Bank loan portfolios, bank heterogeneity and the bank lending channel: new macro evidence for France*

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Abstract

This paper provides new evidence of a bank lending channel in France on the basis of small macroeconomic VARs. Relevant credit aggregates are constructed from a comprehensive sample of French banks balance sheet data, thus allowing to combine the purpose of the credit with bank characteristics. Results show that taking into account both dimensions matters for a correct assessment of the active role of banks in credit dynamics at the aggregate level. Indeed, different components of the loan porfolio react in different ways to monetary policy shocks, as notably short term loans to firms generally increase following a tightening. Besides, I find that being affiliated to a bank holding seems to ease financing constraints that may impede independent banks to shore up their longer term lending activity after a monetary tightening. Finally, some of the results presented here for France, in particular the evidence in favour of positive supply effects in the response of short term C&I loans following a monetary policy shock, parallel previous findings for the US, whereas the structures of financial systems in both countries are generally considered quite different.

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1 Introduction

The issue of the practical relevance of the credit channel for monetary policy has been the focus of heightened debate over the past decade.[1] Numerous empirical studies have run panel data regressions to investigate the determinants of credit variables using individual banks' balance sheet data (see e.g. Kashyap and Stein,1995 or Ehrmann et al., 2003). Typically, such studies have highlighted the impact of key banks' characteristics, such as size or liquidity of assets, on a differentiated response of bank loans to monetary policy shocks, pointing to some relevance of the traditional bank lending channel for monetary transmission, at least for small and less liquid credit institutions.[2] More recently, some authors have postulated that an additional bank capital channel could be at work: less capitalized banks should react more to a monetary policy restriction, either because they can tap the market for uninsured deposits with a premium only (see e.g. Stein, 1998) –in which case the new channel reduces to a sophistication of the old bank lending channel– or because they might fear to hit the solvency threshold monitored by supervisors, as the consequences of a restrictive monetary policy shock tend to deplete their capital buffers

[1] For a general perspective on the credit channel issue, and the usual distinction between the so-called bank lending channel and the balance sheet channel of monetary policy transmission, see Bernanke and Gertler (1995). While my focus is more on the bank lending channel here, I do not formally distinguish between this "narrow" channel and a broader view, that encompasses financial accelerator mechanisms, in my empirical study.

[2] The bank lending channel works on the assumptions that (1) banks cannot easily find a substitute for shrinking insured deposits after a monetary tightening, (2) banks must decrease their loans to the private sector as a consequence instead e.g. to sell more liquid assets and (3) there are bank-dependent firms that are not able to tap the debt securities market for alternative funding when banks cut their credit lines. Romer and Romer (1990), among many others, have argued that financial innovations and increased competition in the financial system must have shut down most of the bank lending channel. However, the common view is that it should still work at least for small banks, which supposedly direct most of their lending activity to (bank dependent) small and medium-sized firms and have limited ability to issue debt securities on financial markets.

(see e.g. Van den Heuvel, 2002, Chami and Cosimano, 2001). Empirically however, the evidence regarding the bank capital channel in industrial countries is mixed.[3] For instance, Kishan and Opiela (1996), Gambacorta and Mistrulli (2004) and Engler et al. (2005) exhibit an effect of bank capitalization in the US, Italy and Austria respectively, but Loupias et al. (2001) find it is not significant as regards the French banking system. Finally, a few recent studies have shed light on the importance, for tests of the bank lending channel, to control for membership of individual credit institutions to a bank network, such as is the case for cooperative or mutual banks in many European countries, or for affiliation to a group (see e.g. Gambacorta, 2005, Ehrmann and Worms, 2004). Indeed, as far as banks within a network can rely on their head institution or holding for adequate provision of interbank credit, their loan supply may be better insulated against the adverse effects of monetary policy shocks than are loans supplied by independent banks of otherwise similar size or liquidity.

A limit of that strand of the empirical credit channel literature is that little can be inferred from the results obtained with micro data regarding the relevance of bank heterogeneity from the macro perspective of monetary policymakers. As argued for instance by Ashcraft (2006), empirical studies broadly support the theoretical view that small bank lending is more sensitive to monetary restrictions than large bank lending, but this does not imply that financial frictions at play in the bank lending channel do really account for a significant part of the dampening of real activity following a monetary tightening. To circumvent this problem, some recent studies have based the analysis on small macroeconomic VARs.[4] Indeed, impulse response functions derived from simple VAR models that factor in a few macro variable like GDP, inflation and a measure of the policy stance, provide a popular device for evaluating the strength of monetary policy transmission mechanisms to the economy. Adding a credit variable to this basic framework, it is then straightforward to gauge the impact of monetary policy shocks on total credit to the economy.

That said, two major problems remain unsolved. First, the estimated response of total bank loans to monetary policy shocks often appears to be muted and non-significant (Den

[3] Mésonnier (2005) offers a review of the bank capital channel literature.

[4] See notably Den Haan et al. (2007), Ehrmann and Worms (2004) and Hülsewig, Winker and Worms (2004).

Haan et al., 2007). However, a closer inspection of monetary and credit time series –e.g. of loans to households versus loans to non-financial firms, or short term vs long term loans– suggests that this may be the result of diverging responses of the main components in the banks' loan portfolio. Hence, aggregate analysis may be misleading regarding the macroeconomic relevance of the credit channel. Second, such a simple statistical device does not allow to tell whether credit contracts after an interest rate hike because of banks being more reluctant to lend or because the deteriorated outlook has shifted down the demand for bank credit. To identify supply effects and test for the effectiveness of the bank lending channel obviously requires to group banks according to their distribution along a few key dimensions pointed out by the credit channel theory, such as size, liquidity or capitalization, as it is done in practice in panel regressions on bank balance sheet data.

Unfortunately, the credit statistics made available by central banks on a regular basis are generally not conceived in order to meet both these requirements. For instance, one may well find in official statistics a series for total credit to the private sector by some institutional part of the banking system -e.g. savings institutions or cooperative banks- or a series for mortgage credit to households by all credit institutions, but one would search in vain for a series for short term credit to non-financial firms granted by small banks. Following an approach that was previously implemented by Ehrmann and Worms (2004) and Den Haan et al. (2007), I therefore built on micro bank balance sheet information to reconstruct relevant loan aggregates for France. However, while previous studies mainly focused on one dimension of heterogeneity (across types of loans or across characteristics of banks), I simultaneously consider here the interactions between three main components of banks' loan portfolio (housing loans to households, short term industry and commercial credit, and longer-term investment loans to non-financial firms) with four banks' characteristics (size, liquidity of the assets, capitalization and affiliation to a bank holding company).[5]

Impulse responses from the estimated VARs show that different components of the loan portfolio react in different ways to monetary policy shocks. Indeed, short term credit to firms tends to increase after a tightening while other types of loans generally decrease,

[5]Regarding loans to households, I focus on housing loans which make up about three quarters of total credit to the household sector by resident credit institutions.

excepted in the case of banks affiliated to a holding company. Although the positive response of inventories to a positive interest rate shock indicates that a demand effect may be at play in the positive response of short term C&I loans, our exercise suggests that this dynamic is likely to be driven by credit supply effects as banks optimize the composition of their loan portfolio when they have enough leeway to do so, a result that echoes the findings by Den Haan et al. (2007) for the US. Indeed, I also find that being integrated into a financial holding, which means here that regulatory constraints on capital are not defined at the bank level but at the level of the consolidating institution, seems to relieve credit institutions of financing constraints that may impede independent banks to shore up their longer term lending activity after a monetary tightening, pointing to supply effects in monetary policy induced contractions of longer term credit. Overall, these findings provide new macro evidence of an active bank lending channel for France.

The rest of the paper is structured as follows. Section 2 describes the data and explains the construction of loan series and bank groupings. Section 3 explains the VAR methodology. Section 4 presents estimation results. Finally, section 5 discusses their economic implications and concludes.

2 Data issues

The initial dataset comprises all balance sheets of French credit institutions over the period from 1993 Q1 to 2005 Q2 as taken from French supervisory sources with quarterly frequency. This balance sheet information is reported on an unconsolidated basis, which makes it suitable for aggregation. Beside universal commercial and cooperative banks, French credit institutions also include municipal loan institutions and a variety of financial institutions, such as specialized investment banks, leasing institutions, or specialized mortgage credit institutions (see Loupias et al., 2001, for more details). I focus here on banks as commonly meant and I thus only keep commercial and cooperative banks in the sample. Among them, branches of foreign banks, as well as banks operating principally in Monaco or in the French Oversea territories are dropped. I also exclude saving banks because of apparent statistical breaks affecting the related series. In order to highlight portfolio composition effects, I identify three types of loans in the banks' balance sheets:

loans to households for housing purpose (housing loans below), longer term loans to non-financial corporations (investment loans) and short term commercial and industry loans (short term C&I loans). The precise content of these aggregates is detailed in an appendix.

Following e.g. Kashyap and Stein (1995, 2000), I proceeded to a minimal preliminary cleaning of the individual database. Thus, only banks with positive total assets and more than six consecutive loan observations were kept in the sample. Whenever the gap at time t between the rate of growth of the relevant loan series of bank i and its average across banks exceeded five standard deviations but no merger or acquisition was recorded for bank i and this quarter, I replaced the outlier level value at time t with the mean of values at times $t-1$ and $t+1$.

Since the early 1990s, the French banking system has concentrated on a large scale.[6] However, since I aim at constructing loan aggregates by adding up individual loan data, I did not need to correct the dataset for the impact of mergers, contrarily to what is currently done in panel data studies (e.g. Loupias et al., 2001). Note that the same treatment was applied to individual series of each loan type (residential loans, short C&I loans, investment loans). As a consequence of some of the banks in the sample being more specialized, the population of banks underlying a particular reconstructed item in the banking system's loan portfolio thus slightly differs from the population underlying the reconstructed total credit aggregate. We end up with an unbalanced panel comprising 401 banks at the beginning of the sample period but only 232 banks at sample end. As of end 2004, the 252 banks in the sample (among which 158 commercial banks and 94 cooperative or mutual banks) accounted for 58% of total assets held by all credit institutions having an activity in France, 53% of credit to non-financial customers and 65% of short-term deposits. As a consistency check, figure 1 compares the obtained series for total credit to non-financial customers (aggregating all banks in the sample) with the corresponding official series from the monetary statistics release of the Banque de France (credit to the private sector by all credit institutions).

Using partitions of the whole sample according to standard bank characteristics, such

[6] See e.g. ECB (2002,p. 138) and Commission bancaire (2003). According to the first source, the number of credit institutions in the French banking system has been cut by more than 50% over the 1990s.

as size and liquidity or capitalization ratios, aggregated credit series can be compiled for every combination of a bank grouping and a credit type by simply adding up individual information. A bank is denoted "small" at a date t if its total assets are less than the 75th percentile of the distribution of total assets over all banks, and it is denoted "large" if its total assets are more than the 90th percentile of this distribution at this date. Banks with an average ratio of liquid assets (i.e. cash and interbank assets) to total assets below the 25th percentile over all banks and all dates fall into the category of "less liquid" institutions and banks with an average ratio of Tier one capital to total assets below the 25th percentile are denoted "less capitalized banks".[7] Recent research has suggested that institutions belonging to a group were more likely to be insulated from the impact of monetary shocks.[8] To test this hypothesis, I also constructed a sub-group of "independent" banks and a sub-group of "consolidated", or affiliated, banks. According to the French reporting system, banks must either report their own solvency ratio on a consolidated basis when it is relevant or state which consolidating banking group they belong to. Since this information was available for the second half of the sample only (since 2000 Q2 onward), banks which reported to be consolidated by another entity for at least four observations over that sub-period were supposed to have been consolidated by a group over the whole period and are identified as "consolidated" or "affiliated" banks below. Alternatively, banks that never reported to be consolidated by another bank since 2000 were supposed to have reported solvency ratios at their individual level over the whole period under review and are denoted below as "independent" banks. My definition of an independent bank does thus not exclude that it is in fact affiliated to a bank network or a subsidiary of another entity, but mainly implies that the links to this holding company are looser. Table 1 details the number of banks in each grouping for each type of credit. Figure 2 displays aggregate loan series obtained for various bank groupings over the whole period 1993-2005.

[7] Concretely, the third quartile of the distribution of total assets over the whole sample (all banks and all quarters) is about 3.2 bn EUR, while the 90th percentile noses above 7 bn EUR. The first quartiles of the liquidity and capitalization ratios are 10.2 % and 4.2 % respectively, while the medians are 20.1 % and 6.6 % respectively.

[8] Notably Gambacorta (2005) and Ehrmann and Worms (2004).

Table 2 summarizes the main features of the population of banks in the sample as observed towards the end of the period (2004 Q4). The statistics presented confirm the picture of a very concentrated banking system, with some 13 large banks holding an average amount of in-balance sheet assets of nearly 156 billions euro and accounting for more than 72% of total assets as well as 41% of all loans and 47% of all deposits. Meanwhile, 189 small banks hold on average assets worth 1.5 billion euro, accounting for roughly a fifth of all loans and deposits. Compared with large banks in the sample, small banks prove to be more capitalized, a fact also documented by Loupias et al. (2001), but equally liquid, with an average liquidity ratio above the median of the whole population. Consequently, one may expect the bank lending channel to be relatively dampened by comfortable liquidity and capital buffers in the case of French small banks, as compared to the textbook case.

Comparatively, less liquid banks in the sample are medium-size institutions (with an average total of assets of 5.3 billions euro, less than half as much as the average bank) that do primarily lend to households, notably for housing purchase, and also more oriented towards providing long-term loans to firms than the average. Overall, summary statistics suggest that the 60 or so institutions that I identified as less liquid banks are indeed quite heterogenous along other dimensions than liquidity and we may thus expect ambiguous responses of their loan portfolio to monetary shocks. The 60 or so less capitalized banks present a balance sheet structure that is close to the average, albeit holding a lower proportion of loans on the asset side (43% instead of 47%).

Less than the half of the banks in the sample (45% as of end 2004) provide the French supervisory authority with their own capital adequacy reporting on a consolidated basis and may be classified as a consequence as independent banks, while the remaining banks can be considered as belonging to a group and being consolidated by a larger entity for reporting purpose. Consistently with intuition, independent banks are somewhat larger on average than consolidated ones, accounting alone for 60% of total assets in the sample. They also have a more liquid asset structure and are better capitalized on average. Consolidated banks in turn hold more loans than the average bank, with a preference for housing loans, which in the French case are mainly longer term fixed rate loans. They also appear to be less liquid and less capitalized than the average credit institution, which we may interpret as their relying on their mother company for adequate liquidity transfers

when needed.

Note that there is no reason a priori why these few bank groupings that result from various partitions of the sample should have a zero intersection. An interesting issue is of course to determine to what extent different categories correspond to different populations. Table 3 helps providing an answer to that question as of end 2004: for each type of banks, the table shows how they are distributed along the other dimensions of interest. This analysis confirms that less liquid banks and less capitalized banks belong to roughly separate populations. Small banks split almost equally into independent and consolidated banks, while two thirds of less liquid and less capitalized banks are affiliated to a group and are consolidated for the purpose of supervisory reporting. Conversely, 82% of independent banks are small, against 69% of consolidated banks. Finally, table 4 shows how the various groupings split between commercial and mutual or cooperative banks at end 2004. Whereas small and less capitalized banks are predominantly commercial banks (over 70%), a majority of less liquid banks in our sample (55%) belong to mutual bank networks. Regarding the consolidation status, commercial banks account for the bulk of "consolidated" banks, and of a majority of "independent" banks, but, somewhat surprisingly, a half of the cooperative banks present in the sample at end 2004 are identified as "independent" entities. Indeed, the regional entities of two major mutual bank networks do compute and report risk-adjusted solvency ratios on a consolidated basis, and are thus classified here as being independent.

3 Empirical strategy

A standard procedure to assess the impact of monetary policy on macroeconomic variables is to estimate a small-scale VAR model consisting of the few variables of interest and compute impulse response functions of the macro variables to orthogonalized policy shocks. To analyze the differentiated response of bank credit to monetary policy depending on loan and bank types, I thus define VAR models of the following form:

$$X_t = A(L)X_{t-1} + \eta_t$$

where $X_t = (p_t, y_t, r_t, l_t)'$ is a (4×1) vector, $p_t$denotes the French price level (CPI),

y_t is France's real GDP, r_t is the short term rate used as a proxy of the policy stance of the Banque de France before 1999 and of the ECB thereafter, l_t stands for one of the reconstructed credit aggregates as detailed in the preceding section. To construct the short term rate series, the 3-month Euribor has been backpolated using the 3-month French Pibor before January 1999. A potential severe problem faced when estimating a monetary VAR for France over a period covering the launch of the euro is the change of scope of the monetary authorities. One may conceive that French bank credit reacts more or less the same way to French economic conditions and the short term money market rate before and after 1999. However, the short term money market rate representative of monetary policy will clearly depend on the euro area output gap and inflation after 1999, not on French variables alone. Besides, one should allow the monetary policy followed by the ECB to differ from the Banque de France's policy before 1999, opening the case for some nonlinearities in the interest rate equation of the VARs. However theoretically grounded, I think that two empirical facts strongly mitigate this risk of misspecification in practice. First, as shown in figure 3, the French business cycle appears to be highly correlated with the euro area one over 1993-2005. Second, since the sample begins in 1993, the year when the Banque de France's independence got warranted by law and by the same time its policy became strongly oriented towards the goal of achieving the EMU -which meant in practice that its key rate followed closely the Bundesbank's decisions-, I feel allowed to assume that the introduction of the euro in 1999 did not imply any major policy regime shift as regards France.[9] Under this assumption, a stationary VAR over 1993-2005 can be considered appropriate to assess the credit channel of monetary transmission in the French economy.

Since I consider three types of loans and six bank groupings, 18 VARs are estimated along the same lines. Note that all the macro variables in X_t are expressed as deviations from their Hodrick-Prescott trend and are thus stationary.[10] $A(L)$ is a polynomial of

[9] The empirical evidence based on factor augmented VARs before and after EMU that was provided recently by Boivin, Giannoni and Mojon (2008) broadly supports this assumption.

[10] The price, output and credit gaps are computed as percentage deviations to the corresponding trend, while the nominal interest rate gap is simply the difference between the current rate of interest and its HP trend. The latest gap may be rationalized as a rough measure of the Wicksellian interest rate gap.

order p in the lag operator and η_t is a (4×1) vector of residuals with covariance matrix Ω. The number of lags p in the estimated VARs was set to 4, consistently with some of the usual information criteria and in order to eliminate most of the auto-correlation in residuals. The benchmark specification for the VARs also includes a constant and three quarterly dummies, since the credit series are based on bank's balance sheet data that are not adjusted for seasonality.

To get the structural shocks from these residuals I perform a standard Cholesky decomposition of their estimated covariance matrix $\widehat{\Omega}$, which implies that the precise ordering of the variables in vector X_t matters. Indeed, as a benchmark, I assume that contemporaneous values of the price gap and of the output gap belong to the information set of the monetary policymaker, while innovations to credit aggregates do not, so the benchmark ordering is p_t, y_t, r_t, l_t. Since I use quarterly data, assuming that the central bank has quite a good knowledge of the contemporaneous values for p_t and y_t deems reasonable, even in spite of well-known publication lags of inflation and output data. However, one may argue that innovations to credit aggregates are then likely to be equally observed by the central bank, all the more than French money and credit aggregates are published with monthly frequency by the French central bank itself. However, first, most of the reconstructed credit aggregates used for this exercise are not computed on a regular basis by the Banque de France but are specific to this study, and second, since the ECB conducts its monetary policy on the basis of an assessment of the euro area economy as a whole, whatever credit aggregates and semi-aggregates for France are very unlikely to have been considered a relevant information for monetary policy purpose, at least since the inception of the euro in 1999. Nevertheless, as a robustness check, I also estimated the same VAR models with the interest rate equation ordering last in vector X_t. Results are qualitatively unchanged, as detailed below in the next section.[11]

[11] Note that my benchmark ordering is common in similar studies. See e.g. Ehrmann and Worms (2004) or Hülsewig et al. (2004).

4 Results

Figures 4 and 5 show the response of the various components of the loan portfolio to a one standard deviation short term interest rate shock. Each panel in the figures refers to a different bank grouping. To preserve the clarity of the figures while combining several impulse responses in each, I replaced conventional confidence intervals by squares on response curves when the response is significantly different from zero (at the 10% level). Since the residuals are often non normal[12] and the times series used are relatively short, asymptotic confidence intervals can not be considered valid. Consequently, I computed the confidence intervals presented here using a standard bootstrap procedure.[13] To facilitate comparisons across loan types and bank types, table 5 also summarizes the information presented by the figures.

The results show the benefit of splitting the population of banks along some key characteristics, as larger responses obtain for some groupings while the loans responses for the whole population is more muted and not necessarily of the same sign. Overall, the results confirm that different types of loans in bank loan portfolios react with different signs and time patterns, a key finding of the study by Den Haan et al. (2007) on US bank data. Indeed, housing loans as well as investment loans to firms do contract after a positive interest rate shock, excepted in the case of consolidated banks and also to some extent of less capitalized banks. By contrast, restrictive monetary policy shocks trigger a significant positive reaction of short term C&I loans granted by small, less liquid banks, as well as by banks that are consolidated by a bank holding. Interestingly enough, the generally negative response of loans by "independent" banks contrasts markedly from the positive response of loans by "affiliated" institutions.

To check the robustness of these results, I considered several alternatives to the benchmark specification of the VAR models. First, I assumed that innovations to loans are

[12] Indeed, they tend to exhibit fat tails, notably for those of the credit aggregates that are based on a small population of banks, e.g. housing loans by less liquid banks.

[13] The number of draws was set to 200. The results do not appear to be qualitatively affected by a reasonable increase in the number of replications (e.g. up to 500 draws)

observed by the central bank (ranking then last the short term interest rate in the vector of endogenous variables). Second, I included simultaneously all three types of loans in each VAR corresponding to a bank sub-group.[14] Third, I controlled in the VARs for components of aggregate demand which are intuitively relevant for the dynamic of a given type of loans: real households consumption for housing loans, real gross fixed capital formation (investment) by firms for investment loans and changes in inventories for short term C&I loans.[15] Tables 6 to 8 document the outcome of these alternative exercises and show that the main results obtained in the benchmark case remain qualitatively unchanged. In particular, the choice of a different variables ordering in the VAR or the addition of one macro-variable does not invalidate any of the key results: first, a positive response of short term C&I loans by small or less liquid banks to a restrictive monetary policy shock, while other types of loans tend to recede and second, a contrasted response of loans by independent versus consolidated institutions.

5 Discussion

The "puzzling" positive response of short term C&I loans to a monetary tightening has already been documented, at least on US data (cf. Kashyap and Stein, 1995, Den Haan et al., 2007). Two main lines of explanations for this temporary increase can be found in the literature. A first line of reasoning points to a demand effect by firms, which may have to finance an inventory buildup following a monetary tightening or have to bear temporarily a higher cost for their working capital (cf. Bernanke and Gertler, 1995). Other authors look for supply effects by banks themselves, which may want to optimize the return on their credit portfolio and/or adjust their (risk-weighted) assets structure to keep complying with capital regulation in spite of the adverse effects of the monetary tightening on their interest revenues and hence on their equity base (cf. Van den Heuvel, 2002, Den Haan et al., 2007). These banks would therefore shift their portfolio towards short term loans and

[14] In this case, loan variables rank last in the VAR and are ordered as follows: housing loans, investment loans, short term C&I loans.

[15] In this case, the additional macro variable was ranked after prices and before GDP in the vector of endogenous.

out of longer term credit, which either typically yield fixed interest rates – as is still the dominant case for housing loans in France – or require a higher capital coverage – as is typically the case for long term loans to non-financial firms, at least under Basel I bank capital regulations–.

In order to identify the most relevant explanation, I first controlled for the behavior of inventories and investment by non-financial firms using augmented VARs as stated above. As shown in figures 6 and 7, investment by firms starts decreasing after one quarter and goes on contracting over the following year, while inventories react positively but temporarily two quarters after an interest rate hike. These results comfort the hypothesis that demand effects may underlie (at least part of) the positive answer of short term C&I loans, notably as regards small and less liquid banks. Regarding small banks, which are often assumed to lend more to small and medium-sized firms, the surge in demand for extra loans in order to finance over a quarter or two the higher cost of working capital can be accounted for by SMEs being possibly less able than larger corporations to hedge ex ante against interest rate risk. However, one may also wonder why the response of these loans to a monetary policy shock is so persistent, whereas the positive response of inventories is short-lived.[16]

Supply effects by banks seem indeed to be part of the story, both as regards the positive response of short term C&I loans as the negative response of loans for investment purpose at the aggregate level. Indeed, whereas demand effects alone should lead to a general contraction of longer-term loans to firms, since investment falls down meanwhile, banks that are consolidated by their holding company do increase their lending after a monetary shock while independent banks cut it. Being tightly integrated to a banking group or network seems thus to ease some balance sheets constraints, allowing "affiliated" banks to lend more, a result that parallels Ehrmann and Worms (2004). Conversely, this hints that parts of the decline of investment loans by small, less liquid and/or independent banks is supply-driven, which is consistent with the case for a credit crunch, at least for the financing of parts of the non-financial sector.[17]

[16] This objection is also raised by Den Haan et al. (2007) on the basis of their data.

[17] Although a definite answer to that point would admittedly require to control for the characteristics of

To investigate this point further, Iet us finally compare the impulse responses to a monetary shock with the response of loans to a real demand shock (i.e. a one-standard deviation negative GDP shock), as shown in figures 8 and 9. Following a contraction of real activity that is not induced by a monetary policy restriction, loans to firms, whether short term or long term ones, fall down, whatever the type of banks that we consider, including "affiliated" banks. This finding clearly reinforces the case for supply effects at the level of banks in the response of aggregate bank loans to firms following a monetary policy shock.

6 Conclusion

To conclude, this study supports the view that testing for the macroeconomic relevance of the bank lending channel requires both to analyze separately short term and long term credit to firms and to correct for the integration of credit institutions into a bank network, which is likely to relieve the capital or liquidity constraints that may bite at the individual bank level following a monetary restriction. Overall, my findings suggest that part of the decrease of longer term credit to firms following a monetary tightening may be supply-driven, in particular in the case of small independent banks. Last but not least, it is worth noting that some of the results presented here for France, in particular the evidence in favour of positive supply effects in the response of short term C&I loans following a monetary policy shock, parallel the findings of Den Haan et al. (2007) for the US, whereas the structures of financial systems in both countries are generally considered quite different.

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A Appendix: definition of bank data

All bank balance sheet data are taken from the BAFI database compiled by the French Commission bancaire. I am grateful to the Banking Studies Division of the Commision bancaire for providing me access to these data. Total loans are defined as the sum of all credit in euros to resident households, non-financial firms and individual entrepreneurs, including commercial credit, export credit, overdraft facilities, credit for equipment purpose, housing credit, other credit, factoring, leasing (BAFI 4014 form, codes b10, b20, b3a, b4a, b5a, b7a, b70, b73). Housing loans are loans to households for housing purpose (code b5a). Short-term C&I loans include commercial credit, export credit and other short term credit like overdraft facilities to non-financial firms including individual entrepreneurs (codes b10, b20, b3a). Investment loans include credit for equipment purpose

to non-financial firms including individual entrepreneurs (code b4a). Bank liquidity is measured as the ratio of liquid assets (i.e. cash and interbank credit, BAFI 4000 form, code a016) to total assets and bank capitalization as the ratio of core capital (so-called "Tier one", including equity and disclosed reserves, cf. codes l605, l7a5 and l9a5) to total assets.

Table 1: Size of bank populations in each grouping, beginning vs end of the sample period.

	All banks	Small	Less liquid	Less capit.	Independ.	Consolid.
			Total loans			
1993	401	299	104	105	222	171
2005	232	172	59	60	89	141
			Housing loans			
1993	342	249	90	93	190	144
2005	196	143	50	52	73	121
			Long term loans to firms			
1993	324	231	84	95	174	142
2005	181	126	46	53	60	120
			Short term loans to firms			
1993	349	255	86	91	195	148
2005	203	147	52	53	74	128

Figure 1: Aggregated private sector loans by all banks in the sample (yoy, in %, solid line) and official annual growth rate of loans by French MFI (dashed line)

Table 2: Descriptive statistics of banks in the sample (at end 2004).

Descriptive statistics of banks in the sample (at end 2004)							
	All banks	Small	Large	Less liquid	Less capit.	Indep.	Consol.
Number	252	189	13	65	63	112	140
Mean assets (bns euro)	11.2	1.5	155.8	5.3	23.9	15.3	8.0
% of total assets	100	10.18	72.5	12.3	53.1	60.4	39.6
Mean deposits (bns euro)	1.1	0.3	9.8	0.8	1.7	1.1	1.0
% of total deposits	100	21.7	47.3	20.1	40.7	47.7	52.3
Mean loans (bns euro)	3.2	0.9	25.3	3.4	4.4	3.2	3.1
% of total loans	100	21.1	41.3	27.4	35.2	45.7	54.3
Liquid assets/tot. assets	24.1	26.2	27.0	6.6	25.1	29.3	19.9
Loans/total assets	47.1	45.3	16.1	66.1	42.7	40.9	52.0
C&I loans/tot. loans	15.0	15.1	24.5	10.6	14.4	16.9	13.5
Investment loans/tot. loans	22.1	21.8	16.8	25.2	24.1	20.0	23.7
Loans to Hh/total loans	42.2	41.1	39.4	47.0	35.6	41.7	42.5
Housing loans/tot. loans	25.8	23.1	25.7	28.3	26.5	23.5	27.6
Deposits/total liab.	19.3	20.0	7.7	14.4	22.0	16.2	20.8
Capital & reserves/tot. assets	12.5	15.6	4.0	12.6	3.7	17.0	11.0
Regulatory solvency ratio	15.3	na	10.8	15.1	8.1	na	12.8

Table 3: Breakdown of bank sub-groups by main characteristics (at end 2004)

	Small	Less liquid	Less capit.	Indep.	Consol.
Small	189				
Less liquid	42	65			
Less capit.	46	8	63		
Independent	92	17	20	112	
Consolidated	97	48	43	0	140

Table 4: Breakdown of bank sub-groups by legal type (in percentage of each grouping, at end 2004)

	Small	Less liquid	Less capit.	Indep.	Consol.
Commercial banks	72	45	78	58	66
Cooperative banks	28	55	22	42	34

Table 5: Sign and magnitude of loans responses to a monetary policy shock: benchmark specification.

	Housing loans	Investment loans	Short-term C&I loans
All banks	0	–	0,– –
Small banks	– –	– –	+ +
Less liquid banks	–	–	+ +
Less capitalized banks	0	+, – –	+
Independent banks	– –	– –	0
Consolidated banks	+	+, – –	0, – – –

Notes: Non-zero responses are significant at the 10% level. The number of minus (resp. plus) characters refers to the size of the response: - (resp. +) is small (0 to 0.5% in absolute terms), - - (resp. + +) is medium (0.5% to 1.0%) and - - - (resp. + ++) is large (above 1.0%).

Table 6: Sign and magnitude of loans responses to a monetary policy shock. Alternative ranking of variables in VAR (interest rate ranks last)

Alternative ranking of variables in VAR (interest rate ranks last)			
	Housing loans	Investment loans	Short-term C&I loans
All banks	0	–	0
Small banks	– –	– –	0
Less liquid banks	0	–	+ +
Less capitalized banks	0	+, – –	0, – –
Independent banks	– –	0	0
Consolidated banks	+	+, – –	0, – – –

Notes: Non-zero responses are significant at the 10% level. The number of minus (resp. plus) characters refers to the size of the response: - (resp. +) is small (0 to 0.5% in absolute terms), - - (resp. + +) is medium (0.5% to 1.0%) and - - - (resp. + ++) is large (above 1.0%).

Table 7: Sign and magnitude of loans responses to a monetary policy shock. Three types of loans enter each VAR

Three types of loans enter each VAR			
	Housing loans	Investment loans	Short-term C&I loans
All banks	–	–	– –, ++, – – –
Small banks	0	0	0
Less liquid banks	–	–	0
Less capitalized banks	0	–	0
Independent banks	– –	– –	0
Consolidated banks	+ +	+, – –	0, – – –

Notes: Non-zero responses are significant at the 10% level. The number of minus (resp. plus) characters refers to the size of the response: - (resp. +) is small (0 to 0.5% in absolute terms), - - (resp. + +) is medium (0.5% to 1.0%) and - - - (resp. + ++) is large (above 1.0%).

Table 8: Sign and magnitude of loans responses to a monetary policy shock. VARs augmented with additional demand variables

VARs augmented with relevant demand variables			
	Housing loans	Investment loans	Short-term C&I loans
All banks	0	–	+ +, – –
Small banks	– –	– –	+ +
Less liquid banks	–	–	0
Less capitalized banks	0	0, – –	+ +, – –
Independent banks	– –	– –	0
Consolidated banks	+ +	+, – –	0, – – –

Notes: Non-zero responses are significant at the 10% level. The number of minus (resp. plus) characters refers to the size of the response: - (resp. +) is small (0 to 0.5% in absolute terms), - - (resp. + +) is medium (0.5% to 1.0%) and - - - (resp. + ++) is large (above 1.0%).

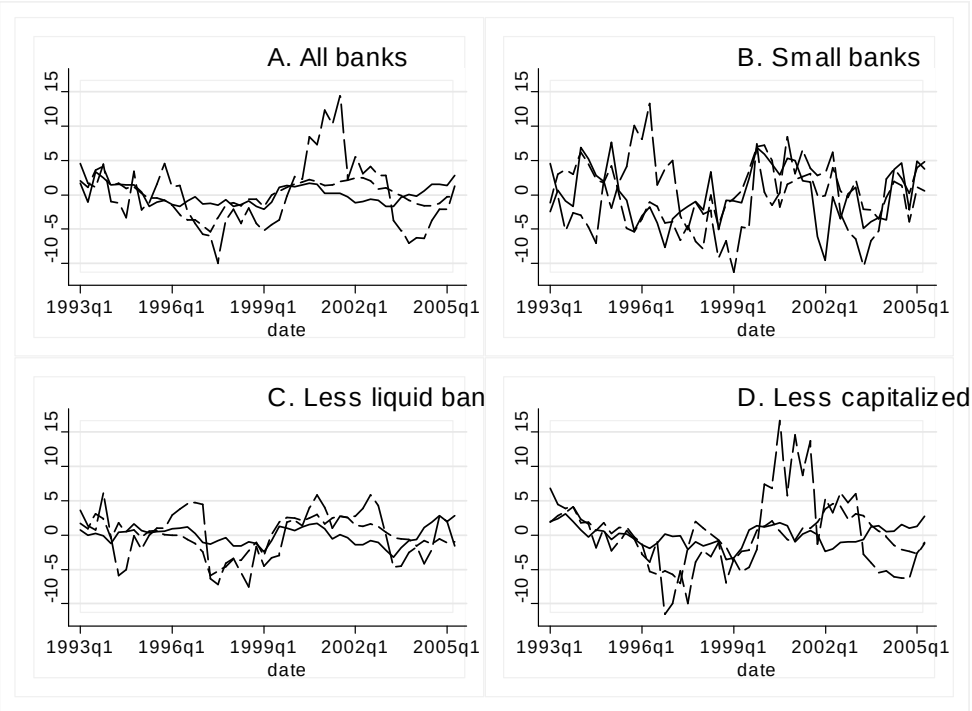

Figure 2: Loans to the private non-financial sector over 1993-2005, various bank groupings. Log-deviations to HP trend in percents. Housing loans: solid line, investment loans to non-financial firms: dashes, short term C&I loans: long dashes.

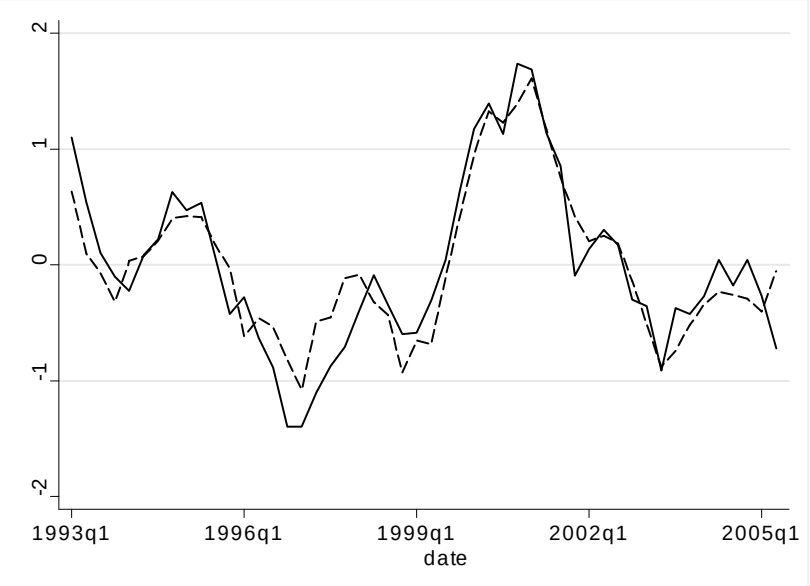

Figure 3: Detrended output, France (solide line) versus Euro area (dashed line)

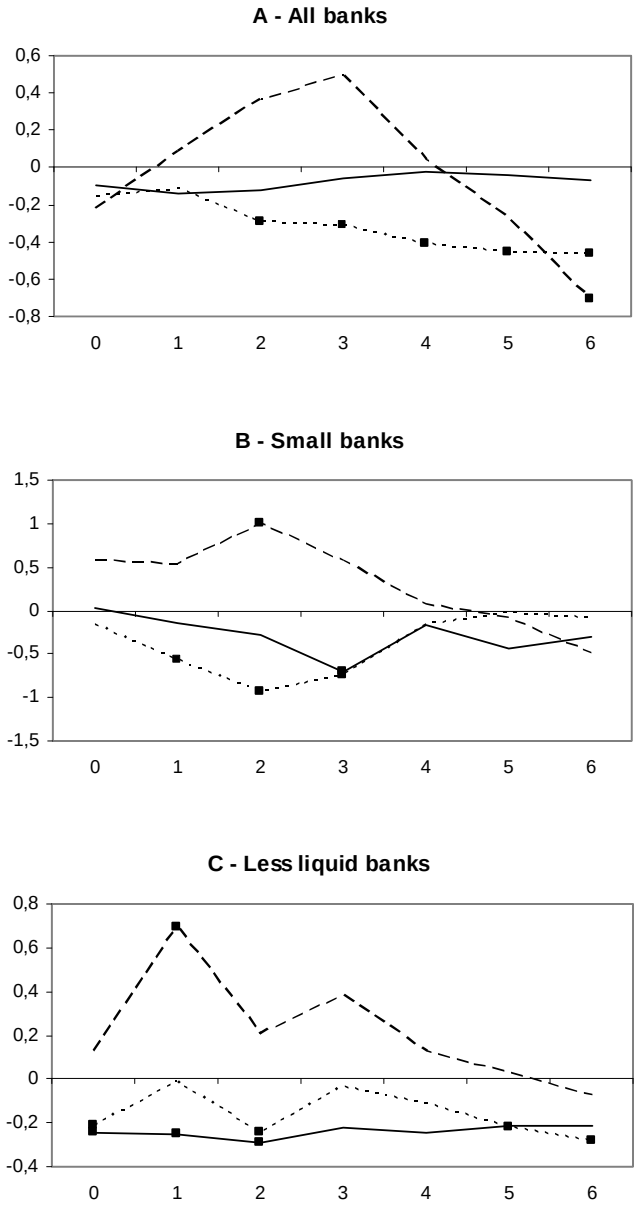

Figure 4: Response of the loan portfolio components to a one-standard deviation shock to the short term rate of interest: loans for housing purpose (solid line), investment loans to non-financial firms (dotted line), short term C&I loans (long dashed line). Benchmark VAR specification. Squares indicate a significant response at the 10% level.

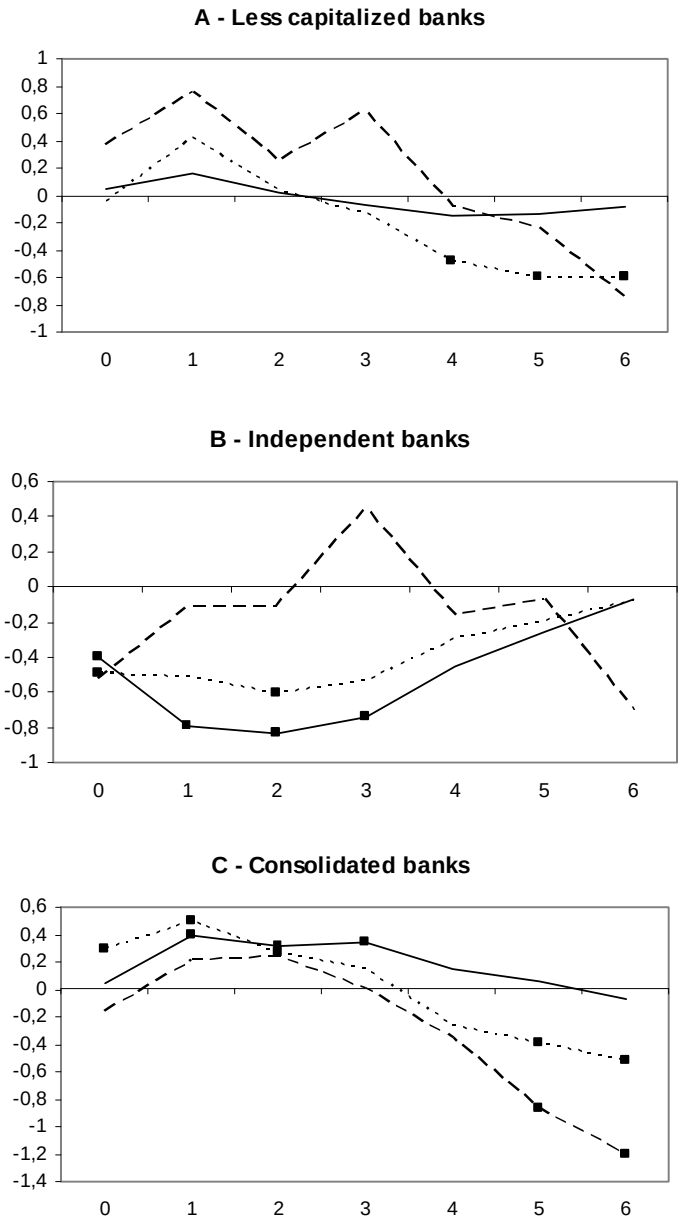

Figure 5: Response of the loan portfolio components to a one-standard deviation shock to the short term rate of interest (continued): loans for housing purpose (solid line), investment loans to non-financial firms (dotted line), short term C&I loans (long dashed line). Benchmark VAR specification. Squares indicate a significant response at the 10% level.

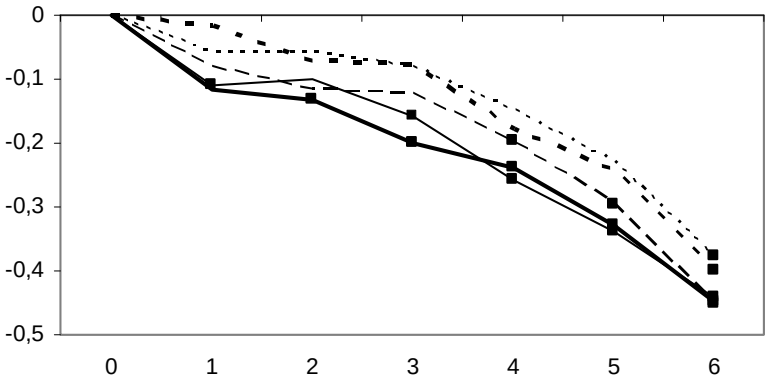

Figure 6: Response of investment to a positive one-standard deviation shock to the short term interest rate: all banks (solid), small banks (dotted), less liquid banks (dashed), less capitalized (bold dotted line), affiliated to a group (bold solid line). Benchmark VAR specification augmented with investment. Squares indicate a significant response at the 10% level.

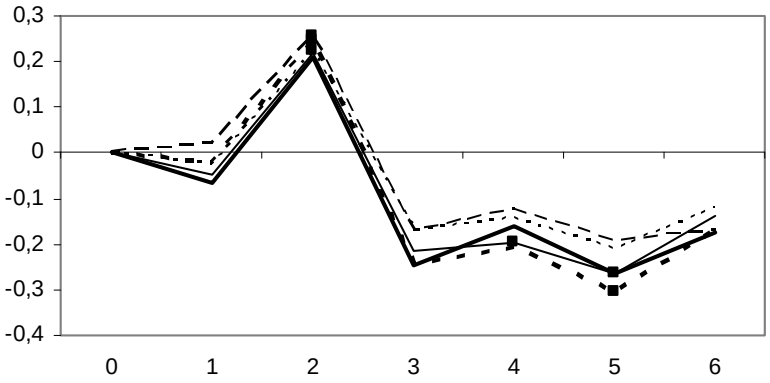

Figure 7: Response of inventories to a positive one-standard deviation shock to the short term interest rate: all banks (solid), small banks (dotted), less liquid banks (dashed), less capitalized (bold dotted line), affiliated to a group (bold solid line). Benchmark VAR specification augmented with investment. Squares indicate a significant response at the 10% level.

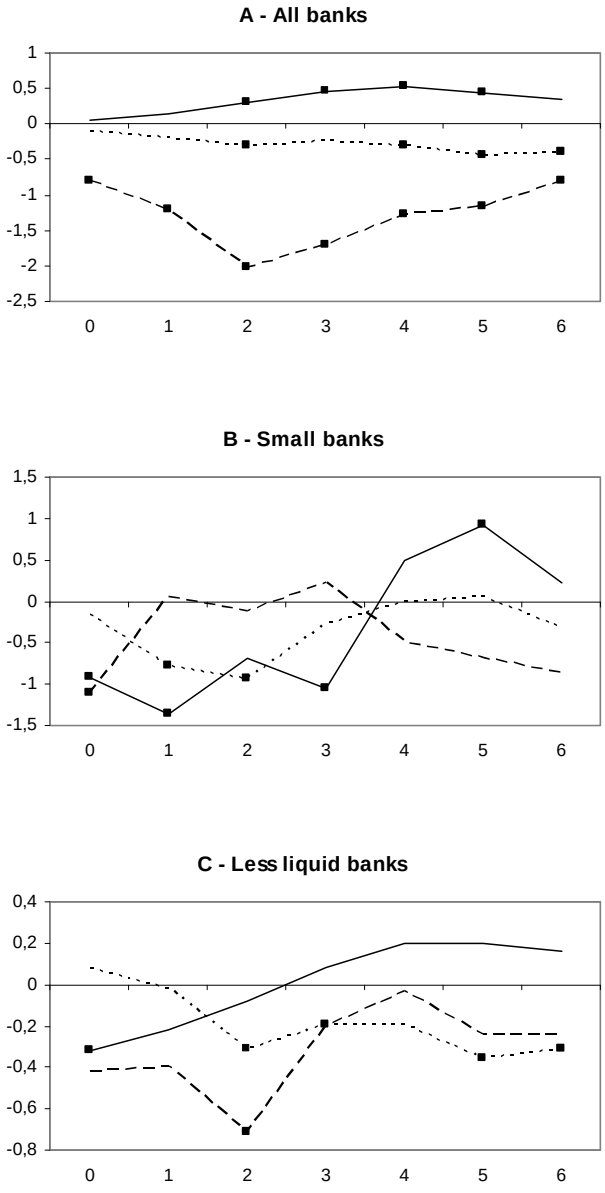

Figure 8: Response of the loan portfolio components to a one-standard deviation negative shock to real GDP: loans for housing purpose (solid line), investment loans to non-financial firms (dotted line), short term C&I loans (long dashed line). Benchmark VAR specification. Squares indicate a significant response at the 10% level.

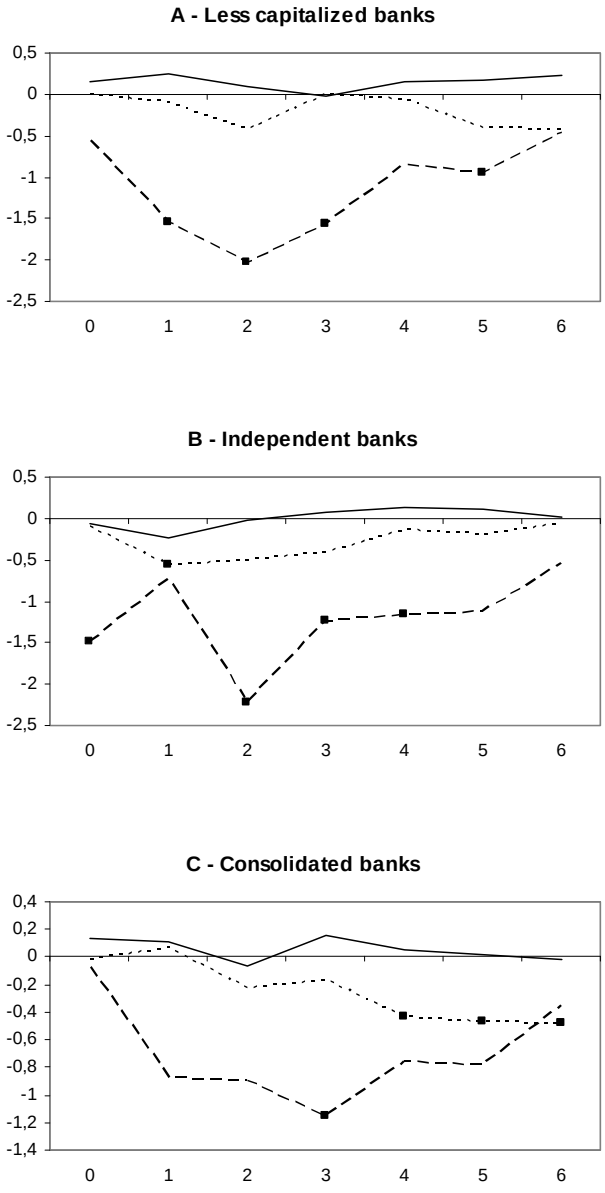

Figure 9: Response of the loan portfolio components to a one-standard deviation negative shock to real GDP: loans for housing purpose (solid line), investment loans to non-financial firms (dotted line), short term C&I loans (long dashed line). Benchmark VAR specification. Squares indicate a significant response at the 10% level.