their assistance with much of the data collection.

1 We consider all foreign currency-denominated bonds to be 'external', in line with the BIS practice of treating the currency of issue as an indicator of whether bonds are external or internal. We thus capture any foreign currency-denominated bonds issued domestically. The subset of EMs follows the grouping of emerging markets used in Chapter 3 of the International Monetary Fund's (IMF) recent *Global Financial Stability Review*. Of note, this includes South Korea, which the IMF normally classifies as a developed economy.

2 The share of domestic credit that is in foreign currency (usually US dollars) is typically no more than 10 per cent, though it is higher in a number of eastern European countries and in Indonesia (see Figure 1.9 in IMF (2015)).

Graph 1
EM Corporations' External USD Debt*



* Includes financials and government-owned corporations
Sources: BIS; Dealogic; IMF

influence of global factors such as low interest rates and market volatility. Similarly, Feyen *et al* (2015) find that EM firms are more likely to obtain US dollar-denominated funding when US capital markets are accommodative. Bruno and Shin (2015) also show that firms are more likely to borrow US dollars when their cash holdings are already high and the differential between local interest rates and those in the United States is wide, implying an important role for carry trade motivations associated with corporations investing their US dollar borrowings in local currency deposits or portfolio assets.

What is not clear from the literature is the extent to which US dollar borrowing gives rise to exchange rate risk in addition to general concerns about increased leverage. This is of particular interest given the recent appreciation of the US dollar and the expectation that the US policy rate will increase. If foreign currency borrowings are not hedged by foreign currency assets, revenue or derivatives, it would mean that leverage statistics understate the risks involved. Notwithstanding the importance of understanding corporate hedging practices, data on this topic are generally unavailable.

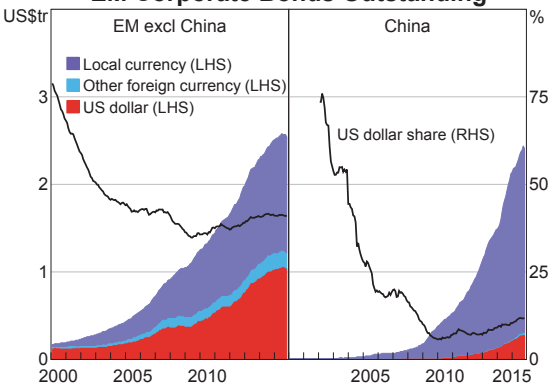
This article first describes recent developments in EM US dollar-denominated corporate bond issuance. It then looks more closely at foreign currency hedging by focusing on the top 100 EM issuers of US dollar corporate bonds (by total gross issuance) since the beginning of 2012. We use information in these companies' annual reports to provide a gauge of the extent to which US dollar exposures may be at least partly naturally matched with US dollar assets or revenues. (These reports do not generally provide adequate information to assess the extent of financial hedging that may further reduce the exchange rate exposure of these firms.) We also supplement this analysis with information on US dollar cross-border bank lending. However, since firm-level data on bank loans are unavailable, we instead compare the total amount of US dollar cross-border bank loans to each economy's total export revenue.

US Dollar-denominated Corporate Bonds

The stock of US dollar-denominated EM corporate bonds has more than tripled since early 2009 and currently stands at US$1.3 trillion, 2½ times the size of these economies' US dollar-denominated sovereign bonds. US dollar-denominated bonds comprise around one-quarter of all EM bonds outstanding and 90 per cent of EM corporations' foreign currency-denominated bond funding. The increase in US dollar-denominated corporate bond issuance has occurred alongside similarly strong growth in the local currency-denominated corporate bond market (particularly for Chinese corporations), such that the share of US dollar-denominated bonds in total EM corporate bonds outstanding has not changed significantly over the past decade (Graph 2).

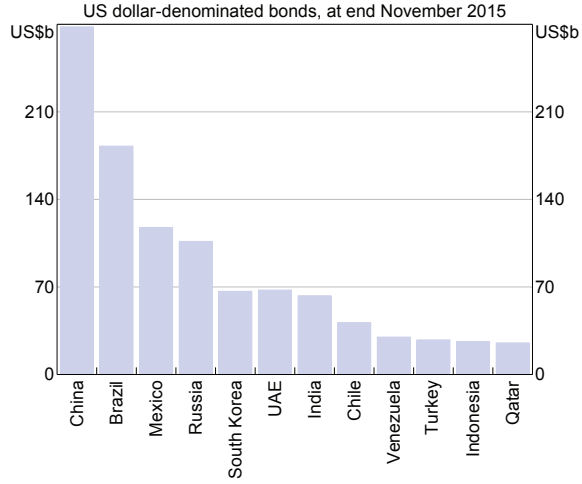
Chinese corporations have accounted for 30 per cent of the US dollar-denominated bonds issued by EMs since 2012, while companies from Brazil, Mexico and Russia make up a further 25 per cent of such issuance. Chinese firms now account for 20 per cent of all outstanding US dollar-denominated bonds (at US$275 billion), up from 8 per cent at the end of 2011 (Graph 3). More broadly, the top 12 EM nations represent over four-fifths of all EM US dollar-denominated bonds outstanding.

Graph 2
EM Corporate Bonds Outstanding



Sources: Dealogic; RBA

Graph 3
EM Corporate Bonds Outstanding
US dollar-denominated bonds, at end November 2015



Sources: Dealogic; RBA

By industry, finance and resource (oil & gas and mining & metals) companies are by far the largest issuers, accounting for 60 per cent of all US dollar-denominated EM corporate bonds issued since 2012 (Table 1). Real estate & construction firms are the next largest borrowers, accounting for around 10 per cent of total EM issuance. However, such firms are geographically concentrated: around two-thirds of such issuance has been by Chinese firms, with companies in Brazil and Mexico accounting for much of the remainder. Beyond this, technology and utility

Table 1: EM US Dollar-denominated Gross Corporate Bond Issuance
Since 1 January 2012, US$ billion

	Finance	Oil & gas	Real estate & construction	Technology	Utility	Mining & metals	Transport	Food & beverage	Other	Total
China	67	47	68	23	16	13	9	6	16	**265**
Brazil	28	34	7	2	0	8	1	14	8	**102**
Mexico	2	29	12	7	4	5	0	7	7	**73**
Russia	33	17	0	1	0	13	3	0	2	**69**
UAE	28	5	5	1	2	0	6	0	2	**50**
South Korea	25	6	1	3	11	1	1	0	3	**50**
India	18	8	0	5	2	5	1	0	5	**44**
Chile	6	1	1	2	2	7	3	1	7	**29**
Turkey	21	1	0	1	0	0	1	1	2	**27**
Indonesia	2	7	2	1	4	0	3	0	1	**20**
Colombia	5	11	0	0	2	0	1	0	0	**18**
Malaysia	6	5	1	1	0	0	0	0	3	**15**
Other	56	35	5	17	18	6	8	4	15	**161**
Total	**299**	**206**	**101**	**63**	**59**	**56**	**36**	**32**	**70**	**923**
Total excl China	**232**	**159**	**33**	**40**	**43**	**40**	**27**	**26**	**55**	**659**

Sources: Dealogic; RBA

companies are the next largest issuers of US dollar-denominated bonds.

Natural hedging among the top 100 issuers

The extent to which firms' US dollar exposures may be naturally matched with US dollar revenues can be gauged from their annual reports. To make the sample manageable, we examine the reports of only the top 100 issuers. These companies represent just over half of total US dollar-denominated EM corporate bond issuance since 2012 and are broadly representative of the overall US dollar EM corporate bond market at the economy level. However, at the industry level, this sample is disproportionately biased towards oil & gas companies, at the expense of real estate & construction, transport and miscellaneous industries (Table 2).

To assess whether such firms have US dollar revenues or assets, we use the information from their financial statements to determine the geographical nature of their business, the reporting currency used and/or the usual currency in which their products are traded. However, this classification is not always clear and we do not attempt to estimate the size of foreign currency assets or revenue (other than requiring them to be material). Some judgement is also involved; for example, firms may borrow in foreign currency to fund an overseas expansion that has not occurred yet (classified here as creating a natural hedge). Judgement is also required regarding debt issued by offshore affiliates (classified as belonging to the parent company)[3] and where related companies each issue debt (in which case it is consolidated in our analysis).

Over two-thirds of the top 100 issuers of US dollar-denominated bonds (by both number and value) appear to be able to at least partially hedge their foreign exchange risk by earning US dollar revenues (Graph 4). This share is likely to be a little lower across all EM issuers, due to the bias in the sample towards resource companies. Stratifying the results for the top 100 companies by industry composition of all issuers implies that 60 per cent earn US dollar revenues.

Almost all resource companies in our sample derive most of their revenue in US dollars. As a result, these companies' risk exposure has likely been lowered by their choice to denominate debt in US dollars since it ensures that the foreign currency shares of their revenues and costs are more closely matched. Nonetheless, the decision to increase borrowing – in any currency – still increases such companies' overall riskiness. This has been prominent in the current environment of lower oil and other commodity prices.

The share of large issuers that are naturally hedged is more mixed in other industries. About two-thirds of the finance companies that have issued such bonds are at least partly naturally hedged, with a number

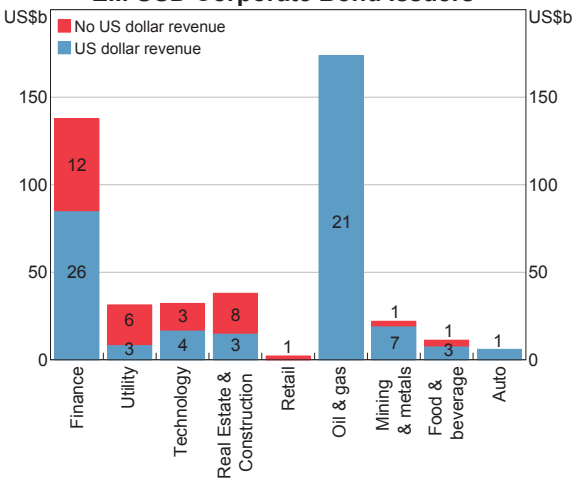
Table 2: Industry Composition of EM US Dollar-denominated Corporate Bond Issuance
Since 1 January 2012, per cent

	Finance	Oil & gas	Real estate & construction	Technology	Utility	Mining & metals	Transport	Food & beverage	Other
Full sample	32	22	11	7	6	6	4	3	8
Top 100 issuers	31	38	8	7	7	5	0	2	2

Sources: Dealogic; RBA

3 Avdjiev, Chui and Shin (2014) find that nearly half of EM non-bank corporate debt was issued by offshore affiliates, which are increasingly acting as intermediaries in debt issuance for their parent companies.

Graph 4
EM USD Corporate Bond Issuers*



* The top 100 US dollar-denominated corporate bond issuers since 1 January 2012; numbers represent the number of companies

Sources: Company websites and annual reports; Dealogic; RBA

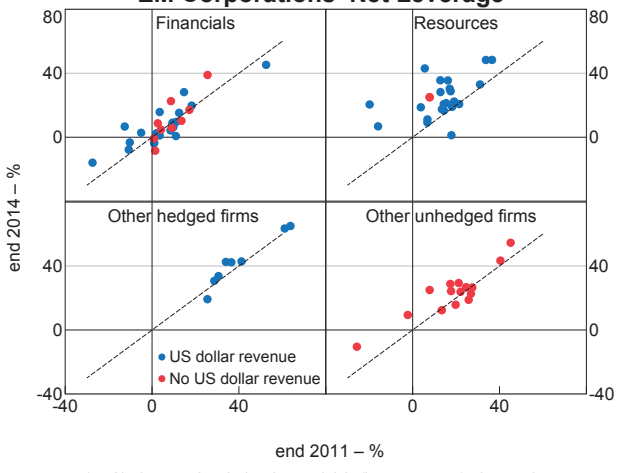
of banks having foreign subsidiaries (generating income in US dollars or euros) and indicating plans to expand their global operations. Over half of the technology companies that have issued a substantial value of bonds also appear to generate US dollar revenue, while four of the five manufacturers (food & beverage and auto companies) are naturally hedged to an extent.

Corporations that have issued large amounts of US dollar-denominated bonds and that do not appear to be naturally hedged include two-thirds of utility firms, three-quarters of real estate & construction firms and the remaining one-third of finance companies. While most of these companies with unhedged borrowings are geographically spread, the unhedged real estate & construction companies in the sample are all domiciled in China. Despite raising substantial funding in US dollars, these firms appear to derive no substantial US dollar revenue and their annual reports indicate that they generally do not engage in foreign currency hedging. These firms have also taken up significant amounts of local currency-denominated debt and exhibit relatively high leverage (Cooper and Cowling (2015)).

Foreign currency risk for firms without natural hedging

A sustained depreciation of a local currency would most significantly affect the firms with high leverage and little natural or financial hedging. In general, companies that do not appear to be naturally hedged have lower net leverage than those that are naturally hedged, and their overall net leverage has not risen substantially since end 2011 (Graph 5). Nonetheless, a number of firms have seen net leverage increase from a moderate level, suggesting they could find it more difficult than others to withstand the rising debt-servicing costs associated with a local currency depreciation. These firms are mostly utilities, although they include several Chinese real estate & construction companies and two banks. Net leverage appears to have risen the most for resource companies, albeit from (relatively) low levels, to be comparable to that for other firms at the end of 2014. The increase in resource sector net leverage has been most pronounced for Latin American (Mexican, Brazilian and Colombian) and Russian state-owned oil companies. Moreover, leverage ratios may not yet fully capture the impact of recent falls in commodity prices (which, if sustained, will reduce the book value of their assets).

Graph 5
EM Corporations' Net Leverage*



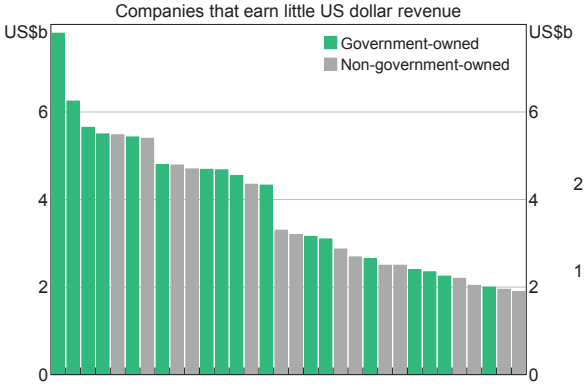
* Net leverage is calculated as total debt (in any currency) minus cash outstanding as a ratio of total assets

Sources: Bloomberg; RBA

Some of this risk may be manageable if companies that have unhedged US dollar-denominated debt have access to their government's balance sheet in the event of difficulty. This would depend on the government's willingness and capacity to provide such support, including having sufficient US dollar reserves, although this capability can also be adversely affected by the same factors that impair corporate health – such as a local currency depreciation and falls in commodity prices. Among the largest borrowers, half of those that are not naturally hedged are government owned, including all the utilities firms that are the most highly leveraged (Graph 6). Such firms may be considered critical strategic assets and therefore could be supported by the sovereign in the event of difficulty. Some of the large financial corporations without natural hedging may also be likely to receive government support due to their systemic importance.[4]

Regardless of the extent of hedging, the cost of borrowing in US dollars is likely to rise as the US Federal Reserve moves towards increasing its policy rate, while falls in commodity prices are already affecting commodity producers' profitability.

Graph 6
EM USD Corporate Bond Issuers*
Companies that earn little US dollar revenue

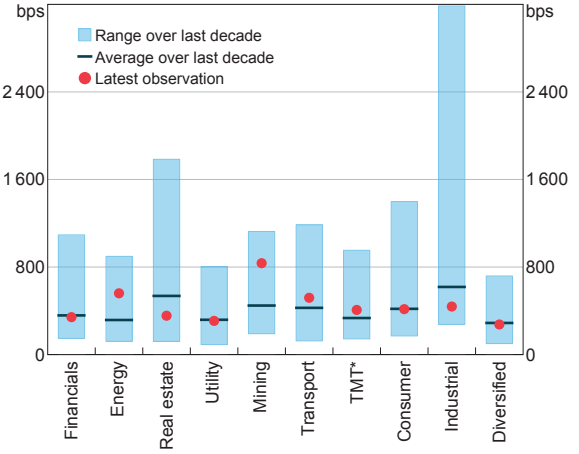


* Cumulative gross US dollar-denominated corporate bond issuance since 1 January 2012
Sources: Dealogic; RBA

The majority of EM corporate bonds issued are fixed-rate debt, and the US dollar cost of such bonds will only rise as they seek to roll over existing US dollar-denominated bonds. This risk is mitigated by these bonds having relatively long maturities, with less than 10 per cent of the outstanding bonds maturing over the next twelve months and just over one-third maturing over the next three years.

Overall, these results suggest that most EM firms that have issued US dollar-denominated bonds are at least in part naturally hedged or could receive some government support, and that the rollover risk appears to be manageable. Market pricing provides some cross-check on these results. In particular, if the extent of natural hedging was lower than estimated here we could expect to see this reflected in higher credit spreads on US dollar-denominated bonds issued by EM corporations as the US dollar has appreciated. In contrast, spreads on many US dollar-denominated corporate bonds remain around their decade averages, consistent with the pattern seen for US corporations' bond spreads, notwithstanding the significant depreciation of many EM currencies against the US dollar over the past year and a half (Graph 7). The exceptions are bonds issued by energy and mining companies, whose spreads are well

Graph 7
EM USD Corporate Bond Spreads
To equivalent maturity US Treasury bonds



* Technology, media and telecommunications
Source: J.P. Morgan

4 For example, the Central Bank of Russia provided large domestic banks with US dollar- and euro-denominated loans in late 2014 and 2015 (on top of foreign currency repurchase operations), secured against those banks' foreign currency loans to Russian exporters.

above their long-term averages, reflecting the sharp falls in commodity prices in recent months rather than any increase in expected losses associated with the realisation of foreign currency risk.

US Dollar-denominated Foreign Bank Lending

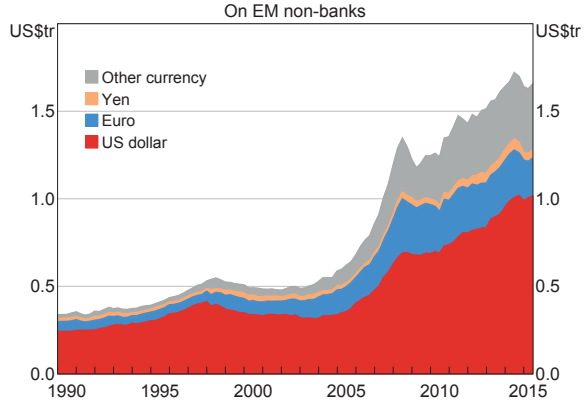
Despite the rapid increase in US dollar-denominated corporate bond issuance, non-financial corporations in EMs continue to source a large portion of their US dollar funding from banks.[5] US dollar-denominated foreign bank claims on all EM non-banks have grown by over US$300 billion since mid 2010, to around US$1 trillion (Graph 8).[6] Euro-denominated foreign bank claims are also substantial, at over US$200 billion at mid 2015, though they are concentrated in emerging Europe. These borrowers are less likely to face substantially higher debt servicing costs in the near term given the outlook for the European Central Bank's monetary policy and the depreciation of the euro since mid 2014.

The increase in US dollar-denominated foreign bank claims on EM non-banks since mid 2010 largely reflects a five-fold increase in claims on China, which remain modest (Graph 9).[7] US dollar claims on EM non-banks domiciled outside China have grown by around 5 per cent per year over the same period, as fairly rapid growth in lending to Asian and Latin American economies has been partly offset by falling US dollar-denominated lending to emerging Europe as part of a broader decline in high debt levels in these economies following the global financial crisis. US dollar claims on non-banks from the Middle East and Africa have been little changed.

Unlike corporate bonds data, data on foreign bank lending (from the BIS) are not available at the firm level. Given this, we can only gauge the extent of natural hedging of bank lending at the economy or regional levels. One (rough) proxy that can be used is primary export revenues (which are typically denominated in US dollars), though the distribution of cross-border borrowers could be different from that of an economy's exporters.

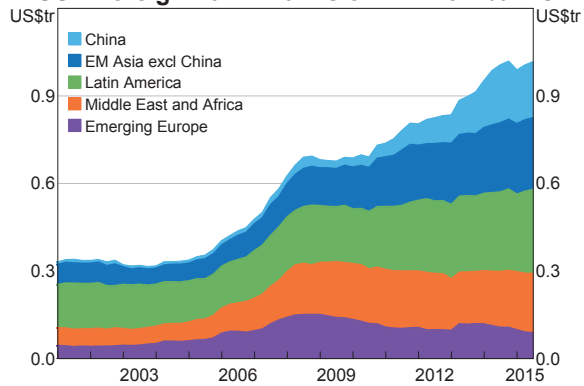
Although many EM regions have relatively high levels of US dollar-denominated bank exposures, they are generally matched by sizeable primary commodity export revenues that, in annual terms, amount to at least twice the level of their US dollar-denominated foreign bank debt (Table 3). This is particularly true for economies in the Middle East and Africa,

Graph 8
Currency Composition of Foreign Bank Claims
On EM non-banks



Sources: BIS; RBA

Graph 9
USD Foreign Bank Claims on EM Non-banks



Sources: BIS; RBA

5 We exclude an additional US$1 trillion in outstanding US dollar credit to banks in EMs from this section as the data contain cross-border lending to related offices. We thereby do not capture any on-lending of these funds to local non-banks.

6 The share of US dollar-denominated claims in total foreign currency claims has risen by 6 percentage points over the same period, to 60 per cent, driven by increases in emerging Asia and Latin America.

7 See Hatzvi, Meredith and Nixon (2015) for a more detailed discussion of banking-related flows to and from China.

Table 3: US Dollar-denominated Foreign Bank Claims on EM Non-banks

	Total at mid 2015		Change (past 5 years)[a]		Primary commodity exports[b]	Primary export coverage[b],[c]
	US$b	% of GDP	US$b	Annual %	% of GDP	Ratio
China	192	2	156	40	1	<1
Emerging Asia excl China	245	3	95	10	10	3
Latin America	289	6	91	8	10	2
Middle East and Africa	203	5	17	2	29	6
Emerging Europe	88	3	–32	–6	11	4

(a) From mid 2010 to mid 2015
(b) 2014 figures (annual)
(c) Primary commodity export revenues divided by total US dollar-denominated bank claims
Sources: BIS; IMF; RBA; United Nations Conference on Trade and Development

which have relatively large US dollar foreign bank liabilities but much higher primary commodity exports (that comprise over one-quarter of these economies' GDP). The primary export revenues of these economies would also cover their outstanding corporate bonds.

While most regions' primary export coverage ratios (that is, the ratio of annual primary commodity export revenues to total US dollar-denominated bank claims) are reasonably high, there are some countries where coverage ratios are 2 or less, including China, Brazil, India and Turkey (Table 4). (Although Indonesia's coverage ratio is slightly higher, at 3, it has a relatively high share of US dollar-denominated local bank loans.) Some of these countries have large non-commodity export sectors that are likely to generate US dollar revenues, so total (as opposed to just primary) export coverage ratios may be the more relevant benchmark. For example, including the large service and manufacturing exports of India and Turkey results in these countries' coverage ratios rising substantially. However, Brazil has a relatively low coverage ratio even when considering total exports.

China's total export coverage ratio is substantial, at 13, and its non-bank sector appears on aggregate to have more than sufficient US dollar revenues to service its US dollar-denominated bank loans, given

Table 4: US Dollar-denominated Foreign Bank Claims on EM Non-banks

	Total at mid 2015		Primary commodity exports[a]	Primary export coverage[a],[b]	Total exports[a]	Total export coverage[a],[b]
	US$b	% of GDP	% of GDP	Ratio	% of GDP	Ratio
China	192	2	1	<1	25	13
Brazil	115	5	6	1	9	2
India	66	3	6	2	17	5
Turkey	36	4	4	<1	19	4
Indonesia	40	5	11	3	19	4
Chile	22	8	24	3	28	4

(a) 2014 figures (annual)
(b) Export revenues divided by total US dollar-denominated bank claims
Sources: BIS; IMF; RBA; United Nations Conference on Trade and Development

that around three-fifths of China's exports are likely to be denominated in US dollars. Total claims on non-banks also remain very small compared with the size of China's economy, at 2 per cent of GDP.

While foreign currency risk on US dollar-denominated bank loans appears manageable in most EMs (based on their export coverage ratios), firms with US dollar loans are more likely to face higher debt servicing costs than bond issuers as the Federal Reserve moves to increase its policy rate. This in part reflects the fact that bank loans are more likely to be floating-rate debt. In addition, we estimate that around half of all US dollar bank loans will mature within the next year. However, this estimate is subject to fairly strong caveats since a maturity breakdown of international bank lending data is only available with inter-bank lending included (and does not provide a currency breakdown), and such lending is more likely to be short-term than lending to non-financial borrowers.

Conclusion

While the pick-up in the US dollar-denominated debt of EM firms in recent years has been rapid, natural hedging appears to mitigate a material portion of the risk posed to firms from a sharp depreciation of their local currencies against the US dollar. In particular, around two-thirds of the top 100 bond issuers are at least partially naturally hedged (though a significant proportion of these are exposed to lower commodity prices) and a number of the remainder are state-owned companies that may well receive some government support in the event of difficulty. In addition, many of the economies that have been the largest recipients of US dollar bank loans also derive significant US dollar export revenues. However, these results are based on partial data and hence are not definitive. Moreover, there are some areas where greater concern might be warranted. Most notably, construction companies in China have been significant borrowers of US dollars and appear to have little natural hedging and relatively high leverage. Some resource companies may also face difficulties following the recent fall in commodity prices, particularly Latin American energy firms that have relatively high leverage.

Regardless of the extent of natural hedging, EM corporations have been able to borrow in US dollars relatively cheaply over recent years and the cost of such borrowing is likely to increase as the Federal Reserve moves to increase its policy rate. This may be more of a concern for cross-border loans than bonds, which are more likely to be floating rate debt and may have a shorter maturity than bonds.

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Total Loss-absorbing Capacity

Penelope Smith and Nicholas Tan*

Total loss-absorbing capacity (TLAC) is a key part of the G20's regulatory reform agenda to address the problems associated with financial institutions that are 'too big to fail'. By strengthening the loss-absorbing and recapitalisation capacity of global systemically important banks (G-SIBs), the TLAC standard is intended to help ensure that these large, interconnected and complex financial institutions can be resolved in an orderly manner if they fail, without the need for financial support using public funds.

Introduction

In November 2015, the G20 Leaders endorsed a new Financial Stability Board (FSB) standard for TLAC for G-SIBs, which, as currently identified by the FSB (2015b), include 30 of the world's largest banks.[1] The finalisation of the TLAC standard is a significant milestone in the international policy reform agenda to address the problem of 'too big to fail', where the threatened failure of a systemically important financial institution (SIFI) leaves authorities with no alternative but to recapitalise it using public funds (that is to 'bail-out'). SIFIs may not only be 'too big to fail', but also too interconnected, too irreplaceable (as a market participant or as a service provider), or too complex to be wound up under normal insolvency proceedings without significant disruption to the wider financial system and economic activity.[2]

The premise of the TLAC standard is that G-SIBs should have sufficient resources to absorb losses and be recapitalised if they fail. The availability of these resources is intended to allow an orderly 'resolution' of a G-SIB where financial stability is maintained and the risk of exposing taxpayers to loss is minimised. 'Resolution' in this context means the restructuring of a failed G-SIB so as to allow its critical functions to continue while potentially winding down other parts of its business. This is achieved by establishing a minimum requirement for financial instruments held on the balance sheet that are readily available to absorb losses and, in the event that a G-SIB fails, enable it to be recapitalised through the writedown and/or conversion of the principal of these instruments to equity ('bail-in'). Financial instruments that count towards a G-SIB's TLAC requirements (TLAC instruments) are a mix of regulatory capital and qualifying uninsured liabilities.

Key Features of the TLAC Standard

The TLAC standard builds on a significant body of international regulatory reform already undertaken by the FSB to improve resolution frameworks for G-SIBs. In particular, it builds on the *Key Attributes of Effective Resolution Regimes for Financial Institutions* (the *Key Attributes*) which specifies that FSB jurisdictions should have in place legally enforceable mechanisms to implement a bail-in and adequate cross-border cooperation arrangements between regulators in the jurisdictions where G-SIBs operate (see 'Box A: Addressing 'Too Big to Fail''). This cooperation has been facilitated through the establishment of crisis management groups (CMGs) for individual G-SIBs.

* Penelope Smith is from Economic Analysis Department but completed this work in Financial Stability Department, and Nicholas Tan is from Financial Stability Department.

1 No G-SIBs are headquartered in Australia.

2 For information on identifying global systemically important financial institutions (G-SIFIs), including banks, see Yuksel (2014).

The TLAC standard itself comprises a set of guiding principles that reflect earlier FSB work and the terms of the minimum requirement, including its size and the characteristics of financial instruments that can be counted towards the requirement (FSB 2015a).

Size of the minimum requirement

For G-SIBs that are headquartered in advanced economies, the FSB's common minimum TLAC requirement has been set as follows:

- from 1 January 2019, resolution entities must hold TLAC instruments at least equivalent in value to 16 per cent of the resolution group's RWAs and 6 per cent of unweighted exposures; and
- from 1 January 2022, resolution entities must hold TLAC instruments of at least 18 per cent of the resolution group's RWAs and 6.75 per cent of unweighted exposures.

G-SIBs headquartered in emerging market economies will be allowed to conform to a delayed timetable, meeting the lower requirement by 1 January 2025 and the higher requirement by 1 January 2028. This is because capital markets may be less well developed in these jurisdictions. The conformance period will be accelerated if corporate debt markets in these economies reach 55 per cent of gross domestic product within the next five years.

The FSB's minimum TLAC requirement is set with reference to both risk-weighted assets (RWAs) and unweighted balance sheet assets, as defined by the Basel III leverage ratio exposure measure.[3] The leverage ratio exposure measure is used in addition to RWAs because unweighted exposures are more relevant than RWAs for valuing assets in the case of insolvency and because there could be uncertainties about the reliability of risk weights once a firm has entered resolution.

The minimum TLAC requirement is also set at the level of the 'resolution entity', rather than for the whole banking group. Resolution entities are the legal entities that will be 'resolved' if a G-SIB fails and are identified by each G-SIB's CMG. Where it is intended that a G-SIB would be broken up into separate groups upon resolution (for example, along national lines), there would be more than one resolution entity (see 'Box A: Addressing 'Too Big to Fail'').

In addition to the common minimum, each G-SIB's CMG is required to set a firm-specific minimum TLAC requirement that is at least equal to the FSB's common minimum. This minimum should take into account the recovery and resolution plans of individual G-SIBs, their systemic footprint, business models, risk profiles and organisational structures. The intent is that this firm-specific minimum should be large enough to absorb losses and recapitalise the critical functions of a failing G-SIB to a level where market confidence and access is restored. The FSB has determined that, in practice, this means that the resolved G-SIB will need to meet the minimum conditions for authorisation to use financial infrastructures, such as payments systems, and comply with its Basel III regulatory capital requirements.

Regulatory capital and relationship with Basel III

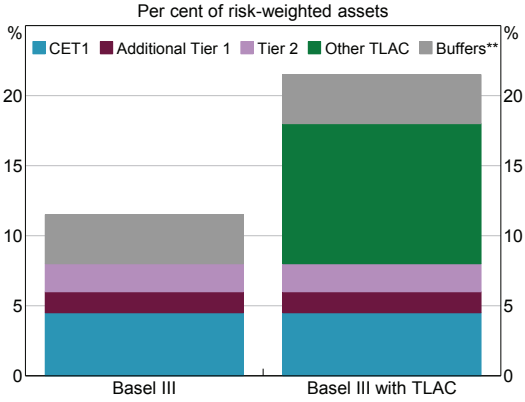
The TLAC minimum requirement is additional and complementary to the existing Basel III capital framework that, from 1 January 2019, requires banks to hold a minimum of 8 per cent of RWA in regulatory capital.[4] In general, instruments that count towards satisfying Basel III capital requirements also count towards a G-SIB's TLAC requirement. However, common equity Tier 1 (CET1) capital that is used to satisfy regulatory capital buffers – capital conservation, countercyclical and G-SIB surcharge

3 For information on the leverage ratio, see BCBS (2014).

4 This is to be made up of 4½ per cent of RWAs in CET1, 1½ per cent of RWAs in Additional Tier 1 and 2 per cent of RWAs in Tier 2 instruments. A capital conservation buffer equal to 2½ per cent of RWAs and a countercyclical buffer set between 0–2½ per cent of RWAs dependent on credit growth will apply on top of this. G-SIBs are also subject to a capital surcharge equal to 1–3½ of RWAs. All buffers must be met with CET1 capital.

– does not count towards TLAC.[5] Hence a G-SIB with a standard 2½ per cent capital conservation buffer and, for example, a 1 per cent G-SIB surcharge would effectively be required to meet a minimum of 19½ per cent of RWA from 1 January 2019 and 21½ per cent of RWA from 1 January 2022 (Graph 1). The decision to exclude regulatory capital buffers was based on the principle that these buffers exist, above the minimum, to be drawn down in periods of stress and should continue to function as intended.

Graph 1
G-SIB Regulatory Requirements*
Per cent of risk-weighted assets



* Examples assume fully phased-in Basel III applies
** Examples assume the standard buffer of 2.5% RWAs and a 1% RWAs G-SIB surcharge is applied; buffers must be met with CET1

Sources: BIS; FSB; RBA

Other eligible liabilities

There is an expectation that at least one-third of the minimum TLAC requirement will be met with eligible debt liabilities. This could comprise of Additional Tier 1 (AT1) and Tier 2 (T2) regulatory capital instruments as well as other eligible liabilities. The eligibility criteria for these liabilities are intended to reflect the feasibility and credibility of bailing them in. In particular, the use of these instruments to cover losses should be legally enforceable and should not give rise to systemic risk or the disruption of critical functions. Particular concerns are that the application of bail-in powers should not lead to contagion to the broader financial system so as to threaten financial stability, or give rise to a material risk of a successful legal challenge or compensation costs under the principle of 'no creditor worse off than in liquidation' set out in the *Key Attributes*.[6]

The identification of TLAC instruments other than regulatory capital is primarily achieved by recognising what instruments are not eligible.

- Insured deposits are protected from bail-in and so cannot count towards TLAC. There are several reasons why authorities seek to provide greater protection to depositors, including that deposits facilitate economic transactions in a way that wholesale debt does not and are a primary form of saving for many individuals, who may be unable to protect themselves against the risk of loss (Turner 2011).
- Liabilities arising from derivative instruments are excluded because they would be difficult to value in a crisis and because their bail-in has the potential to lead to contagion and disrupt the functioning of financial markets.
- Operational liabilities such as wages, pension and tax liabilities are excluded because their bail-in could impair the failed G-SIB's ability to perform critical functions.

In addition, TLAC liabilities must meet certain eligibility criteria.

- To safeguard the availability of TLAC, eligible instruments must be unsecured and have a minimum maturity of at least one year. Financial instruments with a shorter maturity could be prone to be sold-off by investors in times of stress, limiting their availability to be exposed to losses and potentially leading to contagion.
- TLAC liabilities must also be subordinated to financial instruments that are explicitly excluded from TLAC. The subordination requirement

5 Common equity Tier 1 capital is capital with the greatest ability to absorb loss. It includes common shares and retained earnings. Tier 1 capital comprises common equity and Tier 1 hybrids. Tier 2 capital is a lower quality form of regulatory capital, and includes Tier 2 hybrids, which are similar to subordinated debt.

6 In particular the principle is a safeguard that 'creditors should have a right to compensation where they do not receive at a minimum what they would have received in a liquidation of the firm under the applicable insolvency regime'. (*Key Attribute* 5.2; FSB 2014).

ensures that TLAC instruments will bear losses before any excluded liabilities in an order consistent with each jurisdiction's statutory hierarchy of claims in liquidation. This is intended to reduce the likelihood of a successful legal challenge.[7] Under the principle of 'no creditor worse off than in liquidation', creditors could be entitled to compensation if they were to receive less in resolution than they would have received if a G-SIB were placed into liquidation.

Consequences of falling below the minimum TLAC requirement

If a G-SIB's TLAC were to fall below its minimum requirement, this would not in itself trigger resolution. Rather, consistent with the current regulatory capital framework, authorities would be expected to require the firm to take prompt action to address any breach or likely breach of the minimum. If, however, authorities determined that a G-SIB was failing or was likely to fail with no reasonable prospect of recovery, it would be placed into resolution and bail-in could occur.

Implications

G-SIBs' creditors

The application of the TLAC standard implies that TLAC instruments will be at greater risk of being exposed to loss. At the same time, G-SIBs' excluded liabilities, such as short-term senior debt, arguably have become safer.

Insured deposits are protected from bail-in under various national deposit insurance schemes and do not count towards TLAC. In certain jurisdictions, such as in Japan, deposits do not specifically rank ahead of other unsecured liabilities in the creditor hierarchy (Davis 2015). Such deposits could potentially be exposed to loss if they are uninsured and have a maturity that is greater than one year. However, in jurisdictions with 'depositor preference', such as Australia, China, Switzerland or the United States, most uninsured deposits would also be excluded from TLAC due to the subordination requirements discussed above and are less likely to be bailed-in in resolution.

Households could invest in TLAC instruments issued by G-SIBs, including indirectly through pension or other investment funds. To ensure that market participants make investment decisions based on an informed understanding of the associated risks, G-SIBs will be required to disclose the amount, maturity and composition of all TLAC instruments, as well as the amount, nature and maturity of liabilities that rank equal to, or are subordinated to, TLAC instruments in the creditor hierarchy. The extent to which households will actively make investment decisions based on this information is not yet known.

Banks could also invest in TLAC instruments issued by other financial institutions, potentially creating a channel of contagion in the event that TLAC was bailed-in. The FSB has sought to limit this potential. G-SIBs must deduct TLAC instruments issued by other G-SIBs from their own TLAC or regulatory capital exposures. The Basel Committee on Banking Supervision released a consultative document in November 2015 on this provision as well as standards for how prudential authorities might treat non-G-SIBs' TLAC holdings, which include the use of deductions (BCBS 2015a). How regulators choose to regulate TLAC holdings could have implications for G-SIBs' ability to issue TLAC, the market liquidity for such products and therefore the cost of such issuance.

Results of the quantitative impact studies

In setting the minimum TLAC requirement, FSB members sought to balance the need to set a minimum that was high enough to engender market confidence against the effect the TLAC standard might have on raising G-SIBs' funding costs. The concern was that increased funding costs would be passed on to G-SIBs' customers in the form of higher

7 Subordination can be achieved via contract, statute or by issuance out of a parent company that does not have excluded liabilities on its balance sheet (structural subordination). G-SIBs can claim some limited exemptions from the subordination rule.

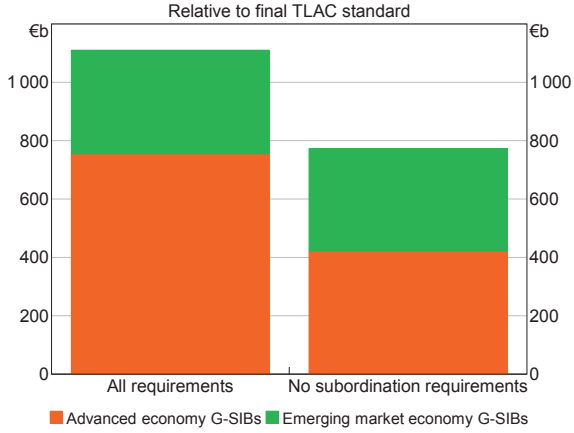
lending rates that could dampen economic activity. This was balanced against the potential benefits that accrue from a reduced likelihood and lower cost of systemic crises (BIS 2015).

To help assess these potential costs and benefits, the FSB in conjunction with the BCBS undertook: a quantitative impact study (QIS) that focused on G-SIBs' current ability to meet the minimum requirements; an economic impact analysis that considered the cost and benefits of the TLAC framework; a market survey to understand market capacity to invest in TLAC instruments; and a historical loss and recapitalisation study to gather information on the scale of previous failures (FSB 2015b).

The QIS found that, excluding emerging market economy G-SIBs, around three-quarters of the remaining G-SIBs have insufficient TLAC instruments to meet the 16 per cent risk-weighted minimum that will apply from 1 January 2019.[8] The total shortfall for these 20 G-SIBs was estimated to be around €500 billion. A further €250 billion is required for G-SIBs to comply with the final 18 per cent minimum requirement in force from 1 January 2022. This implies a total current shortfall of around €750 billion. The QIS suggests that roughly half of this shortfall could potentially be met by the replacement of maturing existing debt, which would otherwise have been TLAC eligible if not for its failure to comply with the TLAC subordination requirement. If the shortfalls of emerging market economy G-SIBs are included, the total estimated G-SIB shortfall increases significantly to €1 110 billion (Graph 2). The large shortfalls of emerging market economy G-SIBs largely reflect their greater use of deposit based funding (BCBS 2015b).

Nevertheless, the market survey suggests that the aggregate shortfalls faced by G-SIBs are small relative to the total size of unsecured securities debt markets (at €1 110 billion, total shortfalls are approximately 1½ per cent of the estimated €80 trillion global debt securities market). Though this implies that, in aggregate, markets for TLAC instruments may be sufficiently deep for G-SIBs to meet their TLAC requirements, some G-SIBs could be faced with impediments that make compliance more difficult. This includes that some G-SIBs have relatively large shortfalls as well as factors that limit the investor base for their TLAC instruments, such as potentially restrictive investor mandates and segmented markets.

Graph 2
TLAC Shortfalls*
Relative to final TLAC standard



* Based on year-end 2014 data
Source: BCBS (2015b)

The historical loss and recapitalisation study found that the size of the minimum TLAC requirement is likely to have been sufficient to meet the loss absorption and recapitalisation needs of most, though not all, systemically important global banks that failed in recent crises. The minimum requirement was set with an appreciation of post-crisis regulatory improvements, that the burden of adjustment across jurisdictions will be uneven, and that the minimum standard will be supplemented by supervisory efforts.

Overall, the economic impact analysis study concluded that the benefits from the reduced likelihood and severity of financial crises outweighed the estimated costs that might arise from higher bank funding costs that lead to lower economic activity (BIS 2015).

8 These findings do not include emerging market economy G-SIBs and do not account for the impact of any possible exclusions to the eligibility rules that are permitted.

Implications for Australia

No Australian-headquartered banks are currently identified as G-SIBs, so none are required to conform to the TLAC standard. Nevertheless, the framework does have implications for the Australian financial system. Subsidiaries and branches of G-SIBs operate in Australia, and Australian households and financial entities will potentially invest in TLAC instruments issued by G-SIBs. As noted, such instruments are now potentially at greater risk of being exposed to loss. At the same time excluded G-SIB liabilities, such as short-term senior debt, arguably have become relatively safer. More prospectively, a recommendation of the 2014 Financial System Inquiry (FSI) was for the Australian Prudential Regulation Authority (APRA) to implement a framework for minimum loss-absorbing and recapitalisation capacity in line with emerging international practice (FSI 2014, p 67). The Government endorsed this recommendation in its October 2015 response to the FSI and asked APRA to ensure Australian authorised deposit-taking institutions (ADIs) have appropriate total loss-absorbing capacity (Australian Government 2015, pp 5). The timeframe for the implementation of this recommendation was beyond 2016.

Box A
Addressing 'Too Big to Fail'

The TLAC standard represents an important milestone in the international policy agenda to improve the resolvability of SIFIs. It is intended to help promote the full implementation of the *Key Attributes*, which was endorsed by the G20 as an internationally agreed standard in November 2011 (FSB 2014). This standard specifies a comprehensive range of powers and options that authorities should have in order 'to make feasible the resolution of financial institutions without severe systemic disruption and without exposing taxpayers to loss' (FSB 2014).

Bail-in

The *Key Attributes* states that resolution authorities should have statutory powers to 'bail-in' shareholders as well as unsecured and uninsured creditors of a failing financial institution. This should be achieved through powers to write down the value of such claims and/or convert liabilities into equity stakes in the firm. This should occur in a manner that respects the order in which creditors would normally be paid out in liquidation (the statutory hierarchy of claims). By increasing the likelihood that shareholders and creditors will be exposed to loss if a SIFI fails (rather than being bailed out using public funds), an effective resolution regime should increase investors' incentives to monitor the risk of their investments and, in theory, impose greater market discipline on the management of financial institutions.[1]

The TLAC standard seeks to operationalise bail-in by ensuring that a sufficient layer of liabilities is readily identified and available to absorb losses and recapitalise G-SIBs in resolution. It is predicated on the assumption that *Key Attributes*-compliant bail-in

1 Note that the *Key Attributes* does not prohibit public solvency support in resolution (i.e. using public funds). Rather, resolution frameworks (and individual SIFIs' resolution plans) should not rely on public support and not create an expectation that such support will be available. Where public funding is required to accomplish orderly resolution, it should be temporary and include provisions to recover any losses incurred from shareholders and unsecured creditors or, if necessary, from the wider financial system (*Key Attribute* 6, FSB 2014).

frameworks are in place in the key home and host jurisdictions where G-SIBs operate.

Resolution Strategies

For global systemically important financial institutions (G-SIFIs), which include G-SIBs, the *Key Attributes* sets out a detailed framework for cross-border cooperation. This includes the establishment of CMGs for each G-SIFI. Members of the CMGs include key regulators – such as supervisory and resolution authorities, central banks and finance ministries – from jurisdictions that are assessed to be material to the resolution of a G-SIFI if it were to fail. These groups are responsible for overseeing recovery and resolution plans for each G-SIFI and for regularly undertaking assessments that evaluate the feasibility of these plans. Where impediments to the resolvability of these firms are identified, measures to address these impediments should be taken. Such measures could include changes to a firm's business practices, structure or organisation.

Because G-SIBs are highly complex financial institutions that typically perform a wide range of functions across multiple countries, the resolution plans that are being developed in their CMGs vary considerably. However, they broadly fall into two categories: 'single point of entry' (SPE) strategies, where resolution powers and tools are applied to one legal entity in a group structure by its home resolution authority; and 'multiple points of entry' (MPE) strategies, where resolution tools are applied to different parts of the group, by two or more resolution authorities which the FSB expects to act in a coordinated way (FSB 2013).

The legal entities to which resolution powers are applied are called 'resolutions entities' in the TLAC standard. The groups of subsidiaries that sit below these entities, together with the resolution entity, are referred to as 'resolution groups'. A banking group can have multiple resolution entities and groups. Depending on the G-SIB's resolution strategy, a resolution entity could be a parent company, an intermediate or ultimate holding company, or an operating subsidiary.

- For SPE strategies, the intent is to keep the G-SIB group together as a single entity after resolution. This strategy tends to be appropriate where there are significant operational interdependencies across the subsidiaries of the G-SIB group, so that resolving them separately is not feasible.[2] The intent is that bail-in powers would be applied only to equity or eligible unsecured liabilities and debt issued by the resolution entity. If necessary, the resulting funds would be passed down to subsidiaries within the banking group to absorb losses and recapitalise them. As long as there is sufficient TLAC issued by the resolution entity, operating subsidiaries should, in principle, be able to continue as going concerns owned by a single parent company without themselves entering resolution.
- For MPE strategies, the G-SIB is intended to be broken up into separate parts upon resolution, typically along national lines. This strategy tends to be more appropriate where the structure of the G-SIB is more modular with few operational interdependencies between resolution groups. Bail-in powers would be applied to equity and unsecured debt issued by each resolution entity in the group (most likely in different jurisdictions). For example, where a resolution entity is a subsidiary, the parent's equity in the subsidiary resolution entity could be written down to zero. Creditors of this subsidiary who had their claims converted to equity would become owners of the resolution group.

2 Neither SPE or MPE resolution strategies preclude the possibility that some subsidiaries might not perform critical functions that are material to the survival of the G-SIB group. Resolution plans could include provisions for such subsidiaries to be sold off or wound up in resolution.

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CCPs and Banks: Different Risks, Different Regulations

David Hughes and Mark Manning*

Recent debate on the adequacy of regulatory standards for central counterparties (CCPs) has often drawn on the experience of bank regulation. This article draws out the essential differences between CCPs and banks, considering the implications of these differences for the regulatory approach. It argues that banks and CCPs affect systemic stability in different ways, with a CCP's systemic importance largely derived from its central role and a bank's systemic importance typically derived from the size and breadth of its activities. Any refinements to regulatory standards for CCPs that are drawn from bank regulation should not overlook these differences.

Introduction

Since the global financial crisis, CCPs have assumed a more prominent role in the financial system. As central clearing mandates for over-the-counter (OTC) derivatives have been introduced around the world, an increasing share of wholesale financial market transactions is being centrally cleared. As the systemic importance of CCPs has grown, the debate has intensified as to whether new international regulatory standards for CCPs introduced in 2012 promote sufficient resilience in CCPs. This debate often draws on the experience of bank regulation.

This article first describes the respective roles of banks and CCPs and how these roles naturally give rise to very different risk profiles and different financial and market structures. It goes on to demonstrate that, while both banks and CCPs can be systemically important and a potential source of financial contagion, the nature of their systemic importance differs. The regulatory frameworks developed respectively for banks and CCPs appropriately reflect these differences. The article concludes with the argument that, while it is important to continuously review and challenge regulatory frameworks, any refinements to the CCP regime should not overlook the differences between banks and CCPs.

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Context and Motivation

Following the global financial crisis, standard-setters for both banks and CCPs have strengthened their respective international regulatory frameworks. For banks, the motivation for stronger standards has been to reflect the harsh lessons of the crisis. In the case of CCPs, which performed well in the crisis, policymakers have recognised the importance of ensuring that CCPs could credibly support the G20's commitment that all standardised OTC derivatives should be centrally cleared.

In 2012, the *Principles for Financial Market Infrastructures* (PFMI), the international standards for CCPs and other financial market infrastructures (FMIs), were developed by the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) (CPSS-IOSCO 2012). At the time of writing, policymakers and industry participants are debating the adequacy of CCP resilience and recovery requirements under the PFMI. There has been particular focus on the calibration of pre-funded financial resource requirements, stress-testing approaches, the CCP's 'skin in the

game' and unfunded loss allocation in recovery and resolution (e.g. JP Morgan Chase 2014; Powell 2014; Coeuré 2015; FSB 2015a; ISDA 2015). Since industry participants are required to assume exposures to CCPs under new central clearing mandates for OTC derivatives, they are appropriately seeking assurances that CCP risks are well managed.

In examining the case for refinements to the existing regulatory standards for CCPs, it is important that the risk and supervisory frameworks for banks and CCPs remain tailored to the specific roles assumed by these entities and the different profiles of their risk exposures. Indeed, almost every aspect of banks' and CCPs' businesses is different: their respective roles in the financial system; their risk profiles; the nature of their interconnections with other financial institutions; the contractual basis for their activities; and the market structures in which they operate.

The Roles and Risk Profiles of CCPs and Banks

A CCP's main role and purpose is to centralise counterparty risk management in the financial markets that it serves.[1] In performing this role, it also provides other benefits, including netting, operational efficiencies, coordination and trading anonymity. Its risk profile is dictated by the characteristics of its participants and the positions that they clear. Standing between the original buyer and seller in a financial contract – typically trading banks acting on their own account or on behalf of non-bank clients – the CCP guarantees the performance of obligations on each side over the life of the contract or trade. This may be days, for example, the pre-settlement period in the case of a securities trade; or it may be many years, and involve periodic cash flows, in the case of some derivatives.

In the absence of a default, the CCP operates with a 'matched book'. That is, since the CCP interposes itself between the buyer and seller, every 'long' position is matched by an equal and opposite 'short' position. The CCP is therefore market-risk neutral. In the event of a participant default, however, the CCP would assume the obligations of the defaulted party. In this way, the risk of loss to a CCP is conditional on the default of one or more of its participants. This underscores the natural interdependence between the risk profile of a CCP and that of its bank participants.

The primary financial risk to a CCP is therefore 'replacement cost risk'; that is, the risk that the replacement trades required to return the CCP to a matched book can only be executed at an adverse price.[2] However, the CCP is only exposed to this risk over the 'close-out period', the time it takes to execute these offsetting trades – typically assumed to be two to five days, depending on the characteristics of the contract. A participant default also exposes the CCP to liquidity risk; that is, the risk that it cannot meet payment obligations on time (e.g. mark-to-market, or variation, margin payments that are no longer received from the defaulted participant must still be paid out to the surviving participants).

A bank, by contrast, operates with a fundamentally different purpose and risk profile. A bank typically engages in three main activities: providing transaction services to households and corporations (e.g. deposit accounts); extending credit; and trading and investment banking.[3] In performing these activities, a bank engages in liquidity and maturity transformation – taking short-term liabilities such as deposits and extending longer-term credit for the purchase of often illiquid assets such as housing or business investment. Banks are exposed to the credit risk of their borrowers, as well as the liquidity risk that arises from the mismatch between their funding sources and assets. Banks often also provide trading, investment banking and agency services to clients, intermediating access to capital markets for both issuers and investors (e.g. through origination,

1 See Pirrong (2011) for a summary of the economics of central clearing.

2 Following the default of a participant, the CCP no longer has a matched book and must act quickly to replace the lost trades in the market. For the period between the default of the participant and the time the CCP replaces its trades – known as the close-out period – the CCP bears the market risk of the defaulter's positions.

3 See Merton and Bodie (1995) for a discussion of the key functions of financial institutions.

underwriting, market-making and brokerage activities), often assuming direct credit, market and liquidity risks. This may include supporting access to FMIs, including CCPs, e.g. through client clearing and custodial services. These infrastructure-like services both carry a distinct risk profile and remain a particular source of interdependence between banks and FMIs.

CCPs and banks also operate in very different market structures. In any given financial market segment, there will typically be just one CCP, or at most very few CCPs. This reflects: economies of scale in the provision of CCP services; network externalities arising from the multilateral netting of offsetting exposures; the operational efficiency of connecting to just one CCP in any given market; and the efficiency of having only a single entity to monitor (and to whom the monitoring of others can be delegated).

By contrast, any given customer segment or financial market will typically be served by several banks. While there are also clear economies of scale in banking, there are fewer network externalities and efficiencies that tie customers to a single provider. Accordingly, in any given customer segment or financial market, there will often be oligopolistic competition. For those banking services that are more infrastructure-like in nature, however, – for instance, custodial and clearing services – the market structure has similarities to that of CCP clearing.

A large, complex bank will also typically be exposed to a wide variety of risks, with a broad geographical scope, both wholesale and retail customers and activities, and often exposures to a range of derivative and securities markets. A CCP, by contrast, will often be active in a much narrower range of financial markets – sometimes providing clearing services for a single exchange or OTC market segment – giving the CCP a holistic view of activity in the product markets that it serves.

Risk Controls

A key benefit to a market participant of using a CCP is that it need only monitor the CCP and not its bilateral counterparties. The CCP must therefore demonstrate that its performance guarantee is credible and robust to the default of its participants. That is, it must demonstrate that it has the financial capacity to effectively manage the financial risk that it would assume in the event of one or more participant defaults.

To do this, a CCP holds margin and other pre-funded financial resources against the risk that participants bring to the CCP, operating on a close to fully collateralised basis. A CCP collects variation margin from each party at least daily to fully cover all observed price movements, and collects initial margin in respect of each cleared position to cover potential future exposure with a high degree of confidence (should that participant default).

The CCP typically strengthens this guarantee by maintaining a pool of additional pre-funded resources to supplement a defaulted participant's margin should it prove to be insufficient. Recognising that the risk profile of a CCP reflects the positions of its participants, most CCPs operate a mutualised model, with this additional pool of funds primarily made up of participant contributions. Margin and other pre-funded financial resources are held in high-quality and liquid assets to maintain participants' confidence in the CCP's capacity to realise their value in the event that they need to be liquidated, even in stressed market conditions. Finally, a CCP will often have mechanisms within its rules to allocate any unfunded losses or liquidity shortfalls to participants.

To manage its risks, a bank operates with a mix of collateral and capital. Most assets – for example, household mortgages – are collateralised, with the collateral reducing the size of the loss incurred in the event of a default. A bank additionally maintains loss-absorbing capital (equity and other loss-absorbing liabilities) sufficient to cover potential losses on its assets to a set level of confidence.

Since liquidity transformation is at the core of a bank's role, liquidity risk management is also important. An inherently unstable asset-liability structure exposes a bank to potential liquidity shocks and funding issues. Accordingly, a bank maintains a sufficient proportion of its assets in liquid form to be able to withstand an increase in withdrawals by its customers, or a loss of short-term funding. In contrast, a CCP will typically only face liquidity issues in the case of a participant default, as incoming funds, such as variation margin or settlement flows, will normally meet obligations to other participants.

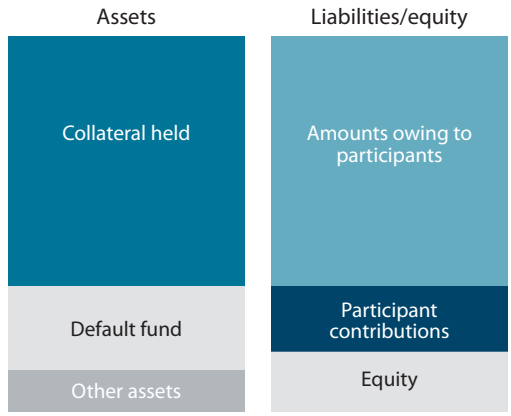
It is also notable that a CCP's operations are defined by a detailed 'rule book', covering all aspects of the CCP's activities. While it is appropriate that a CCP's rule book affords the CCP some discretion, particularly in the event of a participant default, it limits the scope for a CCP to assume discretionary proprietary financial exposures. Indeed, typically the only discretionary financial decisions that a CCP will take relate to the reinvestment of any cash collateral that it receives from participants. This means that even a for-profit CCP enterprise would only pursue profit by taking 'risky' decisions in a naturally tempered manner. Pursuit of profit is further constrained by the usual mutualised model of a CCP, whereby residual risk exposure not covered by margin is largely shared among participants, who naturally take a close interest in the CCP's decisions.

Balance Sheets

Given their respective risk profiles and the risk controls that they apply, CCPs' and banks' balance sheets are very different.

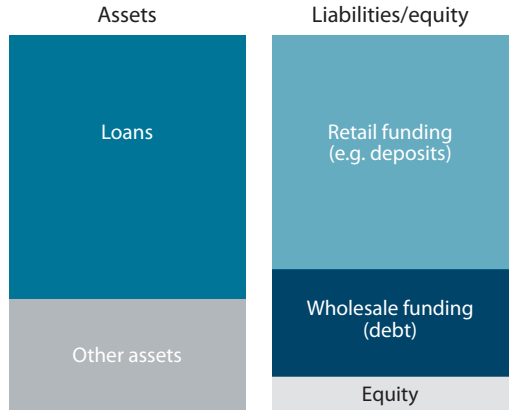
- The bulk of the assets held by a CCP are the collateral (margin) and default fund contributions that it receives from participants against cleared positions (Figure 1(a)). These assets are ultimately funded by obligations to return unused funds to the providing participants. The CCP will also typically make a contribution to the default fund and hold a small amount of proprietary assets in liquid form for business risk management purposes; both are funded by equity. A CCP typically maintains no debt and therefore does not operate on a leveraged basis.
- A bank's balance sheet, by contrast, is typically highly leveraged, comprising a mix of loans and other assets (such as trading assets and liquid assets) backed by a mix of deposit funding, wholesale debt funding and equity capital (Figure 1(b)).

Figure 1(a)
Stylised CCP Balance Sheet



Source: RBA

Figure 1(b)
Stylised Bank Balance Sheet



Source: RBA

Systemic Importance

A systemically important institution, or infrastructure, can be defined as one that is so important that its distress or failure would impose material losses on the real economy (RBA 2014). Both large, complex banks and CCPs can be systemically important, although the channels by which they could impact financial systems and the real economy are very different.

The Basel Committee on Banking Supervision (BCBS) has suggested five key indicators for measuring the systemic importance of banks in its global systemically important banks (G-SIBs) framework (BCBS 2013b) (Table 1). These indicators are also likely to be relevant for a CCP, but the relative importance of each indicator will differ, as will the relevant metrics.

In most cases, a bank's systemic importance will arise from the size, breadth and complexity of its activities, and its network of financial market interconnections. In the case of a CCP, size does not necessarily determine importance. Rather, systemic importance is more a function of the central role that a CCP plays in a given financial market and its lack of substitutability. A CCP's systemic importance is interdependent with the systemic importance of its participants and the markets it serves. Indeed, it is almost misleading to consider the systemic importance of a CCP in isolation. Given its role and structure, a CCP cannot in general be an initial trigger for stress, since a CCP will only transmit stress following the failure of one or more of its participants or an investment counterparty.[4] In such circumstances, a CCP would redistribute any unfunded losses generated by a participant failure to its remaining participants, as would have occurred in the CCP's absence (although with a different distribution across counterparties).

4 While a CCP is also exposed to the risk of investment losses on reinvested cash collateral, the need to maintain a credible replacement cost guarantee requires that its investments are held in the form of highly liquid assets with low credit and market risk.

Regulatory Tools

Systemically important institutions create risks that are borne not just by the institutions themselves, but by the financial system and economy as a whole. It is therefore instructive to look at the regulatory tools applied to manage or mitigate these risks. The differences between banks and CCPs described above are reflected in their respective regulatory frameworks (summarised in Table 2).

- Given their importance for financial systems and the real economy, banks are subject to close supervision against a comprehensive set of internationally harmonised regulatory standards, as set out in the BCBS's Basel III framework (and previous iterations, see BCBS (2011)). These tools aim to ensure that a bank is sufficiently well capitalised that it could absorb losses, while protecting depositor funds, and that it could continue to operate in stressed market conditions.
- Systemically important CCPs are also subject to detailed supervision in accordance with international standards – in this case the standards set out in the PFMI and associated guidance. The PFMI are principles based, but wide ranging, establishing requirements in all areas of CCP design and operation. In particular, these tools aim to ensure that CCPs have appropriate financial and operational risk management processes in place, including sufficient resources to withstand potential losses. At the time of writing, work is ongoing among policymakers to establish whether some aspects of the standards should be refined to promote greater consistency in interpretation.

Table 1: Measures of Systemic Importance
Differences between systemically important CCPs and banks

Indicator	Central counterparties	Banks
Size	A CCP's balance sheet is typically much smaller than that of a bank and does not necessarily determine its systemic importance. More relevant is a CCP's central role in markets.	A bank failure would have a greater impact on financial markets, the economy and confidence if the bank was large.
Interconnectedness	A CCP is by its nature highly interconnected with financial institutions. Compared with a bank, CCPs are typically exposed to fewer counterparties; participants must also satisfy strict membership requirements. CCPs may spread distress following a default if losses exceed the margin posted by a participant and the CCP has to draw on the mutualised default fund; or, if the default fund is exhausted, the CCP has to resort to non-pre-funded loss allocation. More generally, the default management process may itself spread distress in markets.	Borrowing, lending and trading activity between banks creates interconnections that may be a source of contagion.
Substitutability	A given market is typically served by only few (often just one) CCPs, making their substitutability low. Continuity of critical clearing services is often central to participants' ability to access the underlying markets.	Banks perform key financial services for other financial institutions, businesses and households. Where a particular bank controls a large share of a given market/service provision, its failure could cause significant disruption.
Complexity	A CCP's activities are often not complex, typically focused on one product or market segment. A CCP may offer 'complex' products, although to be eligible for clearing products must typically be sufficiently liquid, standardised and subject to reliable valuation (FSB 2010).	Large banks tend to engage in activities that increase their complexity, such as trading complex products, or maintaining investments in illiquid or difficult-to-value assets. This makes them more difficult to deal with during a stress event.
Cross-jurisdictional activity	CCPs are increasingly regulated in multiple jurisdictions, but many are domestically focused. However, participants may be global banks that are connected to many CCPs.	Large banks are often active in multiple jurisdictions, creating cross-border channels of contagion.

Source: RBA

Credit, market and replacement cost risk

Regulatory tools employed under the regimes for banks and CCPs to manage and control credit, market and replacement cost risks take a number of forms.

Loss absorbency

The core of the BCBS's regulatory framework for banks is minimum capital requirements. A bank's capital allows it to absorb losses incurred on its assets without defaulting on its liabilities. For regulatory purposes, this capital consists mainly of common equity (shares and retained earnings) and certain liabilities that can be converted to equity in certain circumstances. Basel guidelines set minimum capital requirements that are proportional to a bank's risk-weighted assets, with capital expected to cover unexpected losses with a 99.9 per cent probability. Risk-weighted assets are largely determined by applying regulatory risk weights, although for those banks approved to use internal models, they are derived from modelled probabilities of default or losses given default on individual (or sets of) assets or exposures. In general, higher capital requirements apply for exposures that have a greater likelihood of defaulting, as well as those that could give rise to a greater proportional loss.[5]

In contrast, CCP regulation focuses primarily on minimising the potential for losses through collateral; the PFMI require that initial margin covers future exposures over the expected close-out period for the relevant cleared product with at least 99 per cent probability, and that exposures are marked to market at least daily. Should losses occur, the structure of a CCP allows it to absorb the losses using funds contributed by participants in conjunction with its own equity. The focus of the PFMI is therefore the total size of default resources which, for a systemically important CCP, should be sufficient to cover the default of any two participants in extreme but plausible conditions. However, the amount of a CCP's own equity at risk ('skin in the game') and, importantly, its position in the default waterfall, does impact the incentives of both the CCP and its participants to prudently manage risk (Carter and Garner 2015).

Procyclicality

These risk controls (capital, margin etc) can be procyclical in nature. During periods of stress, banks are likely to require additional capital, constraining their ability to lend; similarly, CCPs' margin or other pre-funded resource requirements may rise, impacting participants. From 2016, banks may be subject to a countercyclical capital buffer, an additional layer of capital with the intended effect of reducing the procyclicality of capital requirements by increasing capital levels during periods of strong growth, and reducing the need to recapitalise during downturns. For CCPs, the PFMI require margins to be set in a forward-looking and conservative manner, taking into account potentially stressed market conditions and seeking to reduce cyclical fluctuations.

Supplementing the risk-based capital requirement for banks from 2018 is the leverage ratio (BCBS 2014a). This ratio is independent of the riskiness of assets and aims to constrain leverage in the banking sector by reducing the dependence on what may be subjective risk weights. An important aim is to lower the risk that an economic downturn will result in sudden deleveraging. This type of regulation is not necessary for CCPs, which do not rely on leverage in the way that banks do.

Stress testing

The robustness of a bank's or a CCP's framework for dealing with credit risk can be checked through stress testing (liquidity stress tests are also performed, see below).

Reflecting the longer-term nature of their assets, bank stress-test scenarios typically consider the impact of macroeconomic and financial shocks on

5 It should be noted that this includes a bank's exposures to CCPs, with the capital requirement calibrated according to the scale of the bank's trading activity and that of its clients, as well as its contributions to the default fund (BCBS 2014c).

Table 2: Regulatory Frameworks

Key elements of the frameworks for CCP and bank regulation

Element	Central counterparties	Banks
Credit, market and replacement cost risk	Only exposed to credit risk if a participant defaults; exposure is for a short time – the assumed liquidation period	Exposed to credit risk over long periods, since assets and collateral are often illiquid
	Initial margin to cover 99 per cent of price changes; variation margin marks-to-market	Collateral held against some assets; often illiquid
	Default fund – sufficient to withstand the default of two participants in 'extreme but plausible' market conditions (i.e. Cover 2); includes CCP's own equity (typically limited)	Capital is largely risk based; 99.9 per cent coverage
	Models should consider procyclicality of requirements	Leverage ratio (non-risk-weighted) Capital conservation buffer and counter-cyclical buffer
	No market risk	Capital charge for market risk
	Stress tests cover a range of forward- and backward-looking market scenarios; short horizon	Stress tests are largely grounded in macroeconomic scenarios over longer horizons; standardised supervisory tests
Liquidity risk	Funds generally held in liquid assets – must be available in a short timeframe	Assets and collateral generally illiquid
	Minimum liquidity requirement, based on liquidity stress test (Cover 2 requirement)	Liquidity coverage ratio (30-day stress test)
		Net stable funding ratio
Operational risk	Detailed principles for operational risk – reliability, incident management, information security, business continuity and use of critical service providers	Capital charge for operational risk
		Principles for managing operational risk
Recovery[(a)]	Recovery tools written into rules and intended to be comprehensive and effective to ensure continuation of service	Detailed plans and demonstrated capacity to return to viability in the event of a shock
	Recovery plans include tools to allocate unfunded losses and liquidity shortfalls to participants; tools form part of the contract with participants	Recovery plans are more scenario driven
Resolution[(b)]	Loss-allocation in recovery intended to be comprehensive; resolution a 'back-stop'	Resolution plans, which include additional loss-absorbing capacity in resolution for G-SIBs
	Some consideration given to additional pre-funded loss absorbency in resolution	
Disclosure	Disclosure rules aimed at informing participants of risks and responsibilities	Listed companies subject to normal financial reporting requirements
	Minimum quantitative disclosures; qualitative disclosures reflecting PFMI	Comprehensive and detailed qualitative and quantitative regulatory disclosures
	Allows participants to monitor risks	Promotes market discipline

(a) Recovery refers to the tools and plans that financial institutions have in order to return themselves to viability following a severe financial shock

(b) Where recovery tools prove unsuccessful (or cannot be used), resolution tools allow regulators to step in and manage the failure of the institution (potentially allowing some parts to continue while winding down others) in an orderly way

Source: RBA

asset values over a period of time – e.g. an economic recession in which default rates on loans increase over time in response to changes in the level of unemployment or interest rates. In contrast, CCPs are only exposed to the risk of losses over the close-out period, which is typically a matter of days. Scenarios for CCP stress tests generally involve large shifts in portfolio values over a short period – e.g. extreme price moves or sudden changes in volatility, asset correlations, and/or the shape of the yield curve.

Some regulators also use standardised supervisory stress tests for banks, independently testing their resilience against a common set of shocks. Such tests allow banks to be compared and ranked according to their capital adequacy. Some have called for cross-jurisdictional standardised regulatory stress tests for CCPs (JP Morgan Chase 2014). However, any such exercise would need to be approached carefully, given the marked differences in the product scope (e.g. exchange-traded versus OTC derivatives; single market versus multiple markets) and the operating environments of CCPs.

Liquidity risk

Banks and CCPs must also be able to deal with their liquidity risk effectively. For a bank, Basel III addresses liquidity risk with the introduction of two ratios: the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) (BCBS 2013a, 2014b). The LCR ensures that banks have sufficient high-quality liquid assets in order to survive an acute one-month liquidity stress scenario, while the NSFR requires a minimum level of stable funding sources over a one-year horizon to limit banks' reliance on short-term wholesale funding that could quickly dry up in a period of market stress.

While a bank must manage the risk that arises from the liquidity mismatch between its assets and liabilities, a CCP's liquidity risk management focuses on ensuring it has the ability to cover any payment obligations at the time they are due. A CCP is exposed to liquidity risk following the default of a participant, to the extent that it relies on incoming variation margin and other payments from the defaulted participant in order to make payments to other participants. For this reason, a CCP must ensure that it maintains sufficient qualifying liquid resources. These should be held in cash and other highly liquid and marketable securities that maintain their value in times of market stress, and could be liquidated at short notice. The relevant horizon for liquidity risk in the case of a CCP is again a period of days (i.e. until exposures arising from a participant default can be effectively hedged and then closed out). As with credit risk, stress testing is important for both banks and CCPs to confirm the robustness of liquidity risk controls (see above).

Given the funding structure of a typical bank, liquidity stress scenarios typically involve funding pressures, occurring simultaneously with falls in asset prices. Since financial resources for a CCP are pre-funded and largely stable, liquidity stress tests are driven by similar financial market scenarios to their credit stress tests, though with appropriate assumptions related to specific events such as the default of liquidity providers, and in the case of a securities CCP, the timing of settlement obligations.

Market risk

Banks face market risk on their trading assets, as well as through foreign exchange and commodity holdings. Accordingly, a capital charge is applied to this added risk in a bank's balance sheet. In contrast, a CCP maintains a matched book and is only exposed to market movements on cleared products in the event of a participant default. Cash collateral, default fund contributions and assets held for business risk purposes must be invested in assets with low credit, market and liquidity risk.

Operational risk

Operational risk is the risk of losses arising from deficiencies or failures in internal systems, policies or controls. The Basel guidelines account for operational risk using an additional capital charge, complemented by a set of *Principles for the Sound*

Management of Operational Risk (BCBS 2014d). CCPs must meet detailed standards for operational risk management, as set out in the PFMI. This reflects the central importance of uninterrupted operation of a CCP's services, and the maintenance of confidence in the ability of the CCP to perform its functions. These requirements include the capacity to resume operations within two hours following an incident.

Recovery and resolution

There is a high degree of commonality in the recovery and resolution approaches for banks and CCPs, but also some important differences. The basic objectives in both cases are the preservation of financial stability and continuity of critical functions and services, while avoiding recourse to public funds. Given the lack of substitutability of a CCP, continuity of service and the ability to continue to meet contractual obligations to participants on time are particularly prominent considerations, as is the short time horizon over which such obligations are typically due.

Recovery and resolution frameworks for banks are guided by the Financial Stability Board's (FSB) *Key Attributes of Effective Resolution Regimes* (the *Key Attributes*), published in 2011 (FSB 2011), and associated guidance on recovery planning (FSB 2013). The *Key Attributes* were reissued in 2014 with a tailored annex for application of resolution frameworks to FMIs, including CCPs (FSB 2014b), together with a guidance paper developed by CPMI and IOSCO on recovery planning for FMIs (CPMI-IOSCO 2014).

Recovery

Recovery refers to actions taken by the institution (the bank or the CCP) to restore itself to viability following a financial shock. For both a bank and a CCP, the core of recovery planning is to identify stress scenarios and develop processes and options to restore the entity to sustainable viability should they occur. Among the important areas of focus in recovery planning for banks are identification of stress scenarios, operational readiness to deal with stress (including, for instance, by ring-fencing problem business lines, while retaining others intact), early warning indicators, escalation procedures, and the integration of recovery scenarios into the broader risk framework.

In the case of a CCP, a financial shock is less likely to be 'slow-burn' in nature, which requires a CCP to deal with a participant default quickly. It is therefore important that a CCP has clear predefined loss and liquidity allocation procedures established in its rules. The PFMI anticipate contractually agreed loss allocation to (and liquidity provision from) participants sufficient to comprehensively meet any shortfall. The CPMI-IOSCO guidance on recovery sets out five desirable characteristics of CCPs' (and other FMIs') recovery tools: comprehensiveness; effectiveness; transparency, measurability, manageability and controllability; appropriate incentive effects; and minimisation of negative impact (CPMI-IOSCO 2014).

The PFMI requirements aim to strike a balance both between defaulter-pays and mutualised protection, and between pre-funded and ex-post-funded loss allocation. The trade-off is between requiring greater pre-funded loss-absorbing capacity, which could be costly and discourage cleared market activity, versus minimising possible contagion from pushing unfunded losses back to participants. Recent modelling work using data on global OTC derivatives markets (Heath, Kelly and Manning 2015) suggested that a Cover 2 standard (i.e. sufficient pre-funded resources to withstand the default of any two participants in stressed market conditions) would enable unfunded losses to be sufficiently dispersed to minimise contagion, even in highly extreme scenarios.

Resolution

Should recovery prove unachievable, resolution would, at least in theory, be triggered. At this stage, the resolution authority would step in with the power to take a range of actions, including appointing a statutory manager, establishing a bridge institution,

and transferring the clearing business to another provider.

The different roles, risk profiles and balance sheet structures of banks and CCPs lead to significant differences in arrangements for the allocation of remaining losses in resolution. In the case of G-SIBs, the FSB has developed a regime to enhance loss-absorbing and recapitalisation capacity in resolution by establishing a minimum requirement for financial instruments that may be used to absorb losses – so-called total loss-absorbing capacity (TLAC) (FSB 2014a, 2015b).[6] In accordance with the Key Attributes, a G-SIB's resolution authority should have the 'power to write down and convert into equity all or parts of the firm's secured and unsecured liabilities'. Alternatively, the conversion to equity could be applied in the contracts underpinning debt instruments.

Since a CCP is required to establish comprehensive loss allocation arrangements in its rules, resolution should in theory never be necessary (Gibson 2013). Nevertheless, a special resolution regime in accordance with the Key Attributes is an important back-stop should a CCP be unable to fully execute its recovery plan, or should public intervention be desirable on stability grounds. The starting point for a resolution authority would be expected to be the CCP's own recovery plan.

There is an emerging debate at the time of writing as to whether additional forms of pre-funded loss absorbency should be available to a CCP's resolution authority, in the spirit of TLAC. Given the balance sheet structure of a CCP, it is likely that the only remaining pre-funded liability at the point of entry into resolution would be non-defaulted participants' initial margin. Where it was not bankruptcy remote, haircutting initial margin would be consistent with the counterfactual of general insolvency.

Otherwise, generating additional pre-funded resources would necessitate seeking additional *ex ante* commitments – most likely from participants – in the form of a resolution fund (Coeuré 2015). In establishing such a fund, close consideration would need to be given to potential adverse incentive effects, both *ex ante* (since it would increase the cost of submitting trades to clearing) and *ex post* (since the availability of such a fund could have implications for participants' commitment to the CCP's default management and recovery processes). An alternative might involve temporary public funding, to be recovered from participants over time.

Disclosure, governance and transparency

Proper transparency and disclosure is important in order to promote discipline, by giving stakeholders the information required to properly assess the risk of institutions. For banks, the third pillar of the Basel framework details the qualitative and quantitative disclosure requirements for banks, including an extensive and detailed set of data covering a range of risk metrics.

As noted, there is a strong interdependence between CCPs and their participants, who bring risk to the CCP but also bear that risk through mutualisation. Accordingly, such risks should be transparent to participants, and participants should exert a measure of control over them (Kroszner 2006). Governance and transparency are both dealt with in the PFMI, which require that a CCP's 'major decisions reflect appropriately the legitimate interests of its direct and indirect participants'. In practice, many CCPs have participant risk committees and other advisory committees that directly influence key risk policy decisions. Quantitative and qualitative disclosures are also required.

Conclusion

This paper has highlighted some of the key differences between banks and CCPs, demonstrating how these give rise to different channels for transmission of systemic risk and in turn demand different regulatory approaches. At the time of writing, work is ongoing to appraise the level of resilience achieved by CCPs

6 For more information on the TLAC requirements for G-SIBS, see Smith and Tan (2015).

under the PFMI. Experiences from bank regulation may be useful inputs to this debate.

At the same time, however, any refinements to the existing standards for CCPs should continue to reflect important differences between banks and CCPs. For example, banks are exposed to credit risk over long periods, with illiquid assets that can create funding risks; CCPs, by contrast, are largely pre-funded and are exposed to credit and liquidity risk only for a short period following the default of a participant. Similarly, while the size, breadth and complexity of a bank's activities can make it systemically important (domestically and globally), a CCP's systemic importance is largely derived from its role in a specific market (often lacking substitutability) and the important interdependencies it has with its participants.

As discussed, a CCP is not likely to run into difficulties without one or more of its participants failing to meet their obligations, so bank-CCP interactions in a crisis are obviously important. There is more work to be done on the interaction between banks and CCPs. One prominent issue is common participation across CCPs internationally, which means that a large bank failure could impact multiple CCPs.

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