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Abstract

Historical experience shows that disruptions in credit markets can have a material impact on activity and inflation. However, it is hard to measure such effects owing to the difficulty in isolating credit supply shocks. This paper employs survey data to identify the impact of credit supply shocks in Australia over the past three decades, using a structural vector autoregression approach.

We estimate that a one standard deviation shock to the balance of firms reporting difficulty obtaining finance (a 'credit supply shock') reduces Australian GDP by almost ⅓ per cent after one year and gross national expenditure by nearly ½ per cent. The effect on business credit is larger and more persistent, with credit declining by nearly 1 per cent relative to its baseline after two and a half years. During the global financial crisis, the cumulative impact of credit supply shocks is estimated to have contributed to a reduction in GDP of 1 per cent (in mid 2009). While credit supply shocks had a notable effect on GDP during the global financial crisis, this credit event appears to have been shorter and sharper than that experienced during the period of financial instability in the early 1990s.

Consistent with a 'credit channel' of monetary policy transmission, an unexpected tightening of monetary policy results in a significant increase in the balance of firms reporting difficulty obtaining finance. We also find effects consistent with a financial accelerator mechanism, whereby an improvement in balance sheets results in easier credit conditions and higher GDP and business credit. Altogether, these results suggest that credit market developments have been an integral aspect of the business cycle in Australia since financial deregulation in the 1980s.

JEL Classification Numbers: C32, E51, E52
Keywords: credit, credit channel, monetary policy, financial accelerator

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1. Introduction

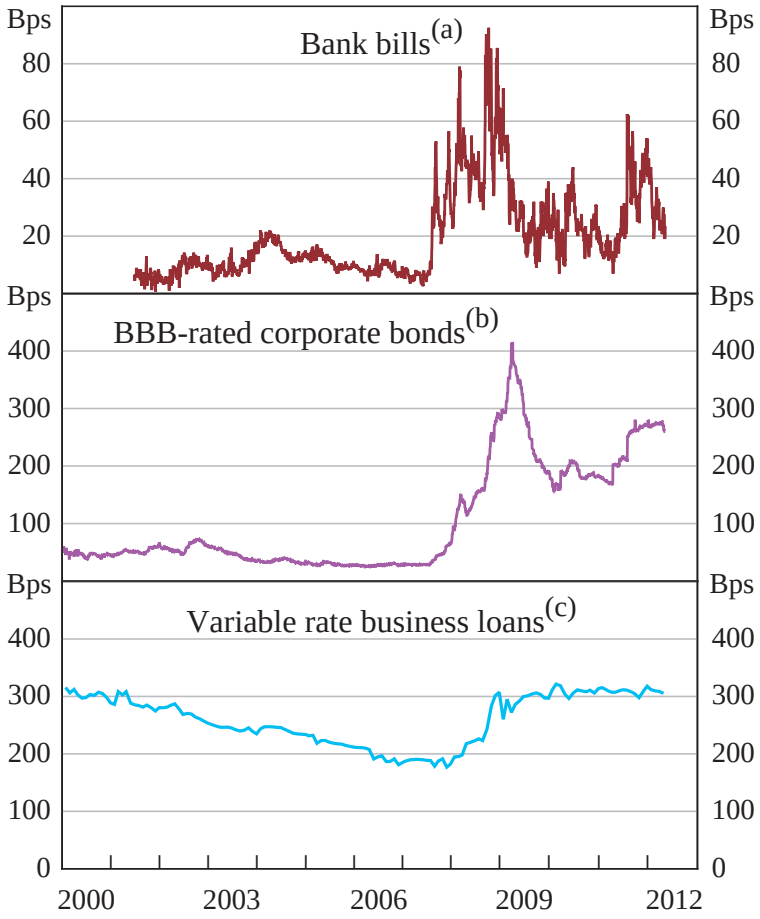
It has long been observed that economies are prone to cycles of boom and bust in credit markets. In Australia, since financial deregulation in the 1980s, there have been two major episodes of financial turmoil, first with the recession of the early 1990s and more recently with the global financial crisis.

These episodes have clearly illustrated that disruptions in credit markets can have significant consequences for the real economy. In Australia and abroad, the global financial crisis saw a sharp rise in risk premia in financial markets and heightened constraints upon the supply of credit (Figure 1). This increased the cost and difficulty of obtaining finance for firms and households to fund private investment and consumption.

The channels through which these credit market frictions can influence the real economy have been discussed at length from a theoretical perspective (see, for example, Pagan and Robinson (2011)). However, quantifying the real effects of credit frictions requires identification of exogenous shifts in credit supply, which can be difficult, particularly as credit demand can also shift. For example, in addition to disruptions in credit markets, the global financial crisis saw sharp falls in consumer and business confidence, and a much more cautious attitude to spending, exacerbated by a desire to repair highly geared balance sheets.[1] This reduced the demand for credit, contributing to the sharp decline in real business credit in 2009, making it difficult to disentangle the effects of a tightening in credit supply (Figure 2).

1 Senior officials at the Reserve Bank of Australia have delivered many speeches since the onset of the crisis discussing the implications of credit market disruptions for the real economy. For example, see Stevens (2009), Battellino (2009), Edey (2009) and Ellis (2009).

Figure 1: Australian Financial Market Spreads



Notes: (a) Spread to overnight indexed swap rate, 3-month

(b) Spread to swap rate, 5-year

(c) Spread to cash rate, outstanding loans

Sources: AFMA; APRA; RBA; Tullett Prebon (Australia) Pty Ltd; UBS AG, Australia Branch

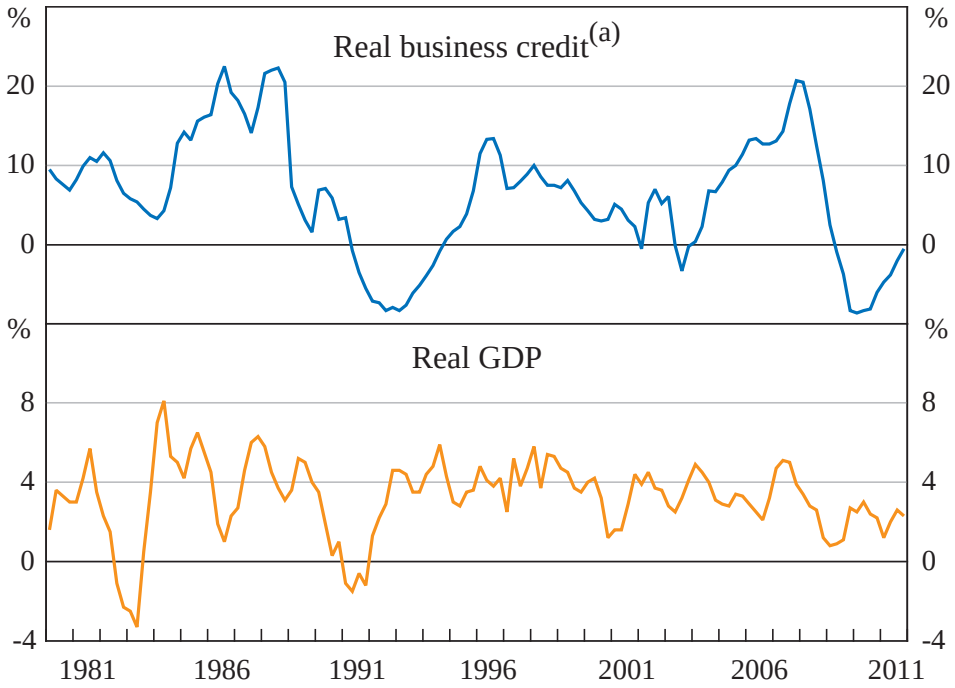
The main contribution of our research is to identify the importance of credit supply shocks for business credit and GDP in Australia over the past three decades. We employ a structural vector autoregression (VAR) model of the Australian economy and identify credit supply shocks by means of a survey variable that captures the difficulty that firms report in obtaining finance. This series is from the ACCI-Westpac Survey of Industrial Trends, the longest, continuous running private-sector survey in Australia.[2] While this survey variable has been previously

2 See Australian Chamber of Commerce and Industry (2009).

interpreted as a gauge of credit supply (Lowe and Rohling 1993; Park 2011), it has not been used to identify credit supply shocks empirically.[3]

Figure 2: Credit and GDP Growth

Year-ended percentage change



Note: (a) Nominal business credit divided by domestic final demand deflator

Sources: ABS; RBA

Understanding the impact of credit supply shocks is important from the perspective of a central bank. The implications for output and policy may vary depending on whether credit developments are driven by supply or demand factors. For example, an increase in the equilibrium price of credit in the economy may reflect an increase in the demand for credit or a tightening in the supply of credit. In the first case, policymakers may respond by increasing the cash rate to contain aggregate demand pressures, whereas in the second case policymakers may decrease the cash rate to ease financial conditions in the economy. Alternatively, a decline in the

3 Suzuki (2004) uses the ACCI-Westpac variable in a structural VAR framework. However, the aim of Suzuki's paper is somewhat different, looking to test the role of a bank lending channel of monetary policy transmission in Australia, as opposed to identifying shifts in credit supply. The bank lending channel is generally predicated on monetary policy affecting the supply of free reserves, which is not the case under the 'corridor' system of monetary policy implementation adopted in Australia (see Baker and Jacobs (2010)).

equilibrium quantity of credit in the economy may reflect a decline in the demand for credit or a tightening in the supply of credit, both of which may require more accommodative policy settings.

In addition to examining whether credit frictions have real effects, we also consider other broad implications of credit frictions for the macroeconomy. We assess whether credit frictions play a role in the transmission of monetary policy (a so-called 'credit channel') and also whether shocks to the creditworthiness of borrowers (unrelated to monetary policy developments) can lead to a higher cost of borrowing and stricter loan terms.

The paper is organised as follows. The next section outlines the theoretical linkages between credit frictions and the macroeconomy. Section 3 considers possible measures of credit frictions, introduces the ACCI-Westpac survey variable, and briefly reviews the related empirical literature. Section 4 explains the structural VAR specification used to model the role of credit frictions in the Australian economy. Section 5 presents the results and Section 6 examines some robustness exercises. Conclusions are drawn in Section 7.

2. Credit Frictions in Theory

Many early scholars of the Great Depression saw credit market developments as central to explaining the length and depth of that crisis.[4] However, the importance of credit frictions and balance sheets largely fell out of favour in the macroeconomics literature over subsequent decades, as documented by Gertler (1988).[5] Attention shifted to the primary importance of monetary aggregates and price rigidities (notably Friedman and Schwartz (1963)).

Accordingly, with some notable exceptions, New Keynesian models at the heart of modern monetary economics generally had not incorporated frictions in the financial market up until recently. Rather, frictions were added as a feature of the goods market in terms of price stickiness or the labour market in terms of wage

4 Most notably, Fisher (1933) placed heavy emphasis on factors such as over-indebtedness and the crippling deterioration in borrower balance sheets caused by the combination of deflation and nominal debt contracts.

5 There were notable exceptions, e.g. Gurley and Shaw (1955).

rigidity. In theoretical terms, abstracting from financial markets can be justified if financial markets are thought to be 'frictionless', with complete information and an ability to hedge perfectly against any risk. In such a world, finance is supplied elastically at the risk-free rate, and so the financial market is a 'passive participant' in general equilibrium. This assumption underlies both the canonical New Keynesian and real business cycle models' treatment of the financial market.

Bernanke (1983) marked the start of a revival of interest in the importance of financial frictions for the macroeconomy. He demonstrated empirically that financial factors held substantial explanatory power over and above purely monetary explanations for the Great Depression. Since the global financial crisis there has been a further resurgence of interest in modelling financial frictions and their importance for the real economy.

A key departure from the assumption of frictionless markets is information asymmetry, which is endemic in financial market contracts.[6] Borrowers are more informed than lenders with regard to the use of, and likely return on, borrowed funds, which presents lenders with the usual agency costs such as adverse selection, moral hazard and monitoring costs (e.g. Stiglitz and Weiss 1981). These agency costs act as a friction against the supply of credit and can manifest themselves in two main ways:

- *An external finance premium*. Borrowers will pay a premium for accessing external funding, increasing the price of finance.

- *Non-price contract terms*. Lenders may seek to alleviate agency problems through 'non-price' aspects of financial contracts; for example, borrowers may be required to post minimum collateral (e.g. a loan-to-valuation ratio limit) or provide minimum documentation. The need to meet these contract terms can restrict the quantity of finance available to borrowers.

6 Frictions other than information frictions may also operate. For example, if lenders are not perfectly competitive and risk neutral, then the external finance premium also reflects risk aversion and profit margin. In this case, credit supply may also shift due to changes in industry structure (e.g. financial deregulation) or the attitude of intermediaries toward risk.

In turn, credit frictions can have broad implications for the macroeconomy. In particular:

- *Credit frictions affect real activity*. Credit frictions increase the marginal cost and reduce the availability of finance – in effect, credit supply is no longer perfectly elastic. This results in a smaller equilibrium capital stock in the economy. Moreover, credit supply may shift in a manner that amplifies the business cycle. A downturn in the real economy weakens firms' and households' balance sheets, leading to an increase in the external finance premium and tighter non-price terms in loan contracts, amplifying the initial shock. The reverse is also true; frictions are alleviated during periods of strong economic growth, providing additional stimulus to real activity. Moreover, as well as propagating shocks within the economy, the credit market can also be a source of shocks.

- *Credit frictions play a part in policy transmission*. Credit frictions may give rise to an additional 'credit channel' of monetary policy transmission. An increase in policy rates lowers both asset values and cash flows to businesses and households, reducing their creditworthiness. In turn, this leads to a rise in the external finance premium and tighter contract terms, which amplifies the initial policy tightening.

A group of theoretical models has embedded these mechanisms in a general equilibrium setting – these are broadly referred to as 'financial accelerator' models (Carlstrom and Fuerst 1997; Kiyotaki and Moore 1997; Bernanke, Gertler and Gilchrist 1999).[7] While the financial accelerator mechanism operates through the investment activities of firms, credit frictions may also affect aggregate demand through other components of expenditure. In particular, residential investment, consumption, trade and inventories might all be affected by the availability of credit (Pagan and Robinson 2011).

7 Earlier work integrated credit market frictions into an IS-LM framework (Bernanke and Blinder 1988). This operated through a 'bank lending channel' which is irrelevant for Australia (as discussed in footnote 3).

3. A Proxy for Credit Frictions

While the mechanisms through which credit frictions might influence the real economy have been set out from a theoretical perspective, determining the empirical importance of these frictions is challenging. Quantifying the real effects of credit frictions requires identification of exogenous shifts in credit supply, which reflect financial stress, separately from shifts in credit demand, which can reflect other factors. Finding an appropriate variable that isolates shifts in credit supply – particularly for Australia – is difficult:

- *Interest spreads on 'speculative grade' corporate bonds* have been identified in the literature as a reasonable proxy of the external finance premium and hence credit frictions (Bernanke and Gertler 1995; Gertler and Lown 2000). However, the corporate bond market in Australia has deepened only since the late 1990s and remains dominated by highly-rated institutions.[8]

- An alternative is to use *interest spreads on bank lending*. Bank lending is the predominant source of business debt – particularly for smaller firms which are more likely to be credit constrained. However, these spreads are volatile prior to 1990. Moreover, measures of credit spreads might reflect demand conditions and fail to capture changes in the non-price terms of credit contracts, which can be an important aspect of shifts in credit supply.

Instead, our analysis makes use of a variable that has been virtually unused in previous Australian studies – a survey-based measure of the difficulty obtaining business finance.[9] The data are from the ACCI-Westpac Survey of Industrial Trends, the longest, continuous running private-sector survey in Australia. The survey began in 1960, and is conducted quarterly across a wide range of Australian

8 See Debelle (2011).

9 As discussed in footnote 3, Suzuki (2004) uses the ACCI-Westpac variable in a structural VAR framework. However, the aim of that work is somewhat different, looking to test the role of a bank lending channel of monetary policy transmission in Australia, as opposed to identifying shifts in credit supply.

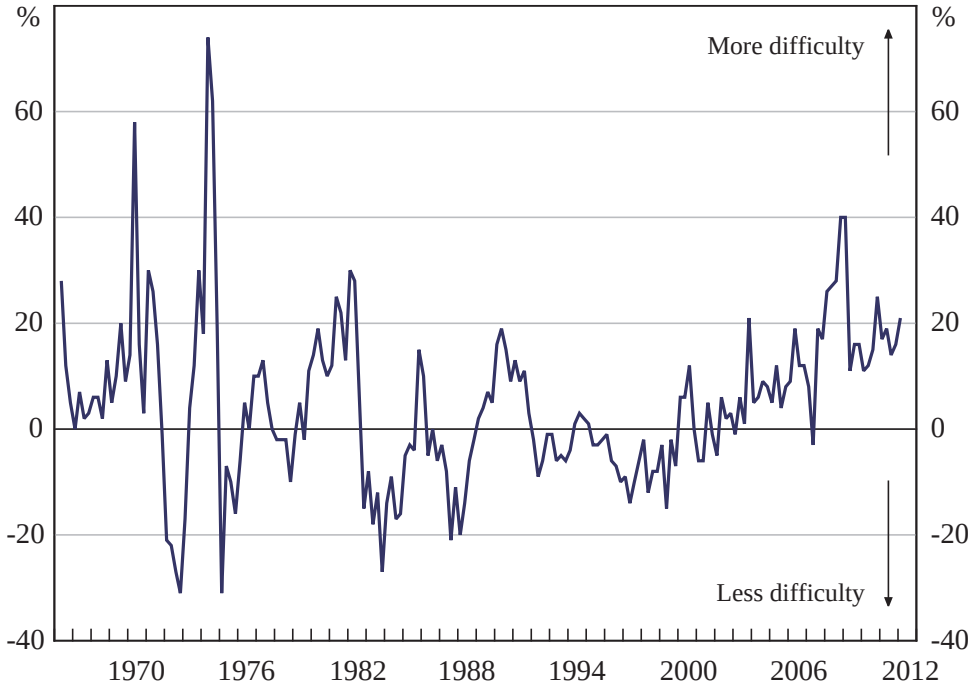
manufacturing firms. It includes the following question, which has been unchanged since June 1966:[10]

'Do you find it is now harder, easier, or the same as it was three months ago to get finance?'

Figure 3 shows the net balance of responses to this question – that is, the percentage of firms reporting more difficulty obtaining finance over the past three months less the percentage of firms reporting less difficulty obtaining finance.

Figure 3: Difficulty Obtaining Finance

Net balance of firms reporting difficulty obtaining finance



Source: ACCI-Westpac

10 The ACCI-Westpac survey period has changed a few times throughout its history, but in recent years it has been conducted over four weeks around the middle month of each quarter. Prior to 1993, respondents were able to choose from the responses: harder, easier, no change or not applicable (NA). Post-1993, the NA response was removed from the survey. The option of the NA response prior to 1993 may have increased the volatility of the series in the earlier part of the sample.

This survey variable offers several key advantages:

- It has been widely interpreted as an indicator of credit supply in other research, including Lowe and Rohling (1993) and Park (2011). This interpretation is important for our analysis, and is discussed in more detail in Section 3.1.

- It should capture both price and non-price changes in credit supply. For example, firms should recognise both an increase in lending rates and a change in lending standards (such as increased collateral requirements) as contributing to finance becoming more difficult to obtain.

- It has a long history, covering a number of business cycles. This history compares favourably to other surveys conducted both in Australia and internationally, most of which commenced in the 2000s.[11]

The ACCI-Westpac survey includes around 300 firms each quarter. The division of respondents between small/medium-sized firms and large firms has remained broadly unchanged over time. Typically, the survey contains more firms employing 1–200 people (around 60 per cent of the sample) than those employing more than 200 people (around 40 per cent). The share of respondents across different manufacturing sub-industries has also remained broadly unchanged over time.[12]

11 Other Australian surveys that include questions on credit conditions include the National Australia Bank's Monthly Business Survey (its question on difficulty obtaining finance started in 2008) and the UBS Loan Officers' Survey, which started in 2009. International surveys with a long history on credit conditions include the Federal Reserve's Senior Loan Officer Opinion Survey (which started in 1967, but there are periods in its history where survey data were not collected) and the US National Federation of Independent Business' Small Business Survey, which started in 1986.

12 One exception to this is the noticeable decline in the proportion of respondents from textiles, fabrics, floor coverings, felt, canvas & rope and clothing & footwear sub-industries between the 1960s and 1980s.

3.1 Difficulty Obtaining Finance as a Gauge of Credit Supply

As noted, the ACCI-Westpac survey variable has been broadly interpreted as an indicator of credit supply in previous research. Accordingly, we interpret innovations to the series as 'credit supply shocks' in order to identify the impact of credit supply on real activity. Given its importance, we explore this interpretation further below.

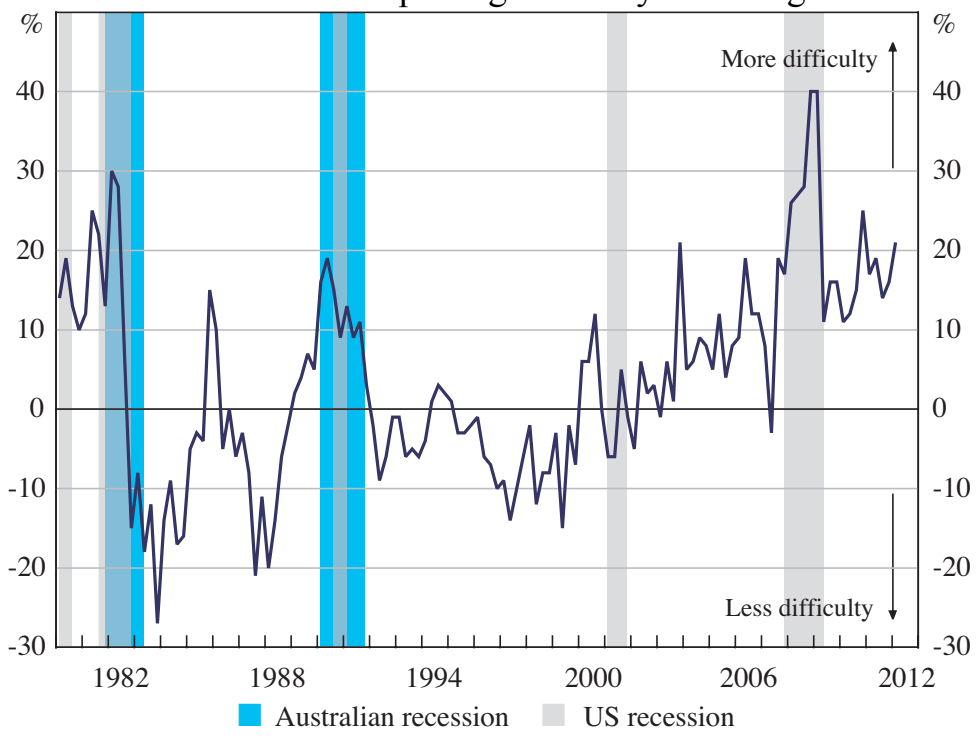
We can see that the variable behaves in a manner over the business cycle that is consistent with broad narratives on developments in credit supply. Respondents report greater difficulty obtaining finance during periods of recession in Australia (and the United States), and less difficulty obtaining finance during periods of economic expansion (Figure 4). Recessions typically result in a deterioration in borrower creditworthiness, prompting lenders to reduce exposures to riskier assets and retract credit supply. Two important episodes of tight credit supply that have been well documented are the early 1990s and the global financial crisis period.[13]

If the survey variable was instead driven by cycles in the demand for credit the opposite pattern would be expected over the business cycle. That is, a recession would reduce the demand for credit, and the resulting decline in competition for funds would therefore reduce the difficulty of obtaining finance.

13 For the 1990s period see Kent and D'Arcy (2000) and Macfarlane (2006), and for the global financial crisis period see Debelle (2009), Battellino (2010, 2011) and Davis (2011).

Figure 4: Difficulty Obtaining Finance

Net balance of firms reporting difficulty obtaining finance



Sources: ACCI-Westpac; Melbourne Institute; National Bureau of Economic Research

Since the period of financial deregulation in the early–mid 1980s, the availability of credit has been determined largely by lenders allocating funds on the basis of commercial considerations, such as borrower creditworthiness. In contrast, the availability of credit prior to financial deregulation reflected a different set of factors. The Australian financial system was subject to various regulatory controls over the price and quantity of credit, and banks were generally reliant on deposits for funding so that asset growth was constrained. One outcome of these constraints was that increased demand for credit might go unmet, resulting in increased difficulty obtaining finance (see Battellino and McMillan (1989), Lowe and Rohling (1993)).[14] In other words, the survey indicator of the difficulty obtaining finance is likely to be a less reliable measure of changes in credit supply prior to the early–mid 1980s.

As an illustration of this, Table 1 calculates the average of GDP growth, business credit growth and a measure of business confidence during periods of increasing

14 Also see Battellino (2007) and references contained therein.

difficulty obtaining finance, and compares these averages to those for periods of decreasing difficulty obtaining finance. Prior to deregulation, increasing difficulty obtaining finance tended to be associated with periods of stronger economic growth, stronger credit growth and improving business confidence, whereas the opposite has been the case in the period since deregulation.[15]

Table 1: Difficulty Obtaining Finance and Economic Conditions[(a)]

Average of economic conditions over the past 12 months

	Before deregulation pre-1984[(b)]			After deregulation 1984–2011		
	Increasing difficulty	Decreasing difficulty	**Difference**	Increasing difficulty	Decreasing difficulty	**Difference**
GDP growth	4.1	1.9	**2.1**	2.7	3.8	**–1.1**
Business credit growth	19.4	14.8	**4.6**	9.5	9.9	**–0.4**
Business confidence	14.3	–1.7	**16.0**	–11.8	1.1	**–12.9**

Notes: (a) Year-ended growth in GDP and business credit; average over the past year of business confidence as measured by the ACCI-Westpac survey; difficulty obtaining finance is adjusted for a structural break in the mean in September 2002, as discussed in Section 4.2.

(b) Sample periods are based on longest available series: GDP growth (1966); business credit growth (1976); business confidence (1966).

Sources: ABS; ACCI-Westpac; RBA

While the behaviour of the survey variable strongly suggests that since deregulation it has been dominated by developments in credit supply, we cannot rule out some influence of credit demand. For example, a positive shock to credit demand might see borrowers increase leverage, creditors tighten lending standards and pricing, and borrowers report greater difficulty obtaining finance. Nonetheless, by restricting our analysis to the post-deregulation period, we expect the influence of credit demand factors on the survey variable to be of a second order of importance.

15 This analysis does not address the possibility of endogeneity between credit supply conditions and economic variables (hence the need for the structural VAR analysis presented later in this paper). Nonetheless, for the purposes of Table 1, a simple means of addressing this endogeneity issue is to use lagged observations of economic conditions, which yields qualitatively similar results.

3.2 Other Caveats in the Use of the Survey Variable

Notwithstanding its advantages, there are also a number of limitations in using the survey variable. Most importantly, the ACCI-Westpac survey covers only manufacturing firms. As a result, we are only assessing financing conditions for one component of total investment. Credit frictions are also likely to operate through other components of business and household investment as well as consumption and trade (Pagan and Robinson 2011).

However, to the extent that credit conditions are correlated across sectors, the ACCI-Westpac variable should act as a proxy for credit frictions more broadly. This correlation is apparent when we compare the ACCI-Westpac variable to broader information about credit conditions, such as in the National Australia Bank's Monthly Business Survey (although this is only available more recently).[16] The ACCI-Westpac variable also exhibits a relationship with international surveys of credit conditions, reflecting the globalised nature of capital markets (Figure 5).[17]

Nonetheless, credit conditions are unlikely to be perfectly correlated across sectors, and the variable is likely to reflect some factors unique to the Australian manufacturing sector. In particular, over the past few decades there has been a structural shift in the economy away from the manufacturing sector, exacerbated in recent years by the mining boom and associated sharp rise in the exchange rate. Manufacturing profits as a share of total profits (excluding manufacturing and mining) have continued to decline over the past decade, and heightened competitive pressures during this period may have contributed to tighter financing conditions in the manufacturing sector relative to the rest of the economy (Figure 6). This appears evident in the ACCI-Westpac variable, with the net balance of firms reporting difficulty obtaining finance trending upwards from the early part of the 2000s. For this reason, we test and control for a structural break in the survey variable, which is discussed in more detail in Section 4.2.

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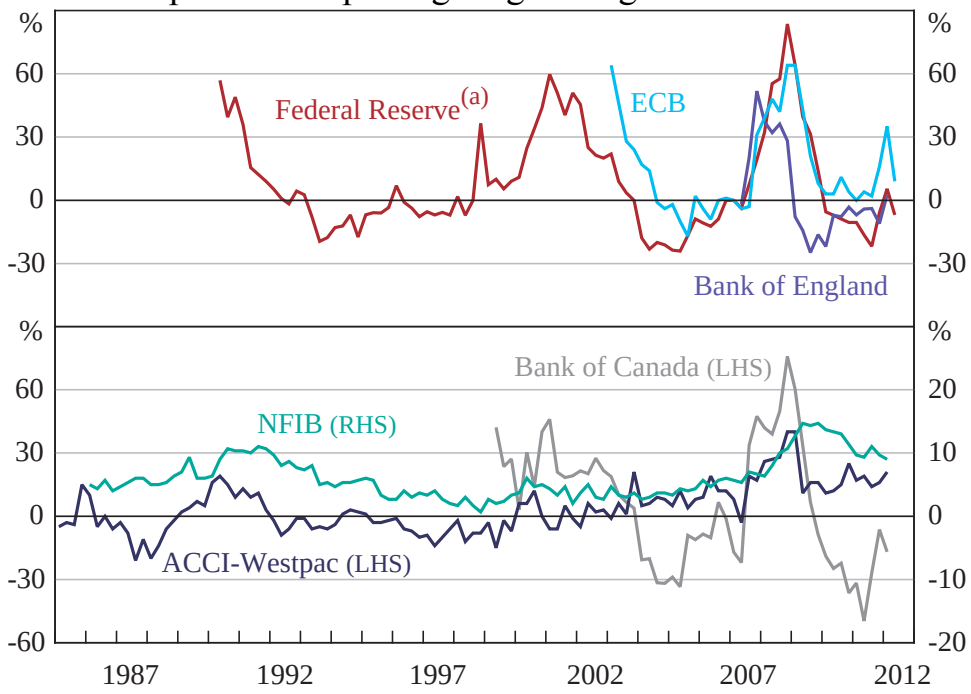
16 This correlation is likely to be boosted by the fact that financial institutions are themselves subject to credit frictions. A deterioration in one sector of the economy can result in a deterioration in the balance sheets of intermediaries, resulting in a tightening of credit conditions more broadly.

17 Note that some of the international surveys are based on information from lenders, whereas the ACCI-Westpac survey is from the perspective of borrowers.

Figure 5: International Credit Conditions Surveys

Net balance of respondents reporting a tightening in business credit conditions



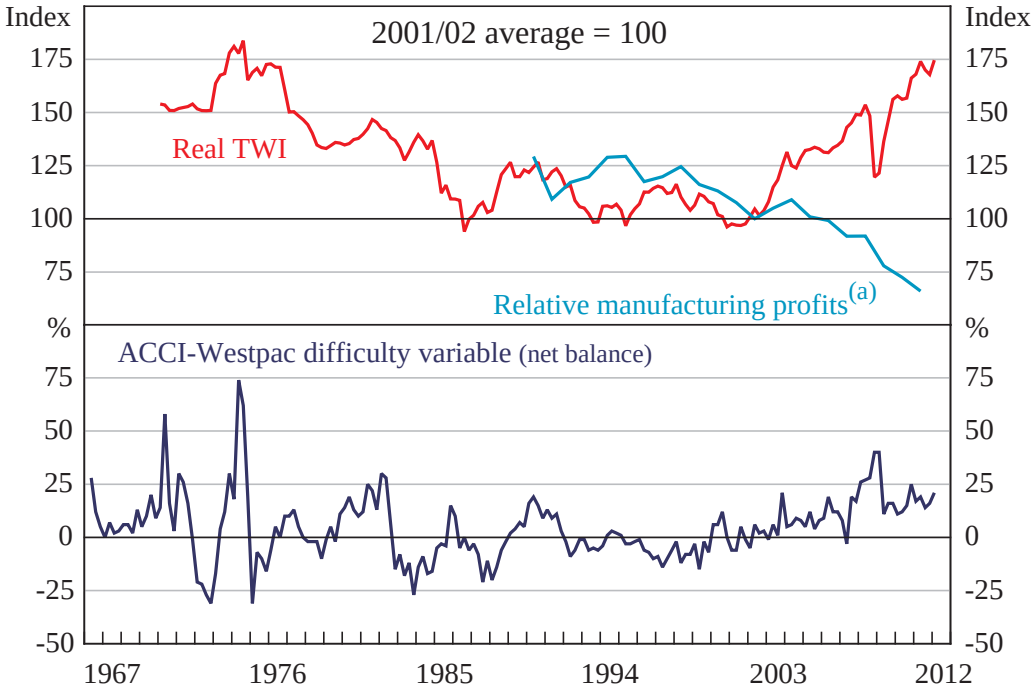
Notes: For details on the international survey questions see Appendix A

(a) Large and medium-sized firms only

Sources: ACCI-Westpac; Bank of England; Thomson Reuters

Finally, as with any survey, there are also potential issues in interpreting responses to the survey question. In particular, past work has suggested that respondents may report the level rather than change in difficulty obtaining finance (Lowe and Rohling 1993; Park 2011).

Figure 6: Manufacturing Sector Indicators



Note: (a) Manufacturing gross operating surplus (GOS) and gross mixed income (GMI) divided by total GOS + GMI excluding manufacturing and mining GOS + GMI

Sources: ABS; ACCI-Westpac; RBA; Thomson Reuters

3.3 Related Literature

Previous papers have used a range of techniques to identify and estimate the importance of credit supply shocks, including: sign- and zero-restricted structural VARs (Halvorsen and Jacobsen 2009; Meeks 2009; Busch, Scharnagl and Scheithauer 2010; Helbling *et al* 2010; Tamási and Világi 2011); DSGE models (Queijo von Heideken 2009; Gilchrist and Zakrajšek 2011); and panel regressions using firm and industry level data (Terrones, Scott and Kannan 2009; Becker and Ivashina 2010). Most of these papers use financial indicators such as credit quantities, prices, spreads, default rates and/or net worth to identify structural shocks to credit supply.

More closely related to our research, a small number of papers have used survey data to identify credit shocks. Bassett *et al* (2010) use the Federal Reserve's quarterly Senior Loan Officer Opinion Survey (SLOOS) to create a measure of credit supply shocks. The authors regress banks' individual responses to changes in their lending standards on a range of bank-specific and macroeconomic variables.

The residuals from this panel regression are then aggregated and treated as an exogenous credit shock series in a VAR model of the economy. They find that a one standard deviation tightening in lending standards results in a decline in real GDP of 0.4 per cent in the first year after the shock. A tightening in lending standards also results in an increase in the credit spread and a decline in the federal funds rate.

In a similar vein, Bayoumi and Darius (2011) include an aggregate measure of lending standards from the SLOOS in a standard VAR model with a range of other macroeconomic variables, interest rates and financial asset prices. Structural shocks are identified by a Choleski decomposition. They estimate that a one standard deviation shock to lending standards results in a 0.3 per cent decline in GDP after one year, and 0.4 per cent after two years. The authors also consider an alternative measure of credit conditions from the NFIB Small Business Survey (SBS). One of the interesting differences between the SLOOS and SBS is that the SLOOS examines credit conditions from the lenders' perspective, whereas the SBS examines them from the borrowers' perspective (as with the ACCI-Westpac survey). The results from the model using SBS data are broadly consistent with the SLOOS model, although the magnitudes of the effects of credit shocks are smaller.

Rather than using an aggregate measure of credit conditions, Lown and Morgan (2006) focus only on changes in commercial and industrial lending standards from the SLOOS. The authors also use a VAR model with a Choleski decomposition to identify structural credit shocks, and they find that an 8 percentage point increase in the net balance of banks reporting a tightening in standards leads to a 3 per cent decline in the quantity of lending and a 0.5 per cent decline in GDP.

Finally, Ciccarelli, Maddaloni and Peydró (2010) use responses from the ECB's and Federal Reserve's bank lending surveys to construct measures of both credit supply and credit demand. These credit variables are included in VAR models (a panel VAR in the case of the euro area) along with real GDP, the GDP deflator and policy interest rates. The credit channel of monetary policy is found to be operational in both the euro area and the United States, with a monetary policy shock affecting credit availability. In terms of decomposing GDP growth during the financial crisis, the authors find that restrictions to the supply of credit to firms

played an important role in reducing output growth in the euro area and restrictions to credit availability for mortgages played an important role in explaining changes in GDP growth in the United States.

4. Modelling the Role of Credit Frictions in the Australian Economy

Our aim is to use an empirical method to assess the impact of credit frictions on the Australian economy and the extent to which shifts in credit supply explain historical variations in GDP and business credit.

We seek to identify the effects of credit supply shocks by using a structural VAR approach. This approach estimates the endogenous relationships between variables using a set of identification assumptions, so that exogenous (orthogonal) 'shocks' to the system can be recovered. The response of the system to these exogenous shocks – for example, a credit supply shock or monetary policy shock – can then be interpreted as revealing economic relationships free of endogeneity problems.

4.1 Structural VAR Technical Details

Technical details of the structural VAR approach are well-documented (Sims 1980; Hamilton 1994; Christiano, Eichenbaum and Evans 1999). We assume that the economy can be represented by the following structural form:

$$\Gamma_0 Y_t = \Gamma(L) Y_{t-1} + \Sigma^{\frac{1}{2}} e_t$$
$$E(e_t) = 0$$
$$E(e_t e_t') = I$$
$$E(e_t e_{t+s}') = 0, \forall s \neq 0$$

where:

- Y_t is a $n \times 1$ vector of macroeconomic and policy variables.

- Γ_0 is a non-singular matrix that captures the contemporaneous relationship between the variables, normalised to have 1's along the diagonal.

- $\Gamma(L)$ is a matrix of p^{th} order polynominals in the lag operator L, capturing the lag structure of the multivariate system.

- e_t is a $n\times 1$ vector of serially uncorrelated, orthogonal structural shocks, with $\Sigma^{\frac{1}{2}}$ being a diagonal matrix of structural shock standard deviations.

To identify the structural system, we must estimate a reduced-form VAR and impose sufficient restrictions to identify the structural parameters. The reduced form is:

$$\begin{aligned} Y_t &= \Gamma_0^{-1}\Gamma(L)Y_{t-1} + \Gamma_0^{-1}\Sigma^{\frac{1}{2}}e_t \\ &= A(L)Y_{t-1} + u_t \\ \Omega &\equiv E(u_t u_t') \\ &= \Gamma_0^{-1}\Sigma\Gamma_0^{-1\prime} \end{aligned}$$

Identification of the structural form involves recovering Γ_0 and Σ from Ω. This requires sufficient restrictions upon the form of Γ_0 and Σ. Specifically, the two matrices may have a total of no more than $n(n+1)/2$ unknown parameters – the number of parameter estimates obtained from $\hat{\Omega}$. In addition, the restricted Γ_0 must be of full rank.

Typically, restrictions are 'zero restrictions' upon elements of Γ_0 and Σ (keeping in mind that Σ is diagonal, and diagonal elements of Γ_0 are normalised to 1). The simplest approach is to specify Γ_0 as lower triangular – a Choleski ordering, or 'recursive structure'. Under such a scheme, each variable in the ordering is predetermined with respect to subsequent variables in the ordering. Variables that are deemed more exogenous are placed higher in the ordering.

Recursive structures are usually difficult to justify on economic grounds and so non-recursive schemes whereby Γ_0 is not lower triangular are often used (see Christiano *et al* (1999)). A non-recursive identification scheme is used in this paper.

4.2 Model Specification

Our structural VAR system consists of the following variables (for complete definitions see Appendix A):

- **External sector.** The external sector is captured by the log of Australia's major trading partner GDP (*gdp**), the log of the RBA's Index of Commodity Prices deflated by the US GDP deflator (*icp*), a real foreign interest rate (*r**) and the log of Australia's real trade-weighted exchange rate (*rtwi*).

- **Domestic (non-credit) sector.** The domestic (non-credit) sector is represented by the log of real gross national expenditure (*gne*), the log of real GDP (*gdp*), trimmed mean CPI inflation (π) and the cash rate (*r*). The latter three variables correspond with the three endogenous variables in the canonical New Keynesian DSGE model (Clarida, Galí and Gertler 1999). We follow Dungey and Pagan (2000, 2009) by including GNE in our model as well as GDP; as discussed in Dungey and Pagan (2000), GNE includes spending on imports and therefore it is likely that GNE and GDP react differently to variables such as the exchange rate.

These variables are generally consistent with other small open economy structural VARs, including Kim and Roubini's (2000) specification for advanced economies and previous Australian studies (e.g. Brischetto and Voss (1999); Dungey and Pagan (2000, 2009); Berkelmans (2005); Lawson and Rees (2008)). Finally, we also include:

- **Domestic credit market.** The Australian credit market is represented by the spread between the average variable lending rate paid by large businesses and the cash rate (*spread*), the log of aggregate real business credit (*credit*), and the ACCI-Westpac survey measure of difficulty obtaining finance (*difficulty*). In effect, these represent price, quantity and a measure of the tightness of

supply for the business credit market.[18] In the baseline model we focus on the business credit market as this is most consistent with the use of the ACCI-Westpac survey variable.

As discussed, the *difficulty* variable is likely to have been affected by structural change in the economy over the past decade. Econometric tests identify a structural break in the mean of the series from September 2002.[19] Given that structural change in the manufacturing industry can be characterised as a gradual rather than sudden change, we account for the structural break in our baseline model by detrending the *difficulty* variable using a Hodrick-Prescott filter. In the robustness section we also consider two alternative possibilities: detrending the series using a deterministic trend from September 2002; and controlling for a mean shift from September 2002.

The logs of major trading partner GDP, Australian GNE, Australian GDP and business credit are detrended using a deterministic trend before entering the structural VAR model. The three foreign variables – *gdp**, *icp* and *r** – are treated as exogenous variables in the system. The system is estimated with two lags of both the endogenous and exogenous variables.[20]

A non-recursive set of restrictions is placed on the contemporaneous relationships in our system. Each coefficient γ_{ij} in the matrix Γ_0 indicates that structural shocks to variable *j* affect variable *i* contemporaneously. The diagonal elements are normalised to 1, and blanks indicate elements that are constrained to equal zero.

The key aspects of our exactly identified scheme are explained below.

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18 The set of credit market variables is somewhat analogous to the set of New Keynesian variables. Both sets contain a price and quantity term – inflation and output in the New Keynesian case, or spread and credit aggregate for the credit market. Also, both contain a 'shifter' variable that is the main focus – an aggregate demand shifter in the case of monetary policy, and a credit supply shifter in the case of the difficulty obtaining finance.

19 A Bai-Perron test using a 'mean + error' specification indicated one structural break in the mean of the ACCI-Westpac series from September 2002 (this allowed for up to four regime changes, imposing a minimum regime length equivalent to 20 per cent of the sample).

20 Akaike and Bayesian Information criteria for various model specifications suggest an optimal lag length of one, but an additional lag is included to absorb remaining serial correlation in some of the equations.

$$\Gamma_0 y_t = \left[\begin{array}{cccc:cccc} 1 & & & & & & & \\ \gamma_{21} & 1 & & & & & & \gamma_{28} \\ \gamma_{32} & \gamma_{32} & 1 & & & & & \\ & & & 1 & & \gamma_{46} & & \gamma_{48} \\ \hdashline \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & 1 & & & \\ \gamma_{61} & \gamma_{62} & & \gamma_{64} & \gamma_{65} & 1 & \gamma_{67} & \\ \gamma_{71} & \gamma_{72} & \gamma_{73} & \gamma_{74} & \gamma_{75} & \gamma_{76} & 1 & \\ \gamma_{81} & \gamma_{82} & \gamma_{83} & \gamma_{84} & \gamma_{85} & \gamma_{86} & \gamma_{87} & 1 \end{array}\right] \left[\begin{array}{l} gne_t \\ gdp_t \\ \pi_t \\ r_t \\ credit_t \\ spread_t \\ difficulty_t \\ rtwi_t \end{array}\right]$$

Credit market variables are assumed to react to real economy variables contemporaneously (the lower left quadrant of the matrix). The exception to this is that the spread is assumed not to react to inflation; that is, the nominal risk-free rate (r) can be thought of as comprising the real interest rate and compensation for (expected) inflation, with the additional spread on business loans compensating only for the additional risks involved in lending to businesses, such as credit and liquidity risk.[21] The difficulty-obtaining-finance variable and the credit spread are assumed to react contemporaneously to one another (γ_{67} and γ_{76}), reflecting the possibility that banks adjust both the price and non-price terms of loans in accordance with their willingness to lend.

The central bank is assumed not to react to Australian GNE, GDP and inflation immediately, reflecting the lag with which these variables are observed. Monetary policy reacts immediately to movements in the credit spread (γ_{46}), as this affects the rate paid by borrowers, but not directly to movements in the *difficulty* variable. That is, while policymakers might react quickly to the impact of a credit shock on loan pricing, they might wait for broader evidence of a change in lending standards rather than reacting immediately to the ACCI-Westpac survey variable. The central bank also takes into account contemporaneous information about the exchange rate when formulating policy (γ_{48}).

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21 The nominal business lending rate can be expressed as:

$r^b = r + s = (\rho + \pi) + s$

where: r is the nominal risk-free rate; s is the spread; ρ is the real risk-free rate; and π is the inflation premium, which compensates for expected inflation. This representation assumes that the components are additive rather than multiplicative.

Credit market variables are assumed not to affect output immediately. This might reflect the tendency for firms to use internal funds to maintain output in the short term, as well as lags between credit applications and settlement. Finally, the exchange rate is assumed to have a contemporaneous effect on GDP (through net exports), but a lagged effect on inflation.[22]

5. Results

The model is estimated using quarterly data over the period December 1983 to December 2011. Confidence bands are generated using a Monte Carlo procedure.[23]

5.1 Response to a Credit Supply Shock

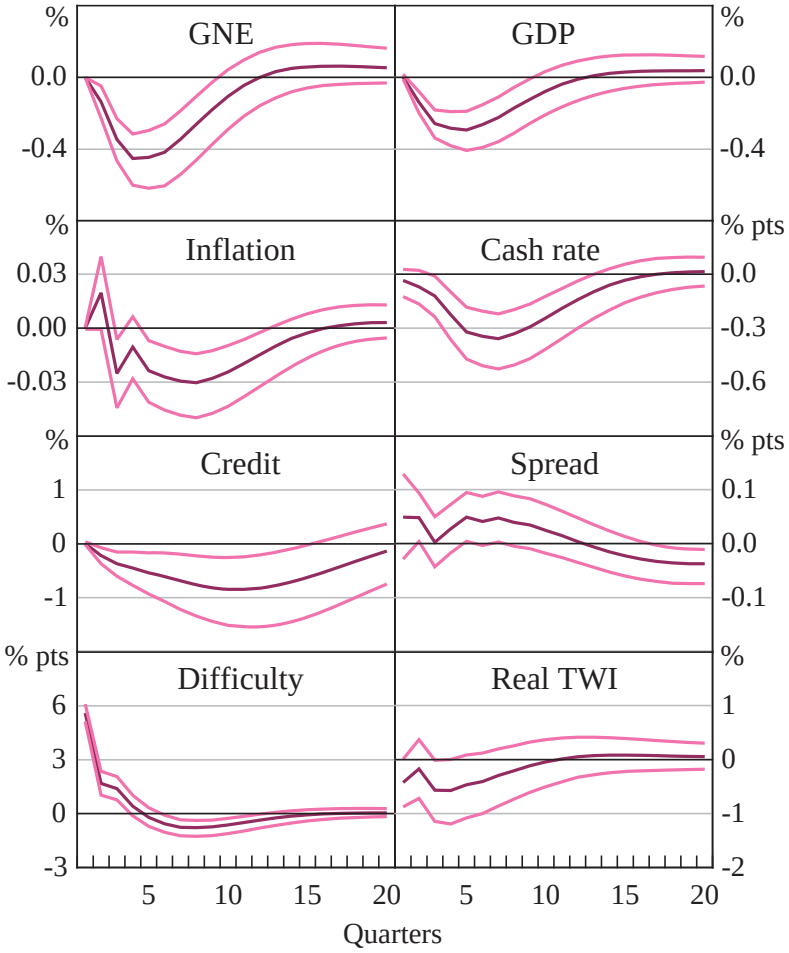
As discussed, the survey measure of the difficulty obtaining finance is assumed to primarily reflect credit supply dynamics. Hence, we identify credit supply shocks as the orthogonal innovations in this series. Credit shocks may also operate in part through the *spread* variable, although, as already noted, this is poorly measured and may also capture demand shocks. Figure 7 illustrates estimated impulse responses to a one standard deviation shock to the difficulty of obtaining finance – that is, a 5½ percentage point increase in the balance of firms reporting greater difficulty obtaining finance.

22 This is consistent with Chung, Kohler and Lewis (2011); their results indicate that the pass-through of exchange rate changes to overall consumer prices occurs gradually over an extended period.

23 Ten thousand draws are taken and confidence intervals are generated using 16th and 84th percentiles (as proposed by Sims and Zha (1999) and as per the recommended settings in RATS Monte Carlo procedures). The main results remain significant when confidence intervals are generated using the 2.5 per cent and 97.5 per cent quantiles. Complete results from our baseline model are available on request.

Figure 7: Impulse Responses to a One Standard Deviation Credit Supply Shock

Monte Carlo confidence bands (16th and 84th percentile)

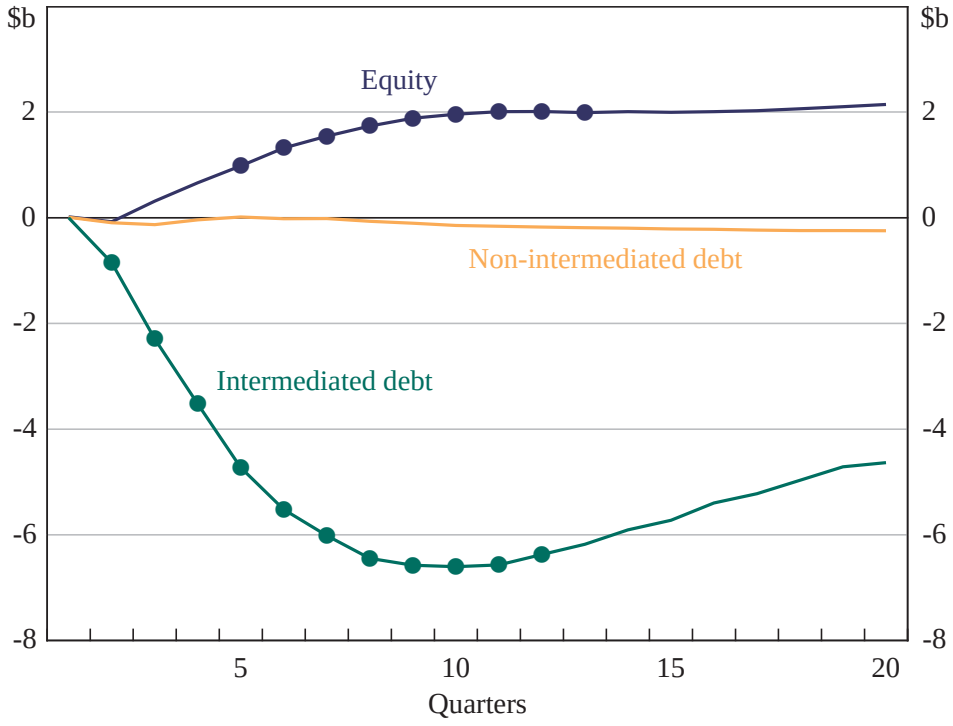


These results suggest that credit supply shocks have a significant effect on the real economy. Australian GDP is nearly ⅓ per cent lower one year after the initial shock and then starts to gradually increase back to its baseline level. Interestingly, the decline in GNE is much larger than the decline in GDP (nearly ½ per cent); this suggests that net exports make a positive contribution to GDP growth after a credit supply shock, in line with the depreciation of the real exchange rate. There is also a decline in business credit, which is larger and more persistent than the fall in output – it takes two and a half years for business credit to reach a trough following a credit supply shock, falling by nearly 1 per cent relative to its baseline. Credit spreads increase after the credit shock, although the magnitude of the increase is small (under 10 basis points). The cash rate declines by 0.4 percentage points after 18 months, before gradually reverting back to baseline. This could

reflect both an indirect response to the macroeconomic effects of the shock and possibly a direct policy response to the tightening in credit supply.

While the results indicate that a credit shock produces a fall in intermediated business credit, firms might react to the shock by tapping other sources of finance such as bonds or equity. To examine this possibility we make use of an alternative dataset of external funding by non-financial businesses separated into equity, non-intermediated debt (i.e. bonds) and intermediated debt (i.e. credit). These data are available from 1986. The results show that the fall in business credit is partly offset by a persistent increase in equity, as firms look to rebuild their balance sheets (Figure 8). However, there is little offset from an increase in non-intermediated debt, suggesting that much of the decline in business credit is due to bank-reliant firms with little recourse to the bond market.

Figure 8: Cumulative Impulse Response of Net Financing to Credit Supply Shock



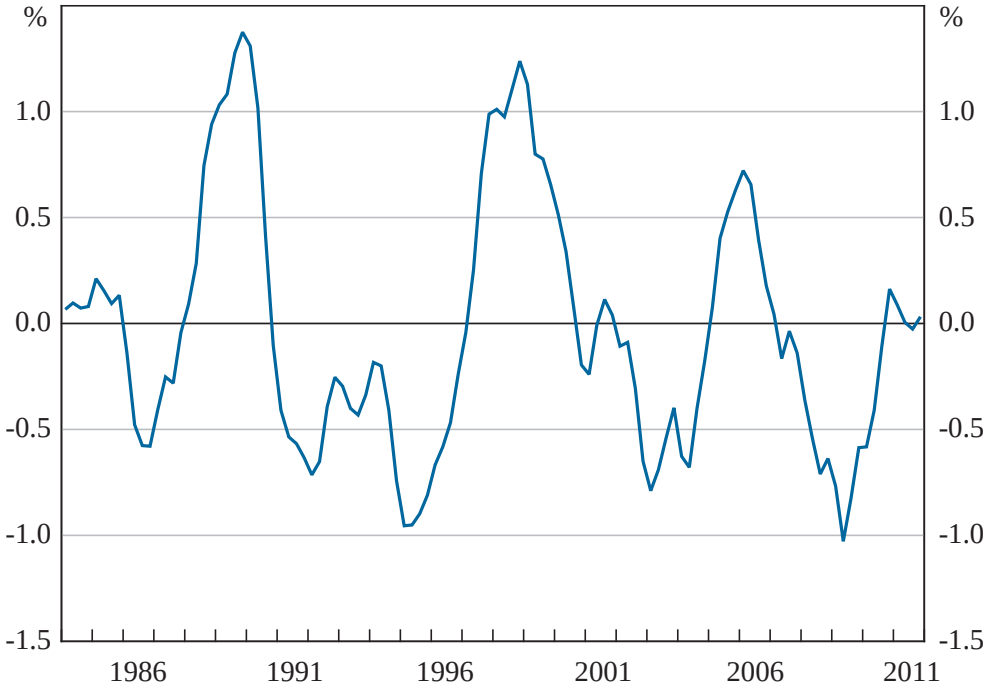
Notes: In 2011 prices; dots represent statistical significance for 16th and 84th percentiles

5.2 The Historical Importance of Credit Supply Shocks

A decomposition of structural VAR forecast errors can provide a measure of the importance of shocks during different historical episodes. Figure 9 shows the contribution of credit supply shocks to GDP forecast errors over time. During the global financial crisis, credit supply shocks contributed to weaker GDP from mid 2007, with GDP furthest from the model's forecast in June 2009 (by –1 per cent). This was one of the largest deviations of GDP from baseline due to a credit supply shock in the model's history.[24]

Figure 9: Historical Forecast Error Decomposition

Contribution of credit supply shocks to forecast errors in GDP



While credit supply stopped having a contractionary effect on GDP from mid 2010, this was not the case for business credit; credit supply shocks subtracted around 2½ per cent from business credit in mid 2010 and they were still having a contractionary effect as of December 2011.

24 Note that these effects do not take account of the credit market's role in propagating shocks from other sources, but only reflect shocks identified as originating from the credit market itself.

While credit supply shocks had a sizeable effect on GDP during the global financial crisis, this event appears to have been shorter and sharper than that experienced in the early 1990s. The early 1990s episode saw a damaging credit cycle in Australia, associated with a deep and lengthy recession. Deregulation of the financial system through the 1980s had resulted in a substantial easing of lending standards, particularly to business borrowers. The result was a sharp rise in corporate gearing and prices of commercial property (which had been an important source of collateral). When this all unwound it produced widespread corporate failures and large losses for financial institutions (Kent and D'Arcy 2000; Macfarlane 2006). Consistent with the severity of this episode, the cumulative effect of negative credit supply shocks on GDP in our model is larger during the early 1990s than in the recent global financial crisis period.

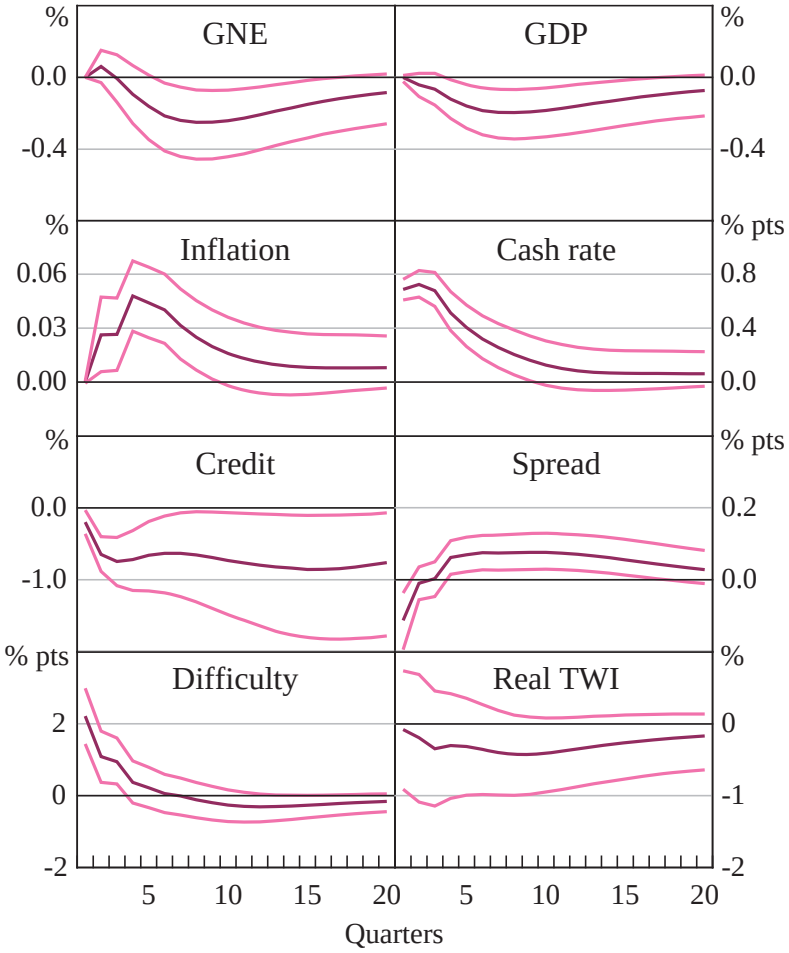
5.3 Response to a Monetary Policy Shock

Figure 10 presents impulse responses to a one standard deviation monetary policy shock – that is, an unanticipated tightening in monetary policy. The results are consistent with a credit channel of monetary policy transmission. A monetary policy shock results in an immediate increase in the difficulty of obtaining finance and a gradual increase in credit spreads. Australian GDP falls by 0.2 per cent relative to its baseline 18 months after the shock. Business credit also declines following a monetary policy shock, and the decline is more persistent than it is for GDP. As with many other macroeconomic VAR models, our results present a 'price puzzle' – a rise in inflation following a contraction in monetary policy – although the magnitude of this effect is small (under 5 basis points).[25] The direction of the exchange rate response is also consistent with a commonly found exchange rate puzzle, although it is statistically insignificant.

25 The price puzzle becomes statistically insignificant if a measure of inflation expectations is added to the model.

Figure 10: Impulse Responses to a One Standard Deviation Monetary Policy Shock

Monte Carlo confidence bands (16th and 84th percentile)



5.4 Net Worth and 'Financial Accelerator' Effects

In assessing the robustness of the model, we consider whether any important variables may have been omitted from the system of equations (other robustness checks are considered in the next section). Credit shocks can be misspecified if lenders change the availability of credit in response to variables that are not included in the system. In particular, the financial position of borrowers is likely to be taken into consideration by lenders when determining the price and non-price conditions of providing finance. This is a key component of the financial accelerator mechanism. Given this, we add a measure of net worth to our model

that was considered in Lowe and Rohling (1993): the market capitalisation of listed equities on the ASX expressed as a ratio to business credit.[26]

The identification of the model with net worth included is very similar to our baseline model, with a few small changes:

- The cash rate is assumed to respond contemporaneously to net worth since stock price data are available in a timely manner and developments in equity markets can be a leading indicator of future economic activity.

- Net worth is assumed to respond contemporaneously to GNE, GDP, inflation, the cash rate and the exchange rate.

- To allow for these new assumptions and ensure identification, we impose a zero restriction that was not imposed in the baseline model. Specifically, we assume that inflation responds to GNE and GDP only with a lag.

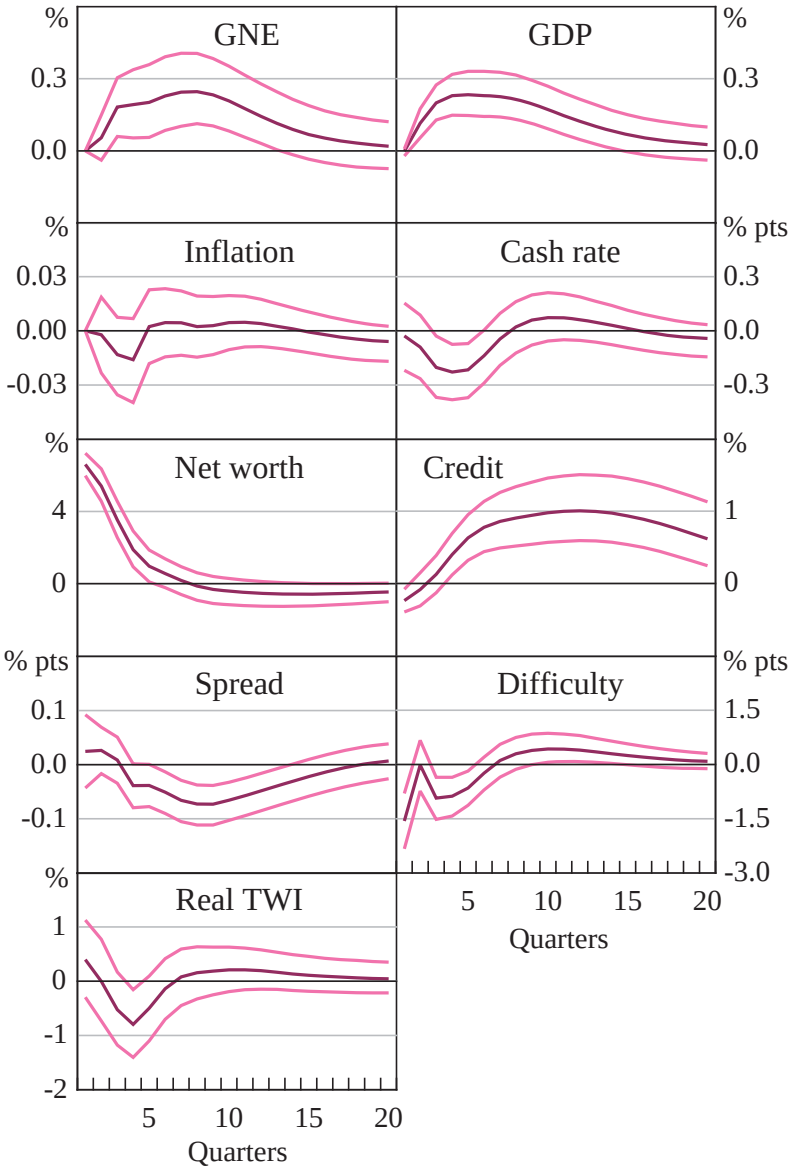
$$\Gamma_0 y_t = \left[\begin{array}{cccc|ccccc} 1 & & & & & & & & \\ \gamma_{21} & 1 & & & & & & & \gamma_{29} \\ & & 1 & & & & & & \\ & & & 1 & \gamma_{45} & & \gamma_{47} & & \gamma_{49} \\ \hline \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & 1 & & & & \gamma_{59} \\ \gamma_{61} & \gamma_{62} & \gamma_{63} & \gamma_{64} & \gamma_{65} & 1 & & & \\ \gamma_{71} & \gamma_{72} & & \gamma_{74} & \gamma_{75} & \gamma_{76} & 1 & \gamma_{78} & \\ \gamma_{81} & \gamma_{82} & \gamma_{83} & \gamma_{84} & \gamma_{85} & \gamma_{86} & \gamma_{87} & 1 & \\ \gamma_{91} & \gamma_{92} & \gamma_{93} & \gamma_{94} & \gamma_{95} & \gamma_{96} & \gamma_{97} & \gamma_{98} & 1 \end{array}\right] \left[\begin{array}{l} gne_t \\ gdp_t \\ \pi_t \\ r_t \\ networth_t \\ credit_t \\ spread_t \\ difficulty_t \\ rtwi_t \end{array}\right]$$

The inclusion of net worth in the model does not change the key results. In particular, a credit supply shock has broadly the same effects, resulting in a significant decline in GDP. Furthermore, consistent with the linkages described in financial accelerator models, we find that a positive shock to net worth results in a

26 A book value measure of net worth is likely to correspond more closely with the covenants contained in credit market contracts. However, book value data are not available for the full sample period, or at quarterly frequency.

decline in the difficulty of obtaining finance, a decline in spreads and a rise in GDP and business credit (Figure 11).

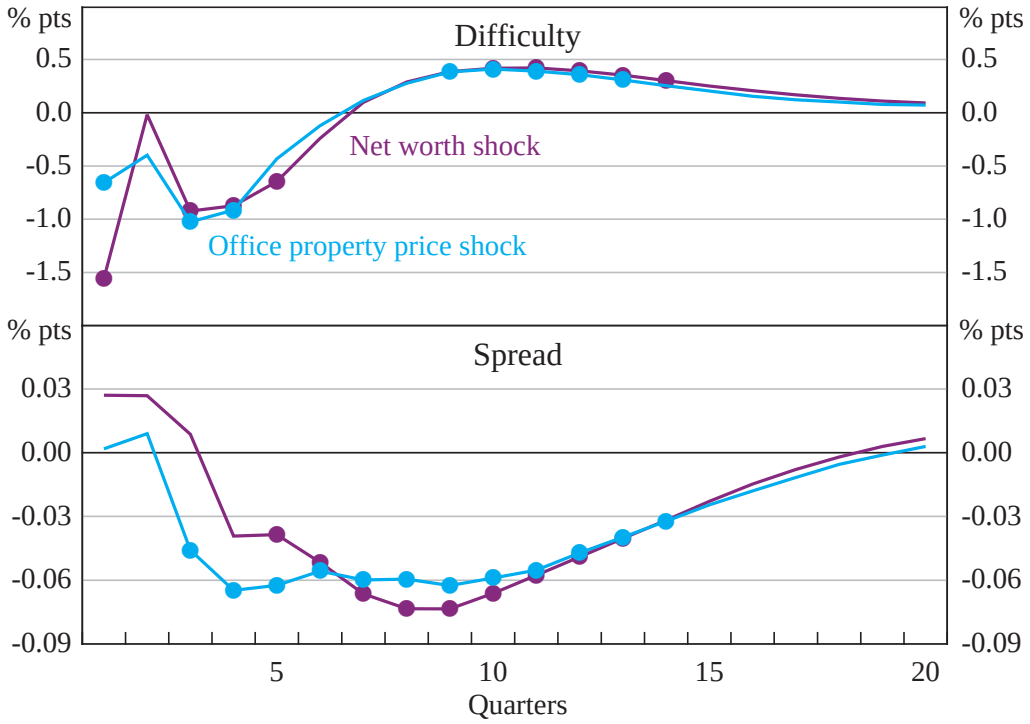
Figure 11: Impulse Responses to a One Standard Deviation Net Worth Shock
Monte Carlo confidence bands (16th and 84th percentile)



For many businesses, a key asset used as collateral against borrowing is commercial property. As discussed above, booms and busts in commercial property prices have often been a key feature of previous credit cycles in Australia (see Kent and D'Arcy (2000)). Accordingly, we also consider changes in office property prices as an alternative proxy for collateral values. The results are similar to the net worth model, with a positive shock to office property prices resulting in a fall in both the difficulty of obtaining finance and lending spreads (Figure 12).

Other responses in the model, including the impact of a credit supply shock on GDP, are largely unchanged from our baseline model.

Figure 12: Impulse Responses to a One Standard Deviation Shock to Collateral Values



Note: Dots represent statistical significance for 16th and 84th percentiles

6. Robustness

The results from structural VAR estimation can be sensitive to the model's specification. Our main finding – that a shock to the difficulty of obtaining finance has a significant effect on Australian GDP – changes very little in response to six different types of alternative specifications described below (Figure 13):

i. **Number of lags.** The baseline specification is estimated using two lags. We also estimate the baseline specification using one and three lags (Figure 13, panel i).

ii. **Identification.** A number of alternative identification schemes for contemporaneous relationships are considered (Figure 13, panel ii):

- The credit spread responds to difficulty obtaining finance only with a lag, while the exchange rate is assumed to have a contemporaneous effect on inflation ('Ident 1').

- GNE is assumed to respond contemporaneously to credit, reflecting a quick pass-through of credit to aggregate demand. GDP is assumed to respond to the exchange rate only with a lag ('Ident 2').

- Monetary policy can respond to GNE and GDP contemporaneously reflecting the partial information available to policymakers through the quarter. Inflation doesn't respond to GDP and GNE contemporaneously, only with a lag ('Ident 3').

iii. Omitted variables:

- It is likely that the confidence of lenders is closely related to the confidence of businesses. To cover the possibility that a 'credit shock' might be capturing a 'confidence shock', we include a measure of business confidence from the ACCI-Westpac survey in the model (Figure 13, panel iii).

- To control for the foreign component of credit shocks originating from global capital markets, we include an international measure of financing conditions – the Senior Loan Officer Opinion Survey (SLOOS) of loan officers' willingness to make commercial and industrial loans (Figure 13, panel iii). However, this series only starts in 1990, so prior to this we splice on the SLOOS series for consumer instalment loans (not secured by real estate, e.g. auto and personal loans). This survey question has a longer history and generally moves in line with the SLOOS series for business lending conditions.

iv. Sample period. Our baseline model is estimated from December 1983 until December 2011. Given the large movements in both financial and real variables during the financial crisis, we also estimate the baseline model over a shorter sample ending before the crisis, in December 2006 (Figure 13, panel iv).

v. **Treatment of structural break in survey variable.** Instead of using a Hodrick-Prescott filter to remove the trend from the difficulty obtaining finance, we also try demeaning and detrending the data from September 2002 onwards (Figure 13, panel iv).

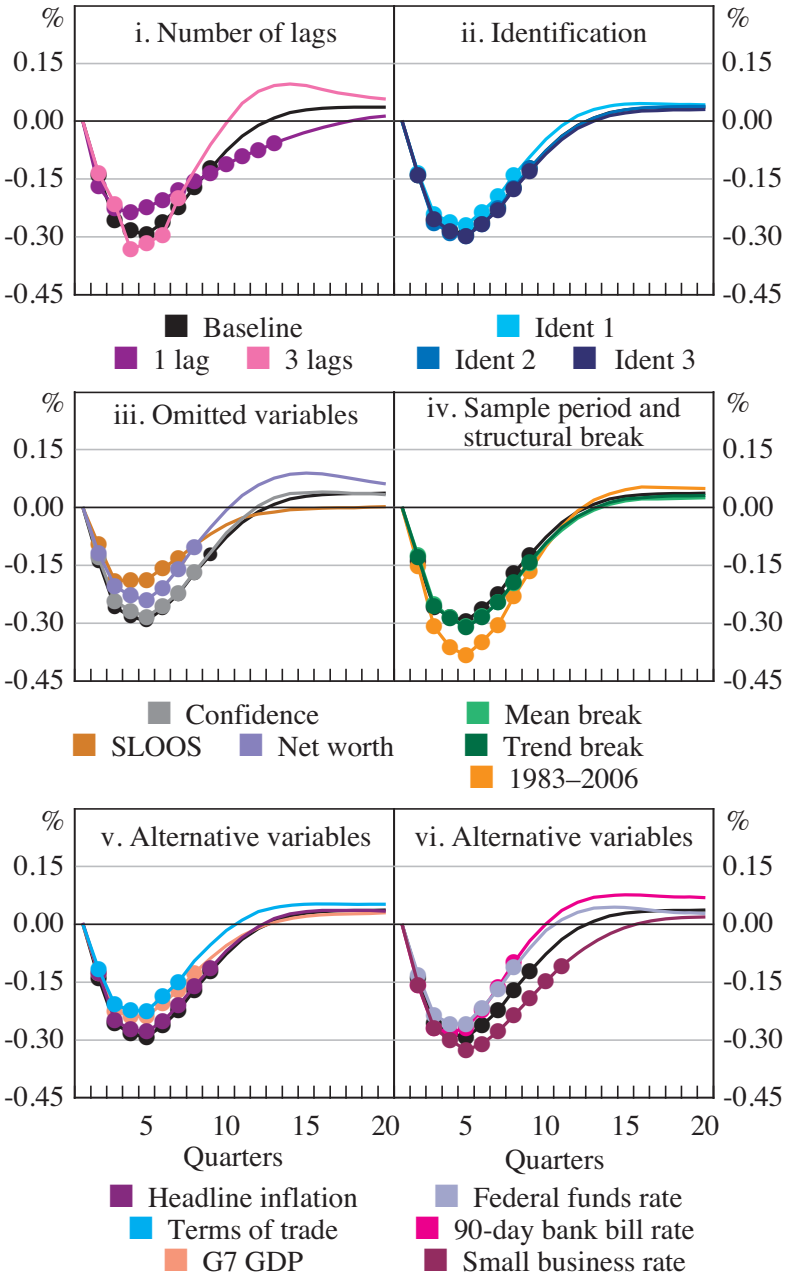
vi. **Definition of variables.** Various alternative variables were substituted into the model, one at a time, as detailed in Table 2 (Figure 13, panels v and vi).

Table 2: Alternative Variables Used in Baseline Model

Variable in baseline model	Alternative variables tried
Major trading partner GDP	G7 GDP, US GDP
RBA Index of Commodity Prices	Australian terms of trade
Weighted real foreign interest rate	Unweighted real foreign interest rate; federal funds rate
Trimmed mean inflation	Headline inflation
Cash rate	90-day bill rate
Large business lending rate spread to cash rate	Large business lending rate spread to 90-day bill rate; small business lending rate spread to cash rate

Figure 13: Robustness Exercises

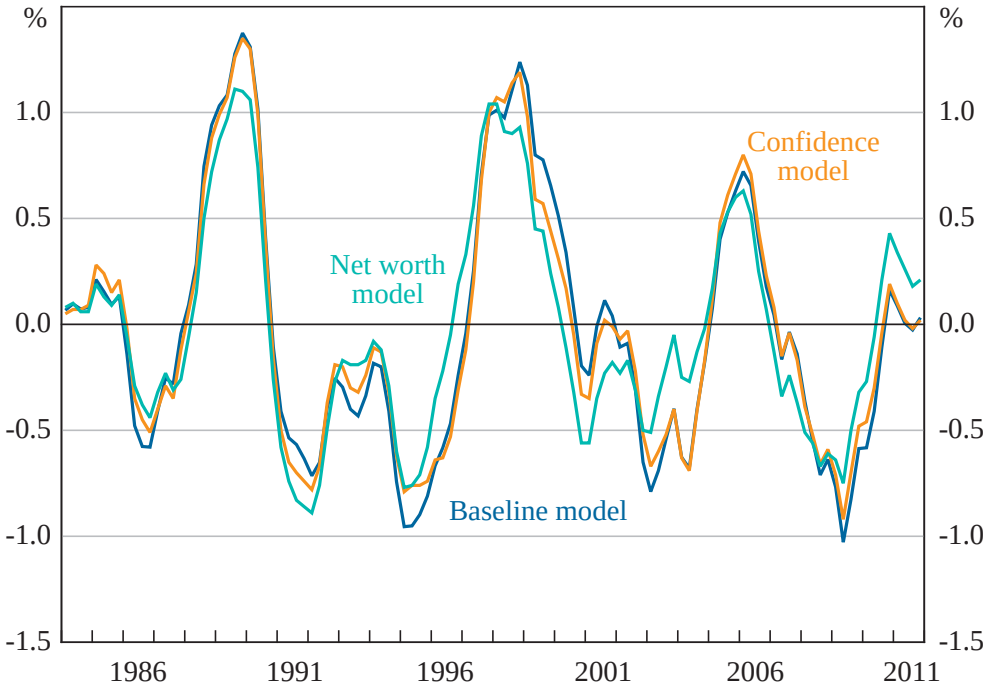
Response of Australian GDP to a one standard deviation credit supply shock



Note: Dots represent statistical significance for 16th and 84th percentiles

The historical decomposition of credit supply shocks on GDP is also robust to alternative models that include net worth and business confidence (Figure 14).

Figure 14: Robustness of Historical Decomposition
Contribution of credit supply shocks to forecast errors in Australian GDP



As an aside, we also estimate the model using household credit data as it is possible that the ACCI-Westpac series on the difficulty of obtaining finance captures an economy-wide 'credit shock'. In particular, we use household credit and the spread between banks' variable mortgage indicator rate and the cash rate. In this model, a credit supply shock has a statistically significant effect on household credit and GDP, but the effect is smaller than in the baseline model. This might suggest that the impact of credit shocks is stronger through the business sector than the household sector, or that credit cycles differ somewhat between these sectors.

7. Conclusion

The global financial crisis highlighted the importance of well-functioning credit markets for the real economy. In Australia and abroad, tighter credit conditions along with reduced demand led to a sharp decline in business and household credit, and this was associated with weaker investment and consumption. Previous research has made a qualitative assessment of the relative importance of credit

supply and demand factors during this time, but has not determined their quantitative significance. This paper identifies and measures the importance of shocks to credit supply over the past three decades and so provides estimates of the impact of those shocks during the recent financial crisis.

Based on a structural VAR model incorporating a survey measure of the difficulty obtaining finance, shocks to credit supply are shown to have a significant effect on the real economy. A one standard deviation shock to credit supply (a 5½ percentage point increase in the balance of firms recording a tightening in financing conditions) is estimated to lower GDP by nearly ⅓ per cent after one year and business credit by almost 1 per cent after two and a half years. Credit supply shocks are also found to be of material importance during earlier credit cycles. During the global financial crisis, the cumulative impact of credit supply shocks is estimated to have reduced GDP by 1 per cent (in mid 2009), one of the largest subtractions since financial deregulation in the 1980s. However, the effect of the global financial crisis on activity via credit supply appears to have been shorter and sharper than that experienced during the period of financial instability in the early 1990s.

This paper also presents evidence of a 'credit channel' of monetary policy transmission, with unexpected changes to monetary policy having a discernible impact on financing conditions. Finally, the results are consistent with the existence of a financial accelerator mechanism in the Australian economy, as positive shocks to net worth reduce the difficulty and cost of obtaining finance, leading to higher GDP and credit growth.

Altogether, these results suggest that credit market developments have had an important bearing on the Australian economy since financial deregulation in the 1980s, and that the credit channel and financial accelerator mechanism have roles to play in the transmission of monetary policy in Australia.

Appendix A: Data Sources and Definitions

Table A1: Data Sources and Definitions

(continued next page)

Series	Sources	Definition
Output		
G7 GDP	IMF; RBA; Thomson Reuters	G7 gross domestic product, chain volume, seasonally adjusted (sa)
Major trading partner GDP	CEIC; IMF; RBA; Thomson Reuters	Major trading partner gross domestic product (merchandise export-weighted), chain volume, sa
US GDP	Thomson Reuters	US gross domestic product, chain volume, sa
Australian GDP	ABS	Australian gross domestic product, chain volume, sa
Australian GNE	ABS	Australian gross national expenditure, chain volume, sa
Prices		
Australian headline inflation	ABS	CPI inflation, all groups excluding interest and tax changes
Australian trimmed mean inflation	ABS	CPI inflation, trimmed mean
Terms of trade	ABS	Ratio of Australia's export prices to import prices
Index of commodity prices	RBA; Thomson Reuters	RBA Index of Commodity Prices, all items in US$, deflated by US GDP deflator
Exchange rates		
Real trade-weighted exchange rate	ABS; RBA; Thomson Reuters	Australia's real trade-weighted exchange rate
Interest rates		
Real foreign interest rate	Global Financial Data; IMF; RBA; Thomson Reuters	Weighted average of real policy interest rates for Germany/euro area, Japan, UK and US
Cash rate	RBA	Cash rate, quarterly average
90-day bill rate	AFMA	90-day bank accepted bill rate
Large business lending rate	APRA	Large business weighted-average variable interest rate on outstanding credit
Small business lending rate	RBA	Standard variable interest rate on residentially-secured small business term loans
Mortgage lending rate	RBA	Standard variable housing interest rate for banks

Table A1: Data Sources and Definitions

(continued)

Series	Sources	Definition
Credit		
Real business credit	ABS; RBA	Business credit (including securitisations), sa, divided by Australian domestic demand deflator
Real household credit	ABS; RBA	Household credit (investor housing, owner-occupier housing and other personal credit, including securitisations), sa, divided by Australian domestic demand deflator
Surveys		
Difficulty obtaining finance	ACCI-Westpac	Net balance of firms reporting greater difficulty obtaining finance relative to the previous quarter
Business confidence	ACCI-Westpac	Net balance of firms expecting an improvement in their general business situation over the next six months
Senior Loan Officer Survey – Bank of Canada	Thomson Reuters	Net percentage of lenders reporting a tightening in overall lending conditions over the past three months
Credit Conditions Survey	Bank of England	Net balance of lenders reporting an improvement in the availability of credit for corporates over the past three months
Euro Area Bank Lending Survey	Thomson Reuters	Net balance of banks reporting a tightening in credit standards for non-financial corporations over the past three months
NFIB Small Business Survey	Thomson Reuters	Net percentage of firms finding credit more difficult to obtain compared to three months ago
Senior Loan Officer Opinion Survey on Bank Lending Practices – Federal Reserve	Thomson Reuters	Net percentage of lenders reporting a tightening in standards for commercial and industrial loans (for large and medium-size enterprises) over the past three months
Net worth		
Net worth	ABS; ASX; RBA	ASX total market capitalisation of domestic companies, convertible notes, options and preference shares (excluding warrants) divided by business credit
Office property prices	Jones Lang LaSalle	National CBD prime office capital values

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