Economic Conditions and Japanese Firm Financing

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Abstract

This paper investigates the role played by non-financial firms in Japanese corporate financing. We find that non-financial firms are an important source of credit for both small and large firms in Japan. We also document that adverse real and financial shocks have similar effects on small and large firm financing. The primary implication of our results is that credit from the non-financial private sector in Japan serves to lessen the adverse impact of real and financial shocks on the economy.

1. Introduction

While financial institutions play a dominant role in the allocation of funds within the Japanese economy, they are not the sole providers of credit in the economy as the non-financial sector is also a critical source of (business) financing. In Japan, private enterprises receive approximately a third of their financing, in the form of trade credit and loans, from the non-financial sector. Understanding the relationship between bank[1] and non-bank financing, therefore, is crucial to not only understanding the financing decisions of firms, but also to understanding how changes in financing affects the real activity of these firms.

The underlying issue of the existence of frictions in Japanese credit markets has been well documented, especially among small and medium enterprises (SMEs).[2] Moreover, there is an abundant body of literature, which finds that, during times of distress in the banking sector, financial frictions are relevant for large firms as well.[3] Thus, an examination of the relationship between firm liabilities and economic conditions may allow us to determine whether non-bank credit amplifies or dampens the impact of adverse shocks to the economy. This is particularly relevant for the Japanese economy as the collapse of the bubble economy forced banks to contract. If non-bank credit filled the financing gap, this would have lessened the real impact of the financial contraction.

By investigating how firm liabilities move with and respond to business and credit market conditions we come to the following conclusions:

- In terms of their financing choices, small and large firms, for the most part, behave quite similarly in response to changes in economic conditions
- In response to a deterioration in (bank) credit conditions Japanese firms increase their reliance on trade credit and especially loans from non-banks
- In response to a fall in business activity small and large firms increase their use of loans from non-banks

These results imply that credit from the non-bank sector in Japan alleviates frictions faced by firms in financial markets. To the extent that flows of credit from these firms make up for a decline in bank loans, non-financial credit can reduce the adverse impact of negative economic shocks. If these firms do not fill the financing gap, changes in access to credit may have strong, real effects.

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[1] Throughout this paper, in an admitted abuse of notation we loosely refer to all financial institutions as "banks." Financial institutions include banks, credit unions, government affiliated banks, registered money lenders, insurance companies, and security companies. The "non-banks" categorization does not include any kind of financial institution.

[2] For instance, the White papers on SMEs, issued by the Small and Medium Enterprise Agency (SMEA) of Japan, constantly refer to this "fact." In the 2002 issue, for example, the SMEA reports that about 20% of small businesses with no more than 20 employees were either declined, or were required to reduce their borrowing requests filed at financial institutions, which is one of many symptoms of financial market frictions. Other practices documented by the SMEA include higher interest payments, additional collateral or personal guarantees, and shorter payment periods.

[3] Nagahata and Sekine (2005) find that a decrease in capital in the banking sector has an adverse effect on corporate investment through severe credit constraints. Other significant studies include Ogawa (2003).

The remainder of the paper is organized as follows. In section 2 we briefly discuss the firm liability data used in the study. Our main results are presented in section 3. Section 4 concludes.

2. Firm Balance Sheet Data

The aggregate firm balance sheet data used in this study are from the *Quarterly Financial Statements Statistics of Corporations* published by the Ministry of Finance.[4] The data are available on a quarterly basis and contains aggregate firm balance sheet data for firms with more than 10 million yen in capital as well as several subgroups of firms including large and small.[5] We define small (large) firms as those whose capital value is less (more) than 100 million yen. We differentiate between small and large firms because we expect these firms to behave differently in financial markets. Since small firms have limited access to corporate bond and commercial paper markets they depend much more heavily on bank credit.

The sources of financing we consider are loans (short-term and long-term) from financial institutions, loans (short-term and long-term) from non-financial institutions, and trade payables.[6] Figure 1 plots, for large and small firms, the relative importance of each liability item. The graph shows that since the early 1980s the importance of trade credit has diminished for both small and large firms, although for small firms the decline is much more dramatic. Small and large firms have both offset the decreased share of trade credit by increasing their usage of bank credit, particularly long-term bank loans. Although the figure makes clear that non-bank loans makes up a limited share of total liabilities, coupled with trade payables the total amount of non-bank financing is quite comparable to bank financing. Regulatory differences between bank loans and non-bank financing, however, are quite significant. For example, the implementation of BIS capital regulations applied only to the banking sector, and severely curtailed banks' ability to extend loans. In contrast, non-financial institutions did not directly face this constraint.

Finally, to begin to understand how large and small firm liabilities move with economic conditions we calculate the dynamic comovement between firm liabilities and business and lending conditions. As proxies for business and credit market conditions we employ the business conditions diffusion index and the lending attitude diffusion index both available quarterly from the Tankan Survey Diffusion Index (DI) of firms available from the Bank of Japan. The business conditions (lending attitude) DI measures the percentage difference between firms that regard current business conditions (lending attitude) as "good (accommodative)" and those that regard

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[4] The data are classified as one of 56 "designated statistics" in Japan. Designated statistics are the most formal of the government statistics collected by the Japanese government and require mandatory firm responses. The Ministry of Finance collects simplified balance sheet information from a sample of firms on a quarterly basis. Failure to respond incurs possible legal penalties.

[5] Size is determined by capital. Firms with capital values exceeding 100 million yen are categorized as large firms, while small firms include all firms whose capital value falls between 10 million and 100 million yen. The threshold capital level of 100 million yen roughly corresponds, for most of the sample period, to the legal definition of small and medium enterprises.

[6] Other liability items available in the data are corporate bonds and other liquid liabilities. Since the primary purpose of this paper is to examine the financing role played by non-financial firms we drop these items from our analysis. Corporate bonds are, by far, the least used financial instrument by small firms. Large firms use them more than small firms, but, even for these firms, corporate bonds still make up only a little more than 10% of total liabilities (this falls to 6% if we consider all firms). Other liquid liabilities are a slightly more important source of funds, accounting for approximately 15% of total liabilities (for all firms), but this "catch all" category includes lending from both financial and non-financial firms making it difficult to distinguish the source of the financing.

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current conditions as "bad (severe)." It is important to note that the lending DI measures the lending attitude of *financial* institutions.

We use the procedure developed by Den Haan (2000), and calculate the correlations of bivariate vector autoregression (VAR) forecast errors at different forecast horizons[7] estimated using the liability components and the Tankan DIs. This method, as opposed to simply taking a single correlation, provides a more precise measure of the relationship between two variables. In this case, when the forecast horizon is short, the correlations between the innovations, which are also limited to these short horizons, reveal the "short-run" comovement of the variables. In contrast, correlations between innovations with long forecast horizons represent the "long-run" comovements. Furthermore, if the variables are stationary, as the forecast horizon goes to infinity, the "long-run" comovement converges to the unconditional correlation coefficient.

The estimated comovements are presented in figures 2 (business conditions) and 3 (lending conditions). The figures reveal that there are clear differences in behavior depending on economic conditions. Furthermore, albeit less significantly, differences depending on firm size are observed. Large firm borrowing moves positively with business conditions. This is also generally true for small firms, although long-term non-bank loans, and to some extent short-term bank loans move opposite of business conditions. When we look at firm borrowing and lending conditions we see almost the opposite picture. For large firms, with the exception of short-term bank borrowing, borrowing moves negatively with lending conditions. Similarly, for small firms both short- and long-term bank loans are the only liability components that move positively with lending conditions.

The story told by the comovements is not that surprising. As business conditions improve, firms borrow more from all available sources of funds. The increase in business transactions leads to an increase in the use of trade credit. As production increases and profitable investment opportunities abound, firms turn to both banks and non-bank firms to meet their need for funds. Also, as it becomes easier to obtain bank financing, firms increase their use of bank loans and reduce their dependence on non-bank sources of financing.

3. The Behavior of Large and Small Firm Liabilities

While the comovements can tell us how firm financing moves with economic conditions it cannot tell us how a *change* in economic conditions impacts the financing choices of firms. Impulse response functions, however, provide complete information about the comovements between the variables after any type of shock.[8] To estimate how shocks to business and credit conditions impact firm liabilities we estimate, for both small and large firms, a series of VARs and calculate the corresponding impulse response functions (to shocks to business and lending conditions). The VARs include real GDE, the real call rate, a diffusion index (business or lending), and a firm liability ratio (liability item relative to total liabilities).[9]

We define business and financial shocks as (one standard deviation) negative shocks to the business and lending DI, respectively. We identify the shocks using the Cholesky decomposition of the variance-covariance matrix. Christiano, Eichenbaum, and Evans (2001)

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[7] The forecast horizons we examine are 1-16. See Den Haan (2000) for more details.

[8] These two methods are closely related. In fact, the covariance of the *k*-period-ahead innovations is the sum of the product of the *k* impulse responses.

[9] Note that due to the availability of data the sample periods differ slightly across the VARs. The business condition DI is available from the second quarter of 1965 and the lending condition DI from the first quarter of 1967.

show that to determine the effects of a shock all that really matters is the relative position of the shock variable. For the results presented in this paper, we order the diffusion index (shock variable) last. Intuitively, the variable being ordered last means that bankers' or business managers' attitudes are affected by current period economic conditions, which we proxy with real output and the real interest rate.[10] Unexpected changes in the diffusion indices then affect economic conditions with a one period lag.[11]

In response to a shock to the diffusion indices, however, the included variables not only respond directly to the change in the index, but also to changes in the other variables, and in particular the decline in real output. This complicates a comparison of firm financing behavior, as the dynamics of the real output response differs across the shocks. In addition, a decline in real activity could either increase or decrease a firm's demand for funds. One possibility is that the reduction in real activity reduces investment and, thus, the demand for financing. Conversely, the reduction in sales increases inventories, which could increase the demand for financing.

In this paper, we "correct" for this endogeneity by using the method proposed by Den Haan, Sumner, and Yamashiro (2005). The correction entails three steps. The first step involves calculating the impulses to the diffusion index. In the second step, we construct a series of output shocks that generates an output response that is identical to the output response to a shock to the diffusion index. Finally, by taking the difference between the liability response generated by the series of shocks and the original response we obtain a liability response that does not depend on the behavior of output.[12] Simply, this method controls for fund demand due to changes in real output. The added advantage is that it exactly captures the dynamics of the transaction demand for funds. Thus, given an adverse shock to economic conditions, the calculated impulses reveal the portion of the liability response not driven by the decline in aggregate output.

We hope to answer a few key questions with this exercise. Do shocks to business and lending conditions lead to different financing choices by firms? Are the observed differences mainly attributable to the behavior of real output? Finally, does this financing choice differ across small and large firms?

The displayed impulses are based on a VAR, which includes one year of lagged variables, a constant, and a linear trend. We also include quarterly dummies since the firm balance sheet data are not adjusted for seasonality.[13] The coefficients are estimated with ordinary least squares (OLS) and the significance levels are established using a Monte Carlo procedure with 5,000 replications in which data are generated by bootstrapping the estimated residuals. To avoid clutter we do not report confidence bands in the graphs but instead use open and solid squares to indicate that an estimate is significant at the 10% and 5% level (one-sided), respectively.

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[10] It is important to remember that, in order to estimate the VAR efficiently, one cannot include too many variables in the system.

[11] Given that we use quarterly data, it probably makes more sense to order the indices last. Regardless, the results are robust to the ordering choice. Moreover, including all the liability components in a single VAR results in qualitatively very similar impulses as those obtained with the more parsimonious system.

[12] While this comparison makes quantitative comparisons convenient, the method is not without its drawbacks. For example, we do not expect expectations across the two downturns to be identical as one downturn is caused by a single shock to the diffusion index, while the other is caused by a series of shocks to real activity. Using a one-time (negative) output shock instead of a series of output shocks, however, we obtain similar results. See Den Haan, Sumner, and Yamashiro (2005) for more details.

[13] In addition, we estimate VARs for which the specification is chosen using the Bayesian Information Criterion (BIC). We search for the best model among a set of models that allows as regressors the variables mentioned above and a quadratic trend. BIC chooses a specification that is much more concise then our benchmark specification, but the results are similar to those including a year's worth of lags.

We graph the (output corrected) behavior of small and large firm liabilities in response to shocks to business conditions and the (bank) lending environment in figure 4. In figure 5 we plot the difference between the set of responses. Below we summarize the results for each liability item.

Trade payables (figure 4 and figure 5, panel A)
The trade payable share of liabilities, for both small and large firms, falls in response to a negative shock to business conditions. It is important to remember that since these are the *output-corrected* responses this decline in the trade payable ratio is above and beyond any fall driven by the decline in real output. This implies that firms reduce their holdings of trade payables more than can be explained by the fall in transactions. The prime reason for this is a decrease in the length of payment terms.

In contrast, in response to a negative shock to (bank) lending conditions both small and large firms, initially (though not significantly) increase the trade payable share of liabilities, with large firms then quickly and significantly reducing the share of trade payables in their liability portfolios. When we look at the difference between the responses (figure 5, panel A), it is clear that an adverse credit shock, relative to an adverse business shock, leads both small and large firms to increase their use of trade payables. These results are, at least initially, consistent with the findings of Nilsen (2002). He documents that both small firms and large firms in the U.S. increase their use of trade payables in response to a monetary contraction. He argues that small firms, being credit constrained, turn to payables as an alternative (and less attractive) source of financing. He attributes the behavior of large firms to firms without bond ratings, firms with more volatile cash flows, and firms lacking collateralizable assets. Finally, looking at the difference between the responses (figure 5, panel A) we see almost no difference between large and small firm behavior.

Bank lending (figure 4 and figure 5, panels B and D)
A negative business shock results in large firms significantly increasing the loan (both short-term and long-term) share of their liabilities. The small firm responses to the same shock are insignificant. This may seem surprising, as we may expect firms to reduce their holdings of bank loans due to the fall in demand, but is somewhat consistent with Den Haan, Sumner and Yamashiro (2005) who find that U.S. banks actually increase their lending to firms during a monetary downturn.

In contrast, an adverse shock to the credit conditions leads to both types of firms strongly reducing their short-term loan ratios. This is unsurprising as the lending DI measures the lending attitude of banks. If the lending attitude of loan officers worsens, it should be the case that that firms turn away from bank credit. Note, however, that the long-term loan ratios for both types of firms are initially unresponsive before increasing, particularly for large firms. This is presumably attributed to large-sized firms being less credit-constrained than their smaller counterparts are.

The difference between the responses (figure 5, panels B and D) reveals no difference between small and large firm behavior. A negative (bank) credit shock relative to a negative business conditions shock leads both types of firms to decrease the short-term bank loan share of their liabilities. Moreover, an adverse credit shock, relative to an adverse business shock, leads both small and large firms to initially reduce the long-term bank loan share of liabilities.

Non-bank lending (figure 4 and figure 5, panels C and E)

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It is clear that both small and large firms depend critically on loans from the non-bank sector. In response to both types of shocks small and large firms increase their borrowing from non-bank firms. The exception to this is large firm short-term borrowing following a shock to business conditions. This can be explained, however, by the fact that large firms are able to increase their short-term borrowing from banks in response to negative business condition shocks, and thus, have no "need" for short-term non-bank loans. Therefore, tighter bank lending conditions and worsening business conditions lead to overall increases in the non-bank lending share of liabilities. Small firms seem to rely slightly more on short-term loans, while large firms make heavier use of long-term loans. The general result is that non-financial sources of funds move opposite of bank financing over the business cycle. This supports the idea that non-financial firms play an important financing role in Japan. Finally, as with the other liability shares the difference between the responses (figure 5, panels C and E) reveal little, if any, difference between large and small firm behavior.

The key implication of these findings is that non-bank private firms play a critical financing role in Japan. While small firms do rely heavily on long-term bank loans, large firms tend to rely more on long-term non-bank loans. Further, small firms, much more so than large firms appear to rely on short-term non-bank loans to fill the financing void created by declines in short-term bank lending. It has long been discussed in the literature if adverse shocks in bank lending are accommodated by trade credit. However, though the share is still much lower than that for trade credit, non-bank loans may play much more relevant role in alleviating financial distresses in Japan.

A surprising result is that we do not find much of a difference between large and small firm behavior across the shocks. This runs counter to the observed comovements, and to much of the existing empirical literature. It is generally believed that smaller firms, being credit constrained, would be much more adversely affected by changes in their sources of financing. In terms of their behavior following shocks to business and lending conditions, however, we do not observe much difference between the financing choices made by small and large firms in terms of their liability portfolios. This does not mean that small firms have unconstrained access to credit markets, but instead, have access similar to that of larger firms.

4. Conclusion

In this paper, we investigate the financing role of the non-financial sector in Japan. We document that, in general, non-bank sources of credit moves counter to bank credit. When we correct for differences in the behavior of real output, we find that an adverse shock to real activity, while having little effect on the demand for bank loans, leads to a fall in the demand for non-bank credit, while an adverse financial shock leads to an increase in demand for non-bank credit. These results imply that non-bank private firms in Japan play a critical role in alleviating financial market frictions.

To the extent that non-bank lending can make up for a decline in bank loans, these firms can reduce the adverse impact of negative economic shocks. We also find that adverse real and financial shocks have similar effects on small and large firm financing choices, implying that small firms are not necessarily more constrained than large firms in their access to credit, which is consistent with the trade credit literature including Nilsen (2002) and Burkart and Ellingsen (2004)

Admittedly, however, the results of this paper rely solely on aggregate data. As Calomiris, Himmelberg, and Wachtel (1995) make clear, there is a possibility that the results of a firm-level analysis could be at odds with the results of an aggregate study. In the case that firm-level data were available, it would be of great interest to resolve any discrepancies that may exist between the two types of studies. Unfortunately, the data necessary for such an investigation is not available. That being said, a VAR analysis is not without merit. VARs provide a clearer picture of the dynamics of firm financing. How firms' liability portfolios respond to aggregate shocks is not something that can cleanly be obtained from firm-level data (with a limited time horizon).

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Figure 1: Firm liability portfolio
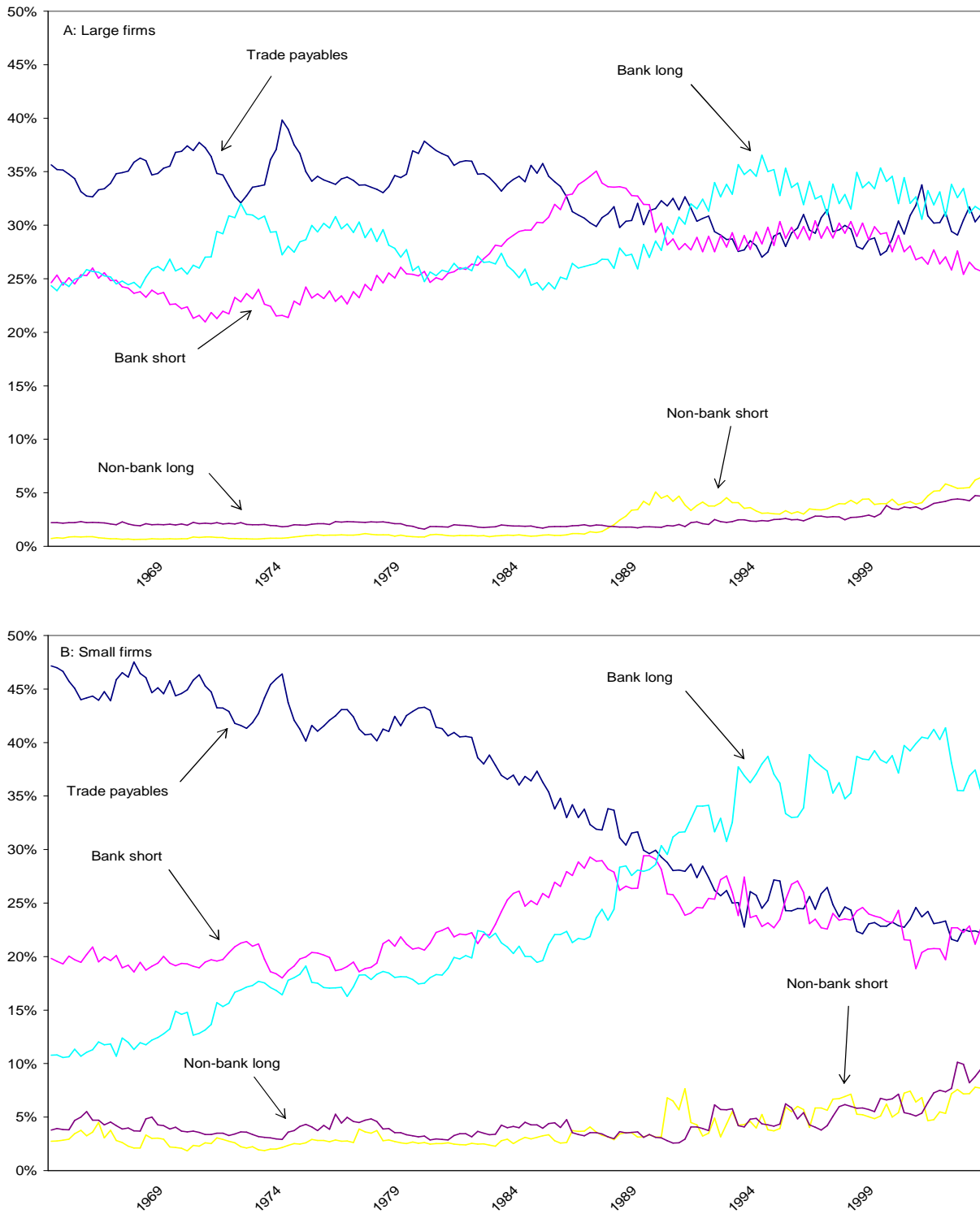
Note: These graphs plot the share of the indicated liability component as a fraction of the sum of the six liability components.

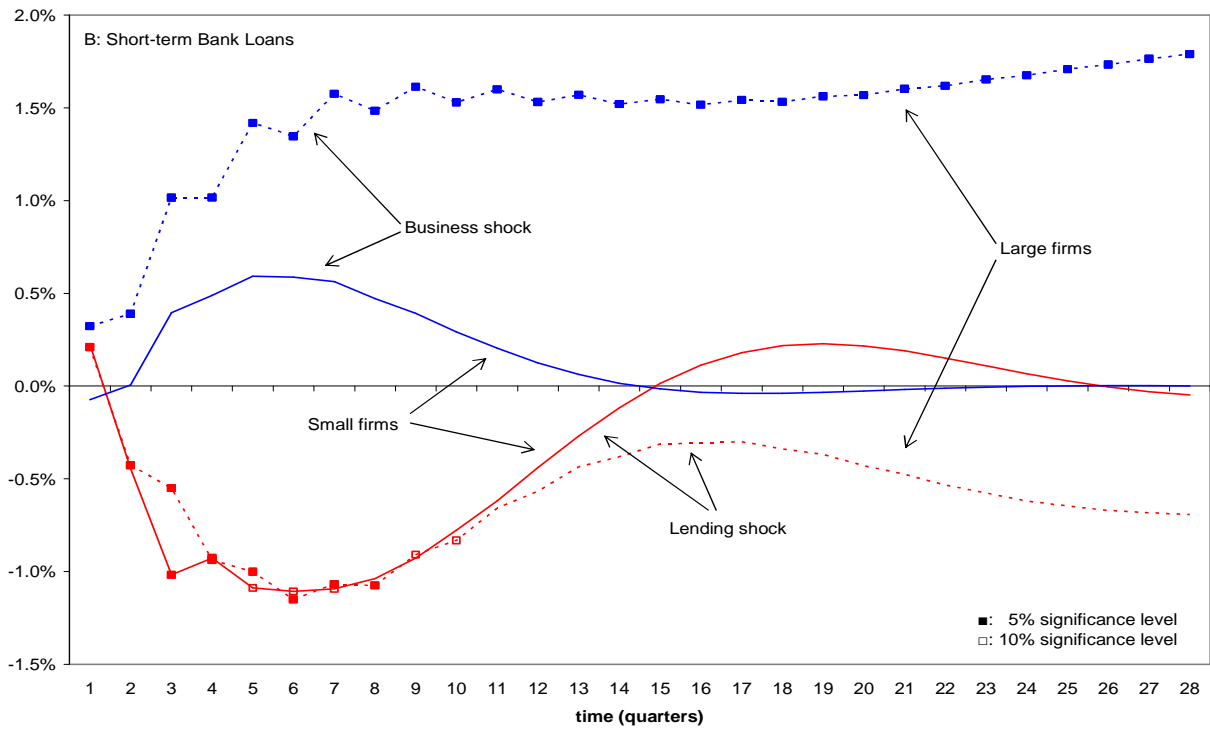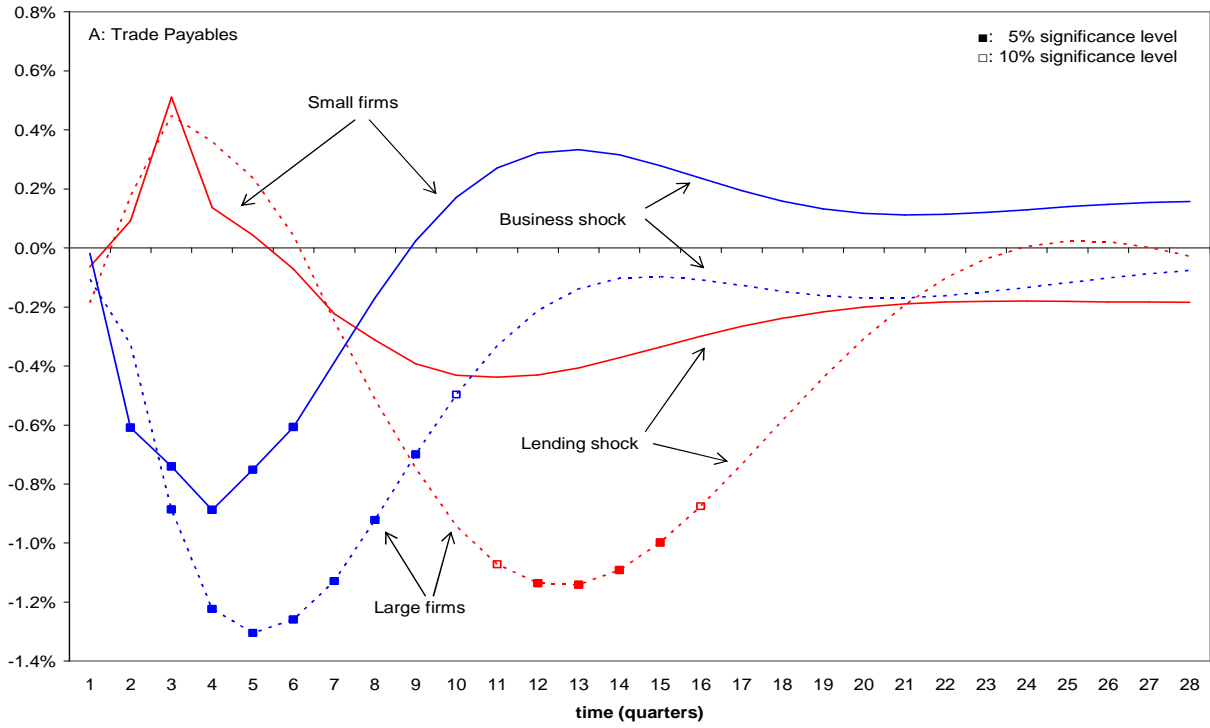**Figure 2: Comovement of firm liabilities with business conditions**
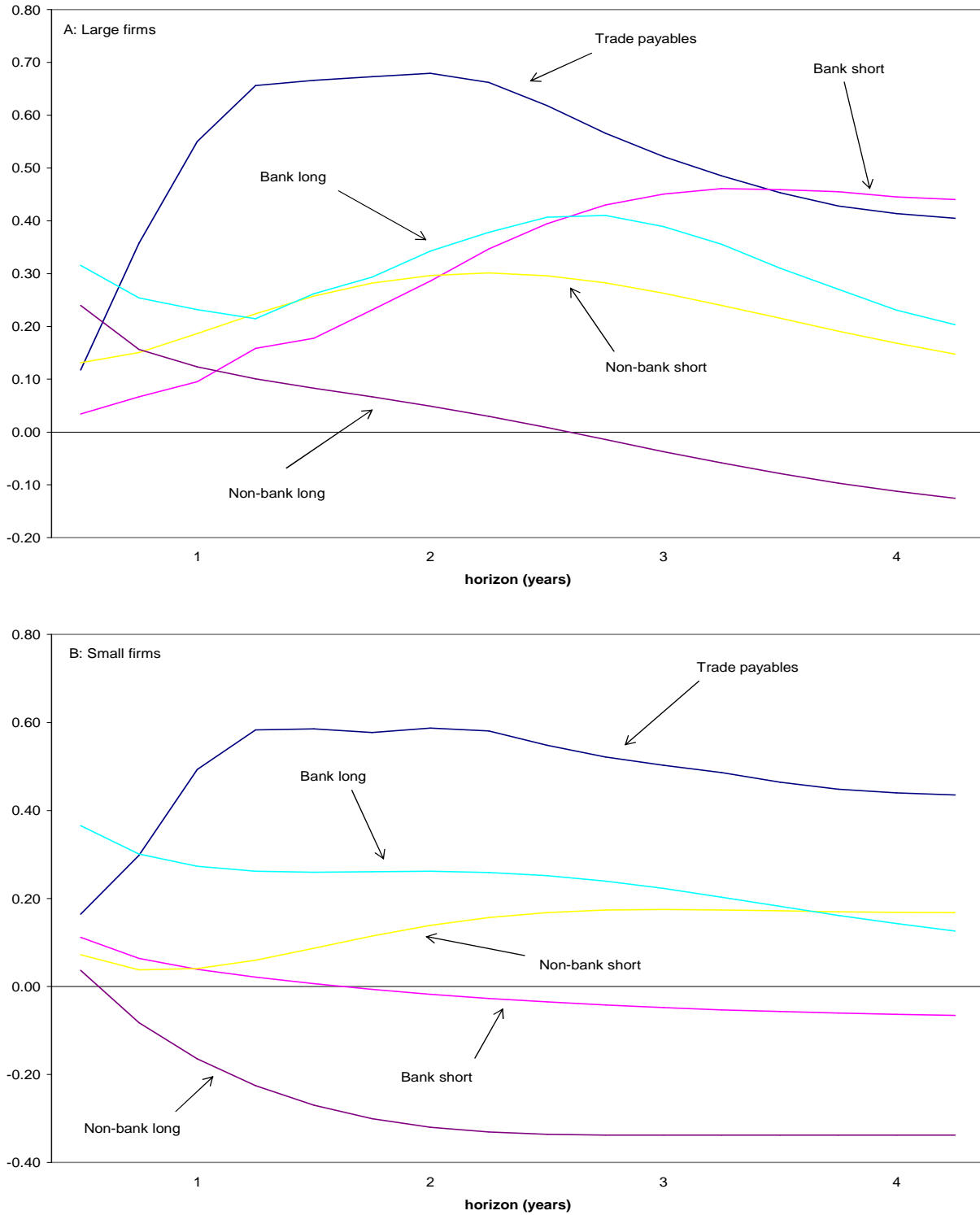
Note: These graphs plot the correlations of the k-period-ahead forecast errors from a series of bivariate VARs. Each VAR includes the Business Condition Diffusion Index and a liability component.
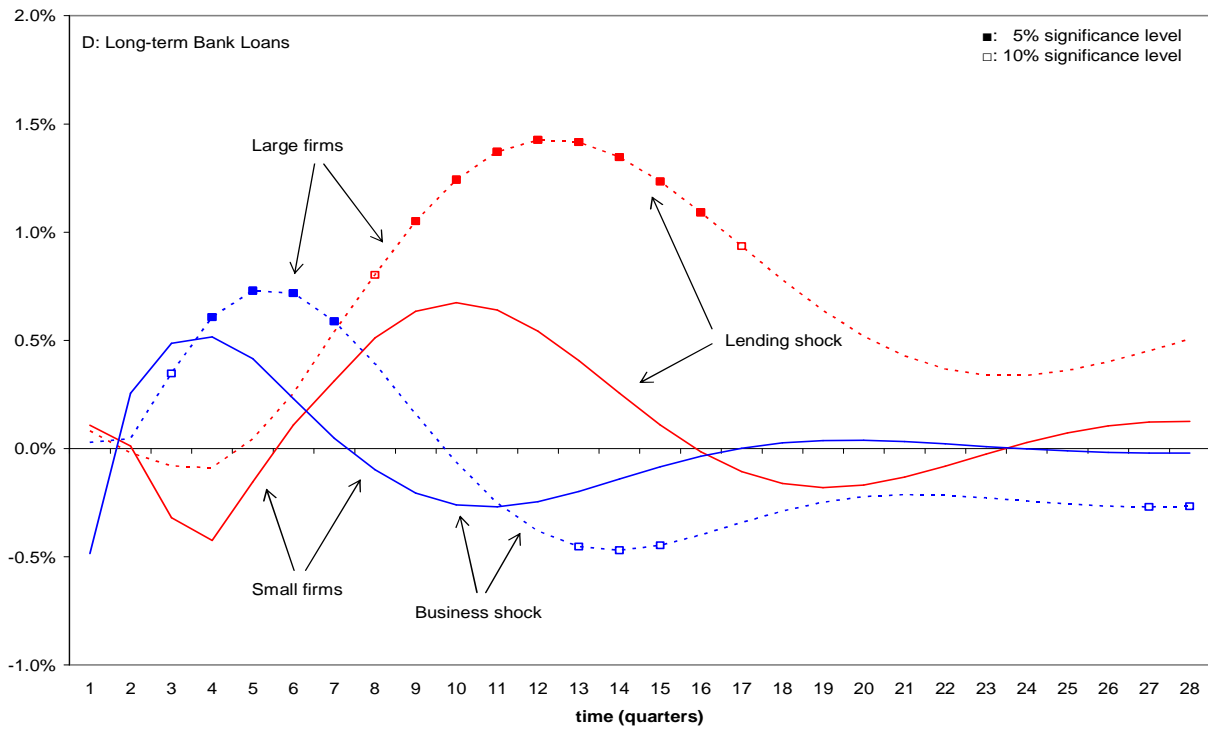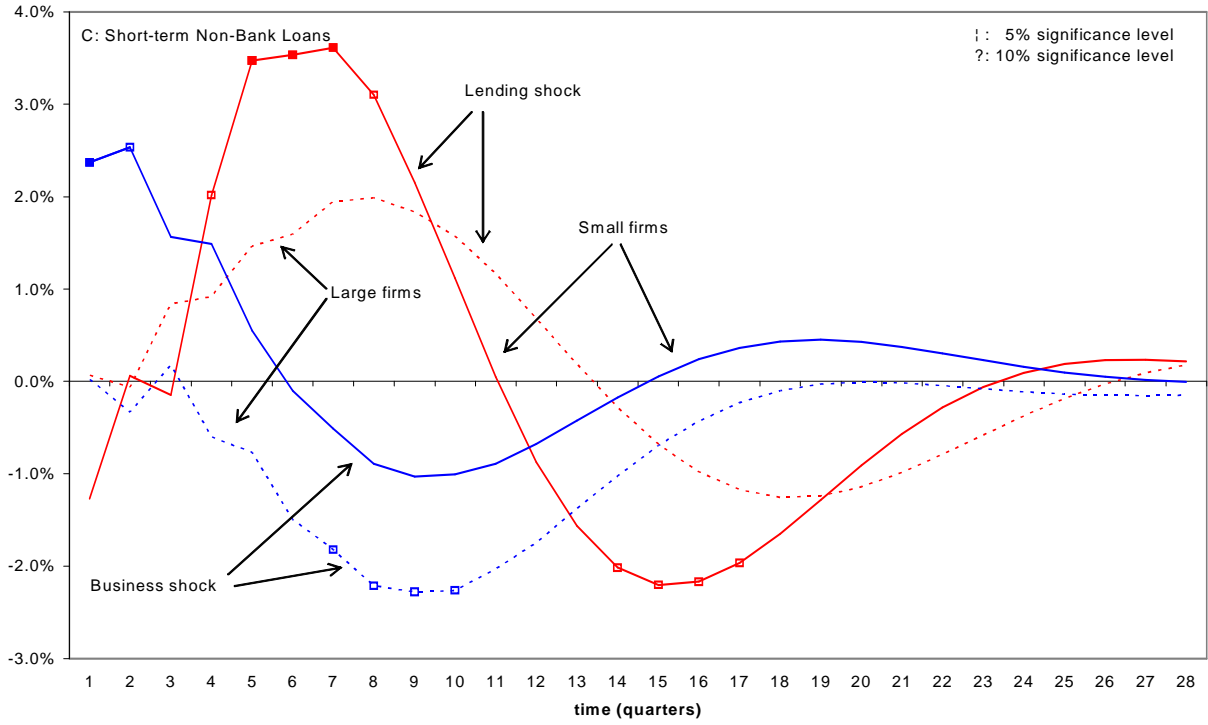
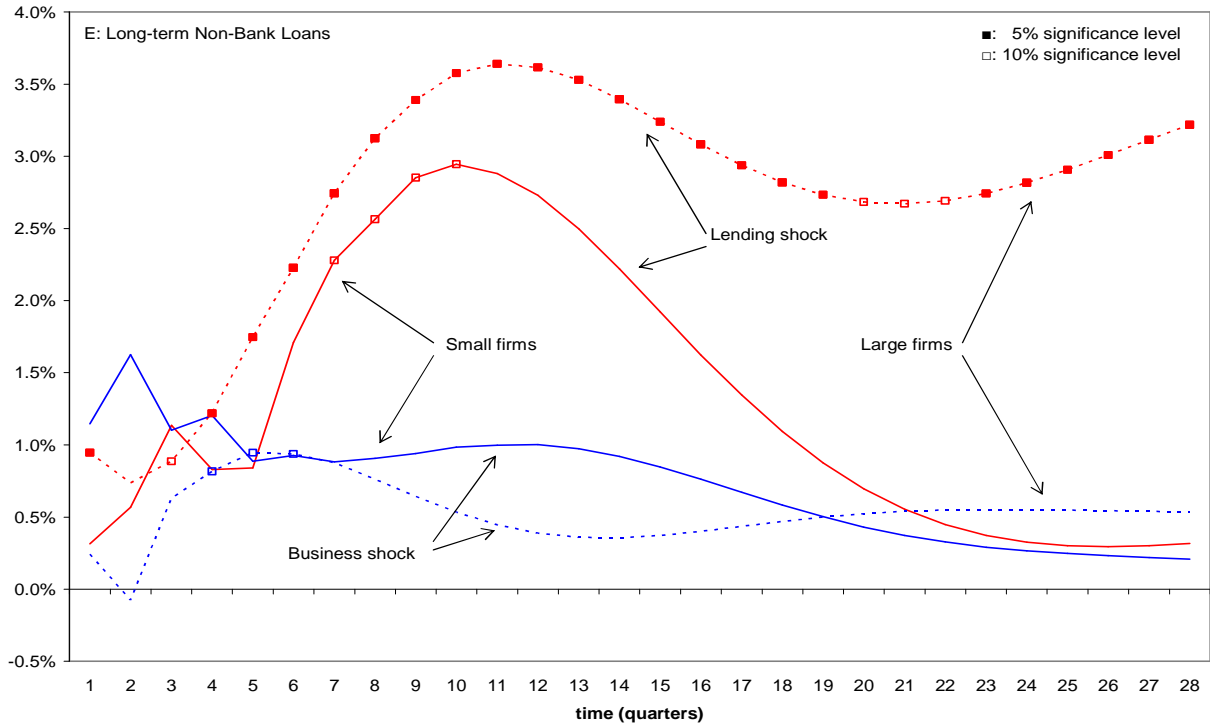**Figure 3: Comovement of firm liabilities with lending conditions**
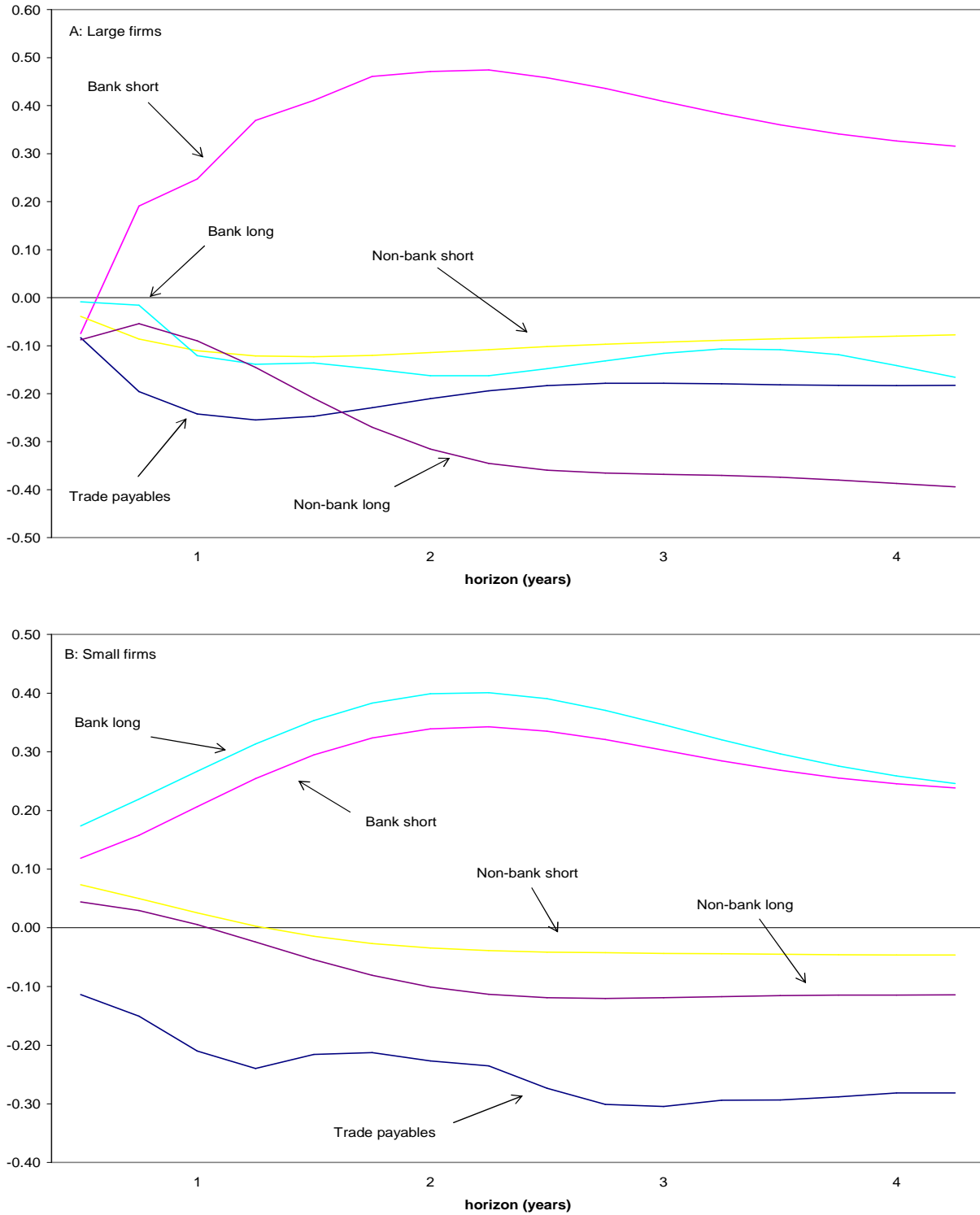
Note: These graphs plot the correlations of the k-period-ahead forecast errors from a series of bivariate VARs. Each VAR includes the Lending Condition Diffusion Index and a liability component.

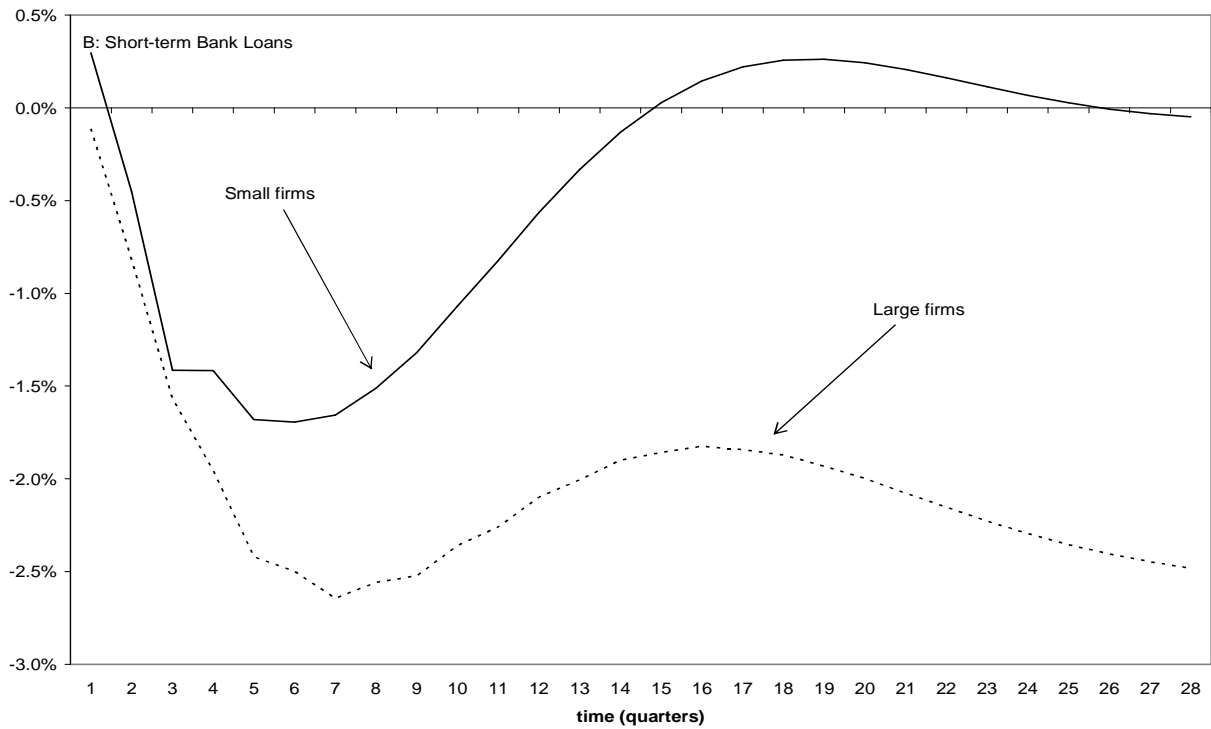**Figure 4: Liability share impulses for large and small firms**

C: Short-term Non-Bank Loans

¦ : 5% significance level
? : 10% significance level

Lending shock

Small firms

Large firms

Business shock

time (quarters)

D: Long-term Bank Loans

■ : 5% significance level
□ : 10% significance level

Large firms

Lending shock
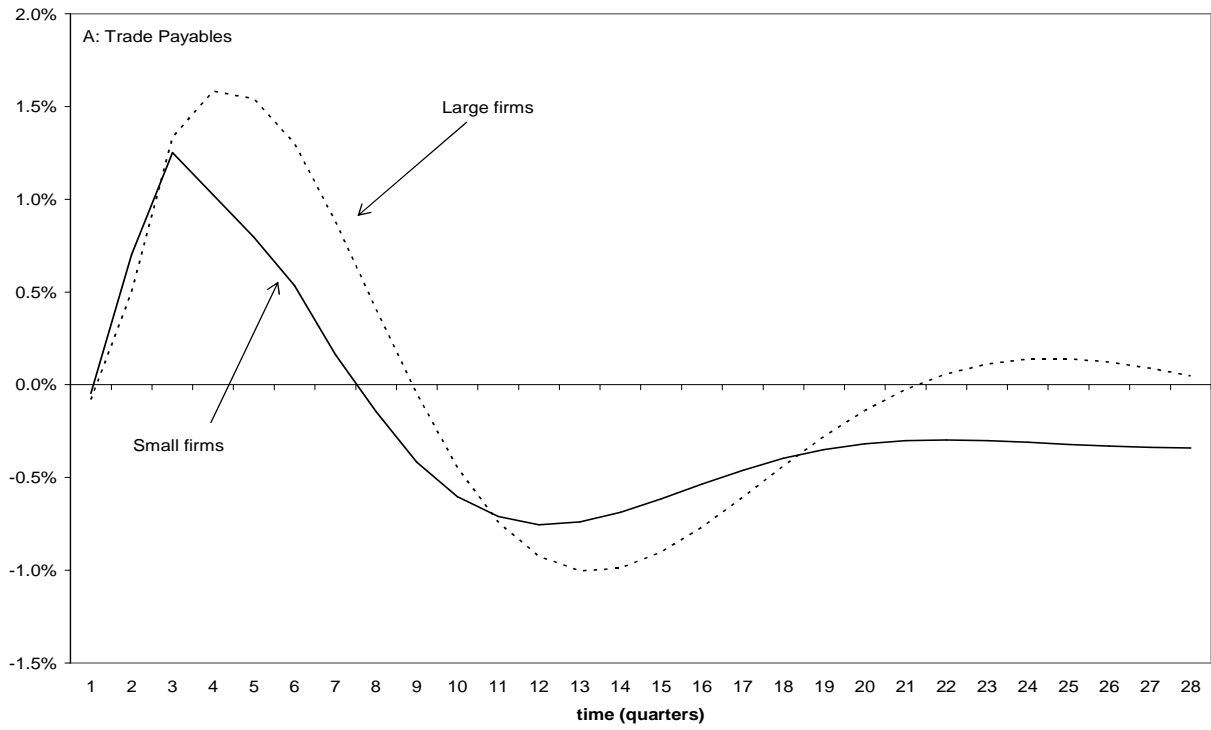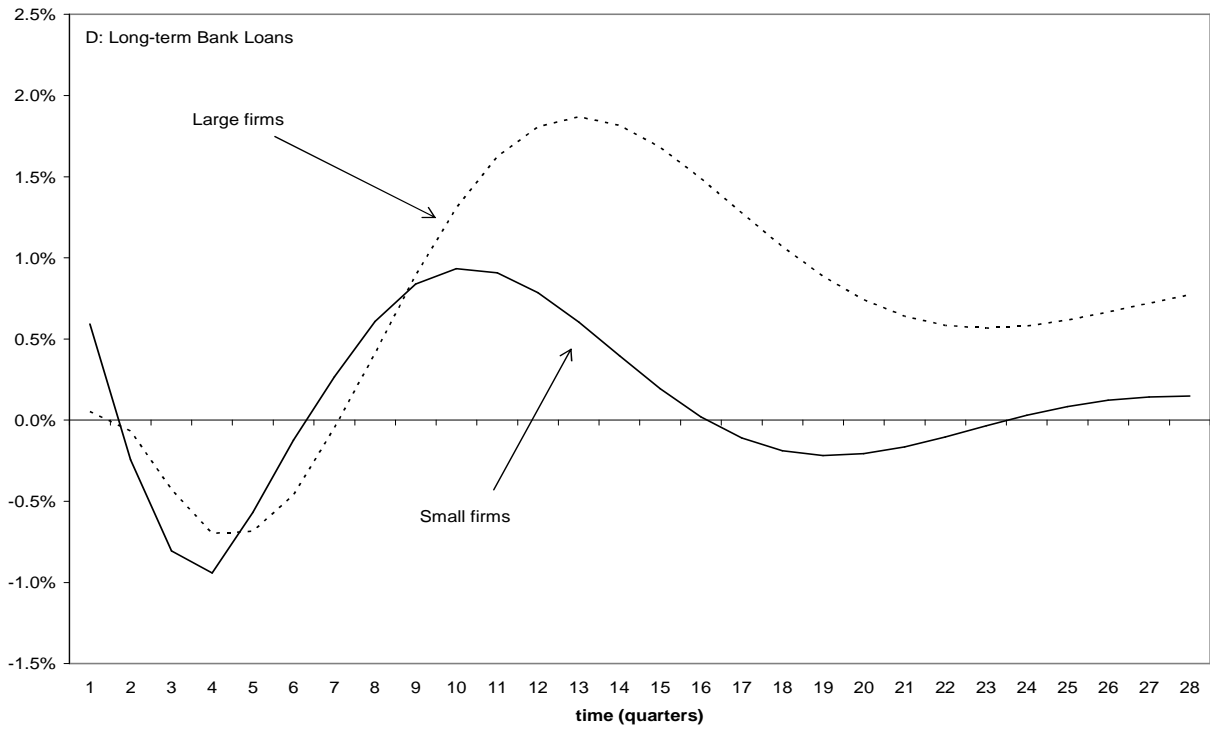
Small firms
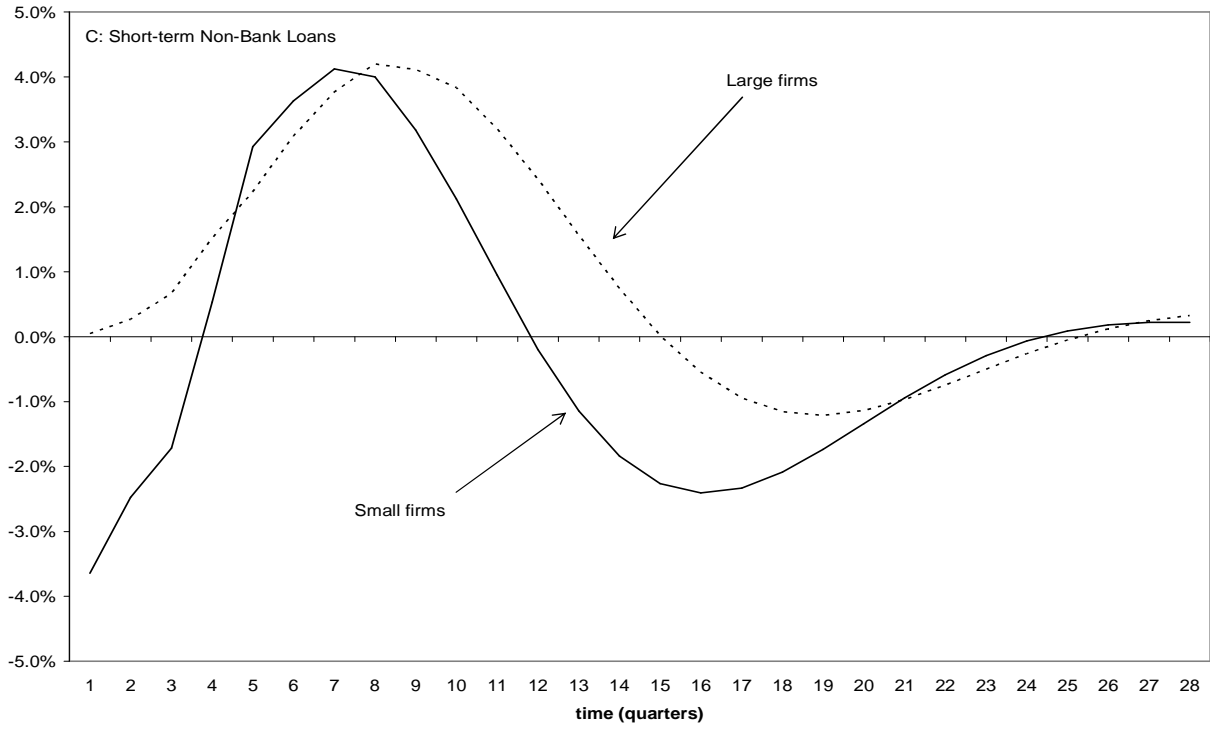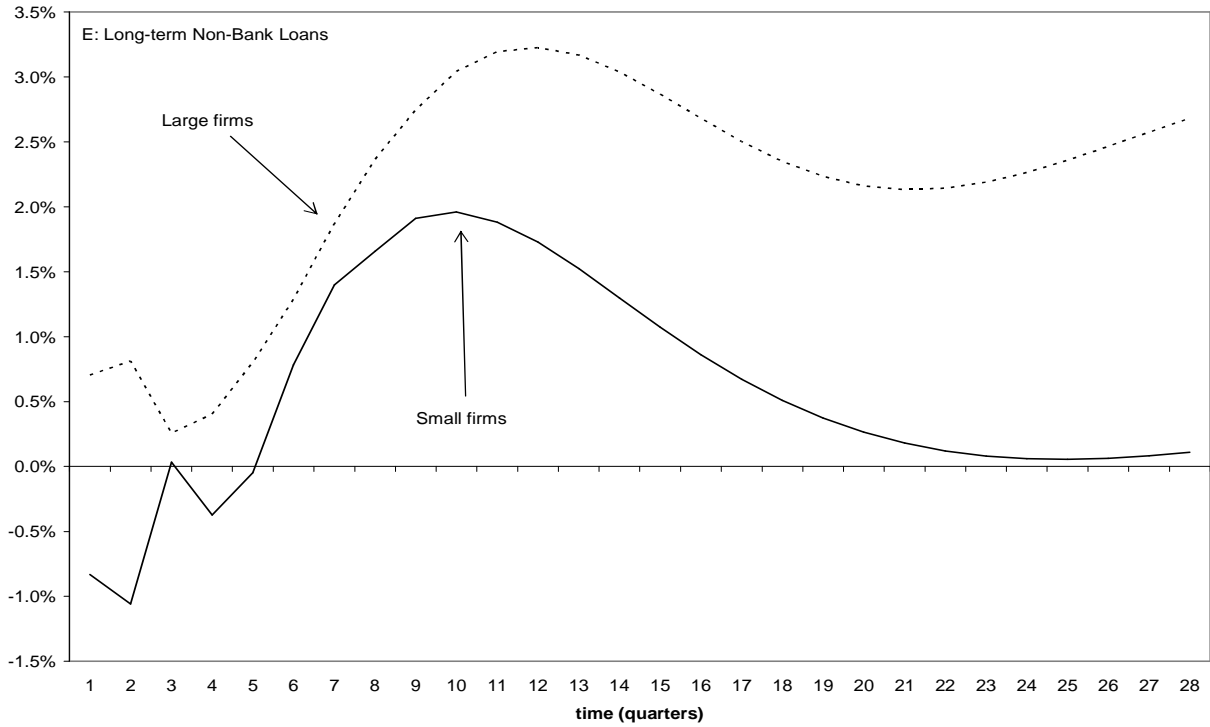
Business shock

time (quarters)

Note: These graphs plot the response of the indicated variable (relative to total liabilities) to a one-standard deviation negative shock to the business DI (business shock), and a one standard deviation negative shock to the lending DI (lending shock). Open squares indicate a significant response at the 10% level and a solid square indicates a significant response at the 5% level (one-sided tests).

Figure 5: Difference between the liability impulses for large and small firms

A: Trade Payables
Large firms
Small firms
time (quarters)

B: Short-term Bank Loans
Small firms
Large firms
time (quarters)

C: Short-term Non-Bank Loans

Large firms

Small firms

time (quarters)

D: Long-term Bank Loans

Large firms

Small firms

time (quarters)

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E: Long-term Non-Bank Loans

Large firms

Small firms

time (quarters)

Note: These graphs plot the difference between the response of the indicated variable (relative to total liabilities) to a one-standard deviation negative shock to the business DI and a one standard deviation negative shock to the lending DI.

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