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DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES

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Is there a bank lending channel in France? Evidence from bank panel data.

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Ce travail a été réalisé dans le cadre d'un réseau de recherche organisé par la Banque Centrale Européenne avec l'ensemble des Banques Centrales Nationales de la zone euro. Ce réseau intitulé « Monetary Transmission Network » a fonctionné du mois de juin 1999 au mois de décembre 2001, date à laquelle s'est tenue la conférence de clôture. Ces travaux seront publiés dans un ouvrage collectif à paraître chez Cambridge University Press.

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Résumé :
Le but de ce papier est d'étudier l'existence d'un canal du crédit en France. On estime pour cela la forme réduite d'un modèle dynamique qui autorise des asymétries dans la réaction de l'offre de crédits des banques à un changement des taux de la politique monétaire, asymétries liées à leur taille, leur liquidité et leur capitalisation. Les données utilisées concernent 312 banques françaises observées trimestriellement sur la période 1993-2000.
On obtient des asymétries entre les banques liquides et illiquides, ces dernières étant plus réactives à la politique monétaire. Ce résultat est conforme à celui obtenu pour plusieurs autres pays de la zone euro. Cela constitue une indication du fait que, dans la mesure où elles le peuvent, les banques françaises vendent une partie de leurs actifs liquides pour protéger leur portefeuille de crédits des effets d'une hausse des taux d'intérêt.
Contrairement aux résultats établis pour les Etats-Unis (voir par exemple, Kashyap et Stein (1995, 2000) et Kishan et Opiela (2000)), les deux autres caractéristiques considérées (la taille et la capitalisation) ne semblent pas avoir d'influence sur l'offre de crédit des banques.

Mots clés : Politique monétaire, Canal du crédit

Abstract:
The aim of this paper is to check the possible existence of a bank lending channel in France. For that purpose, we have estimated a dynamic reduced form model allowing for asymmetries in loan supply across banks, depending on their size, liquidity and capitalization. We have used a panel of 312 French banks observed quarterly over the period 1993-2000.
We find some asymmetry between liquid and illiquid banks, the latter being more sensitive to a monetary policy tightening. This result is in accordance with that obtained for several other countries of the Euro area. It constitutes an indication that, as far as they can, French banks sell part of their liquid assets in order to shield their loan portfolio from the effects of increases in the interest rate.
Contrary to what has been found for the US (e.g., see Kashyap and Stein (1995, 2000) and Kishan and Opiela (2000)), we do not find the two other banks' characteristics we consider (size and capitalization) to have any significant impact on bank lending.

Key words: monetary policy, credit channel

JEL classification numbers: E51, E52, G21

1. Introduction

The French monetary and financial markets have been largely restructured in the 80's, to allow in particular a better access of economic agents to market finance. However, bank lending still remains a major source of finance for French firms and households. Then, a bank lending channel is worth considering. Indeed, the population of monetary and financial institutions (MFIs) is, in France as in many other countries, quite heterogeneous. Strong discrepancies can be observed across banks (e.g. in terms of legal structure, size and structure of their balance sheet) and information asymmetries between banks and their funds providers cannot be ruled out.

Unfortunately, previous work, based either on macro VAR models or on microeconometric estimates, is not very conclusive. In particular, Favero et al. (2001), in their comparative multinational study based on bank balance sheets from the BankScope database, do not find strong evidence of a bank lending channel in France. At the opposite, Martin and Rosenwald (1996) and Rosenwald (1998), using information about the rates at which banks issue CDs, find some differences across banks and thus, cannot reject the existence of a lending channel. However, the latter find it to be of a rather small magnitude.

The present paper fits, partly, in this literature. Its aim is to add a piece at the available evidence by looking at the way, depending on the banks' characteristics, the outstanding amount of bank loans responds to policy shocks. Using a panel of more than 300 banks observed over the years 1993-2000, we estimate a dynamic reduced form model close to that proposed in Kashyap and Stein (1995, 2000). This model, fully described in another chapter of this book (see Ehrmann et al. (this volume)), allows asymmetries in loan supply across banks, depending on their size, liquidity and capitalization. In addition to the results provided in Ehrmann et al., we provide robustness checks related to different liquidity measures, as liquidity appears to be a key variable in our results.

The structure of the paper is as follows: Section 2 proposes a brief description of the French population of banks. Section 3 is devoted to the presentation of some data and econometric issues. In section 4, the existence of a bank lending channel is discussed. Section 5 concludes.

2. French banks: a brief presentation

At the end of 1998, there were 1191 Credit Institutions (CIs) having an activity in France, among which 369 "commercial banks", 120 "mutual and cooperative banks" (which in fact belong to four large networks), 31 "savings and provident institutions", 22 municipal credit banks and 649 financial

companies (see Loupias et al. (2001) for a description of those different groups of CIs).[4] This figure has to be compared with the 1630 CIs that existed in March 1993. Indeed, stemming from the banking system law of 1984, the suppression of the State direct control over credit volumes (1985), the creation of a true capital market (including commercial paper) in 1986, and the end of the currency exchange controls (1990), the rationalization of the structure of the French banking industry and the more intense competition that followed have resulted in a steady decline in the number of credit institutions over the last decade (see Commission Bancaire (2000)). In particular, these reforms have improved the access of economic agents to capital markets and induced an increase in the availability of market finance which, in turn, have increased competition between banks. However, this better access to market finance has been essentially significant for large firms. The financing of small businesses and households still mainly rests on bank lending (e.g. see Kremp and Sevestre (2000)).

"Commercial banks" clearly play a prominent role in the French banking system as their market share was, in 1998, around 50% both in terms of bank lending and deposits[5]. The cooperative and savings banks come in second position. However, while those banks collect almost all the remainder of deposits (their market share is 42%), their position is less strong on the loan market as they granted about 28% of loans in 1998.[6]

Due to the particular importance of size as an indicator for information asymmetries between banks and their funds providers, it is worth comparing the characteristics of small and large banks (see table 1 below).

[4] The Caisse des Dépôts et Consignations is not included in this population.
[5] Except where indicated, all subsequent figures in this section refer to the situation at the end of 1998.
[6] For a more detailed description of the population of French banks, see Loupias et al. (2001).

Table 1: Banks' characteristics with respect to size (December 1998).

Banks' characteristics	absolute size		relative size		Total
	Small	Large	Small	Large	
Number of banks	182	24	249	16	332
Mean assets (billions of euro)	0.313	66.741	0.770	92.326	6.398
Fraction of total assets	0.027	0.754	0.090	0.695	1
Mean deposits	0.182	33.000	0.492	44.885	3.393
Fraction of total deposits	0.029	0.703	0.109	0.638	1
Mean loans	0.124	26.788	0.343	37.907	2.576
Fraction of total loans	0.026	0.752	0.100	0.709	1
Loans/total assets	0.379	0.335	0.411	0.358	0.403
Deposits/total assets	0.549	0.491	0.581	0.438	0.585
Capital and reserves/total assets	0.123	0.034	0.106	0.037	0.089
Liquid1	0.455	0.317	0.416	0.294	0.401
Liquid2	0.523	0.491	0.481	0.454	0.481
Liquid3	0.236	0.095	0.216	0.034	0.203
Securities holding ratio	0.132	0.311	0.140	0.304	0.163
Interbank liabilities ratio	0.246	0.246	0.226	0.281	0.227
Securities liabilities ratio	0.040	0.196	0.046	0.206	0.062

Notes:

1) Source: authors' calculations based on data from banks reports to the bank Supervisory Authority (the Commission Bancaire).

2) Deposits include certificate of deposits (CDs) and medium term notes (MTNs). Liquid1 is the ratio of the sum of cash and interbank assets to total assets, Liquid2 is the ratio of the sum of cash, interbank assets and the so-called "transaction" and "short-term investment" securities to total assets. Those two categories are made up of securities that the bank does not consider as "long term investments" and can thus be considered to be a part of the banks' liquidity. Liquid3 is a measure aiming at taking account of the banks' net interbank position. It is defined as the ratio of the difference "interbank assets - interbank liabilities" to the difference "total assets – min(interbank assets, interbank liabilities)". Unfortunately, the securities holding and liabilities ligns include other items "divers". Securities liabilities do not include CDs and MTNs. Capitalization is the ratio of the sum of capital and reserves to total assets. The last three ratios are also relative to total assets.

3) Absolute size: "Small" banks have assets less than 1 billion, while "large" banks have assets more than 10 billions.

4) Relative size: A "small" bank has the average size of the banks below the third quartile, while a "large" bank has the average size of the banks above the 95th percentile.

It must be mentioned that, for the sake of comparability with other countries, institutions with deposits representing less than 10% of their total assets have been discarded from our sample. Financial companies have been thus excluded from the sample as well as some other financial institutions which had almost no deposits despite their legal classification as banks (among which numerous foreign banks' affiliates). Moreover, because of their particular nature, municipal credit banks have been also discarded and regional banks of three of the four mutual or cooperative bank networks have been replaced by their corresponding global entities. This has left us with 332 banks before the necessary trimming of the sample (see section 3.1 below).

The share of credit in small banks' balance sheets (38 %) is higher than that for large banks (34 %). Small banks' balance sheets include a lot more liquidity (in the stricter sense, i.e. *Liquid1*) than the ones of large banks. The share of cash and interbank operations in total assets is indeed of 45 % (resp. 32 %) for small (resp. for large) banks while at the opposite the share of securities is 13 % (resp. 31 %). Thus, small banks are more liquid than large banks. This could help small banks to shield their loan portfolio by making it easier for them to get funds by selling some of their liquid assets after a monetary policy tightening. On the liabilities side, small banks have slightly more deposits than large banks do. The share of deposits in total assets is respectively 55 % for small banks against 49 % for large banks. The share of interbank liabilities in total assets equals 25 % for both small and large banks, but the share of security liabilities is only 4 % for small banks, against 20 % for large banks. These figures might indicate that small banks face stronger asymmetric information problems and have more difficulties for issuing bonds than large banks do. Then, smaller banks would be more affected by a monetary policy tightening than large banks. However, if one looks at capitalization, one may notice that small banks are a lot more capitalized than large banks. The capitalization ratio is indeed of 12.3 % for small banks while it is only of 3.4 % for large banks. This might counterbalance the previous asymmetric information effect.

3. Data and econometric issues

3.1 Data issues

As stated above, we have had to discard some groups of CIs from our sample in order to ensure the comparability of our results with those for other countries. This has left us with a sample of 332 banks. However, as is often the case with individual data, this sample contained some outliers that could have led us to get unsound econometric estimates. Those outliers have then been discarded from the sample in the following way. For quarterly growth rates of total assets, loans and deposits, all observations below the 2nd and above the 98th percentiles have been treated as outliers. For the first difference in the capitalization and liquidity ratios, the thresholds have been set to the 1st and 99th percentiles. In

addition, a bank had to have at least 6 successive observations in levels, i.e. 5 in growth rates, in order to be kept in the sample. We have then been left with an unbalanced panel comprising 312 banks over the years 1993-2000 and 5327 observations.

3.2 Econometric issues

We have estimated the same kind of model as Ehrmann et al. (this volume), inspired from a generalization of the textbook IS-LM model described in Bernanke and Blinder (1988), re-written in first differences:

$$\Delta \log(L_{it}) = \Sigma_{j=1}^{4} b_j \Delta \log(L_{it-j}) + \Sigma_{j=0}^{4} c_j \Delta r_{t-j} + \Sigma_{j=0}^{4} d_j \Delta \log(GDP)_{t-j} + \Sigma_{j=0}^{4} e_j INFL_{t-j} + f \quad x_{it-1} + \Sigma_{j=0}^{4} g_{1j} x_{it-1} \Delta r_{t-j} + \Sigma_{j=0}^{4} g_{2j} x_{it-1} \Delta \log(GDP)_{t-j} + \Sigma_{j=0}^{4} g_{3j} x_{it-1} INFL_{t-j} + \Delta \varepsilon_{it} \quad (1)$$

where $i = 1,...,N$ indexes banks and $t = 1,...,T_i$ indexes time periods (quarters). L_{it} represents the loans of bank i in quarter t to the non-financial private sector. Δr_t represents the first difference of a nominal short-term interest rate, namely the 3 month interbank interest rate. $\Delta \log(GDP)_t$ is the growth rate of real GDP[7], and $INFL_t$ the inflation rate computed as the growth rate of the consumer price index. x accounts for banks' characteristics that may affect directly or indirectly their loan supply through their reaction to monetary policy changes (as well as their reaction to GDP or price changes). We have decided to introduce three banks' characteristics together: size, liquidity and capitalization. Indeed, these characteristics are not independent from each other. Then, including them separately in a model was likely to generate an omitted variable bias. Indeed, estimating models including only one characteristic at once led to unsatisfactory results (See table 6.a in Ehrmann et al. (this volume)).

We first estimated the model including four lags of the three macroeconomic variables and their interactions with all bank characteristics. However, this led to unsatisfactory results. Indeed, we faced a strong multicollinearity problem, implying a lack of significance of almost all the estimated coefficients. We then decided to keep the interactions of monetary policy with size, liquidity and capitalization but to discard all interactions with GDP growth and inflation, which were much less significant than the ones with the monetary policy indicator. The validity of this choice was confirmed by the fact that when the model included only one bank characteristic, we got insignificant coefficient estimates for the interactions with GDP and inflation, but significant ones for the monetary policy interactions[8]. In other words, it seems that one can accept the assumption that loan demand elasticities with respect to GDP and inflation are homogeneous across banks. This set of estimates is referred to as model 1. In another set of regressions, time dummies were substituted to macroeconomic variables. This estimation, being referred to as model 2, was aimed at checking for the proper isolation of

[7] GDP evaluated on a 1995 basis.

asymmetries in banks' response to monetary policy changes. It is then worth pointing out that, as regards the monetary policy interaction coefficients, the estimates obtained from model 1 (column 1 in table 2 below), are very similar to those obtained from model 2, including time dummies (column 2). This reassures us that our interpretation of these interaction coefficients as indications of the existence of some heterogeneity in banks' lending behavior is robust.

Table 2: Econometric results

	MODEL 1 Liquid1		**MODEL 2 Liquid1**		**MODEL 1 Liquid2**		**MODEL 1 Liquid3**	
	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error
direct coefficients								
sum of lags	0.289***	0.050	0.301***	0.056	0.307***	0.053	0.381***	0.053
Monetary policy(MP)	-1.400***	0.403			-1.350***	0.432	-0.433	0.410
Real GDP	2.115***	0.318			2.392***	0.343	2.352***	0.338
Prices(CPI)	-2.615***	0.393			-2.716***	0.401	-2.492***	0.412
interaction coefficients								
Monetary policy(MP) x size	-0.045	0.156	-0.093	0.163	-0.166	0.164	-0.257	0.174
Monetary policy(MP) x liquidity	5.762***	1.389	5.743***	1.539	2.810**	1.104	4.176***	0.856
Monetary policy(MP) x capitalization	1.638	4.969	1.546	5.271	3.875	5.097	-10.840**	4.978
Long run interaction coefficients								
Monetary policy(MP) x size	-0.063	0.218	-0.132	0.233	-0.240	0.236	-0.416	0.287
Monetary policy(MP) x liquidity	8.106***	1.931	8.211***	2.102	4.055**	1.588	6.750***	1.482
Monetary policy(MP) x capitalization	2.304	7.007	2.210	7.537	5.593	7.395	-17.530**	7.999
	Stat.	p-value	Stat.	p-value	Stat.	p-value	Stat.	p-value
m1	-3.588	0.000	-3.584	0.000	-3.260	0.001	-4.224	0.000
m2	-0.863	0.388	-1.058	0.290	-0.751	0.453	-0.717	0.474
Sargan test (2nd step)	122.669	0.231	105.892	0.376	126.309	0.168	137.486	0.051
Number of banks	312		312		312		313	
Number of observations	5327		5327		5320		5279	

Notes:

1) Large and small banks are defined here as the top 5 % and bottom 75 % of the sample. Liquid (illiquid) and highly capitalized (under-capitalized) banks are both defined as the top (bottom) 10 % of the sample.

2) Long run interaction coefficients are computed as the interaction coefficients given above (themselves being the sum over lags of all the corresponding coefficients) to one minus the sum over lags of the endogenous variable.

In order to account for the autoregressive nature of the model and for the possible endogeneity of banks' characteristics, the GMM estimator has been used with the following instruments: the second and third lags of the quarterly growth rate of loans, the second lag of the bank characteristics and the first difference of the three month interbank interest rate. Moreover, to increase efficiency, this instrument set has been expanded following Arellano and Bond's procedure, i.e. all instruments have

[8] The results associated with the estimation of a model with only one characteristic at a time are not reported here, but can be

been multiplied by time dummies. According to the Sargan test statistics we get, the instruments used are valid. Then, one cannot reject the assumption that the three month interbank interest rate is exogenous. Moreover, this statistic together with the p-values of the m1 (disturbance serial correlation of order 1) and m2 (disturbance serial correlation of order 2) statistics confirm our interpretation of the model as the first difference of a "theoretical" specification in log levels. Indeed, the disturbances appear to be MA(1), and thus to be uncorrelated with bank specific variables dated t-2 or less and with lags 2 and 3 of the endogenous variable.

The results presented in table 2 are the GMM second step estimates. However, first step estimates with robust standard errors do not significantly differ from those. Moreover, robustness checks have been done as regards seasonality. Neither the inclusion of seasonal dummies nor the inclusion of the fourth lag of the growth rate of loans in the instrument set indicated any significant seasonality, besides that implicitly taken into account by the macro variables. Other robustness checks, specific to the particular treatment we applied to mutual and cooperative bank networks, did not indicate any quantitatively significant impact.[9]

4. Is there a bank lending channel?

In our model, the existence of a bank lending channel can be assessed through the sign and significance of the interaction coefficients measuring the differential impact of monetary policy on bank lending according to banks' size, liquidity, and/or capitalization. If small/illiquid/under-capitalized banks faced stronger difficulties in finding external finance, after a monetary policy tightening, they would reduce their loans by more than large/liquid/highly capitalized ones. Given the negative impact of an interest rate increase on bank lending, this should translate into a positive and significant estimate of the interaction coefficients between monetary policy and banks' characteristics.

4.1 The impact of liquidity

Contrary to Favero, Giavazzi, and Flabbi (2001), who carried out a multinational comparative study using BankScope data, we find some evidence of a lending channel in France. Indeed, the existence of a lending channel can be assessed since our econometric results show that more liquid banks do not respond to a monetary policy tightening as strongly as less liquid banks do. Indeed, they use their liquidity to compensate the effects of a monetary policy tightening: the interaction coefficient with liquidity is positive and highly significant. Banks appear to draw on their short-term interbank assets to dampen the consequences of an interest rate increase on their loan supply.

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found in Ehrmann et al. (this volume).

[9] For more details, see Loupias et al. (2001).

As liquidity appears to be important, robustness checks have been done by considering three alternative measures of the liquidity. Liquid1 is a very simple measure of liquidity as it takes into account only cash and interbank assets on a gross basis. It is the one used in Ehrmann et al. (this volume) and is our benchmark. The second measure of liquidity (Liquid2) is almost as simple but it includes, on top of cash and interbank assets, transaction securities and short-term investment securities. These securities are supposed to be easily marketable, and thus relatively liquid. The third measure of liquidity (Liquid3) aims at taking account of the banks' net interbank position. It is defined as the ratio of the difference "interbank assets-interbank liabilities" to the difference "total assets-min(interbank assets, interbank liabilities)". The purpose of this measure is to get rid of the interbank activity of a bank in order to measure its "truly disposable" liquidity. Indeed, one can imagine situations in which banks with a high level of interbank liquid assets cannot necessarily shield their loan portfolio from a monetary policy tightening by selling those assets. Banks with large commitments on the interbank market may have to use their interbank assets to fulfill their obligations. This phenomenon seems to be important for mutual and cooperative banks, due to their particular management of liquidity (see Worms (this volume) for a comparable observation for Germany).

The third column of table 2 presents a regression with the second measure of liquidity. The results are qualitatively not quite different from the ones with a more restricted definition of liquidity. Nevertheless, although still significantly positive, the magnitude of the monetary policy-liquidity interaction coefficient appears to be about one half of that with the first definition of the liquidity ratio. This is an indication that the impact of a restrictive monetary policy on the banks' securities portfolio is less important than that on their interbank assets. This result is consistent with Baumel and Sevestre (2000) who found that, in order to finance more loans, banks use only marginally the possibility they have to sell the long term securities they own. It is also in line with the results of Worms (this volume) for German banks. The third definition of the liquidity ratio, aimed at taking account of the net liquidity position of banks, also leads to qualitatively similar results (column 4). In other words, even taking account of their possibly particular management of liquidity, one cannot dismiss the conclusion that banks insulate their loan portfolio from a monetary policy tightening by first selling part of their most liquid assets portfolio.

4.2 The impact of size

Contrary to the results obtained by Kashyap and Stein (1995, 2000) for the US, size does not appear to have any impact on the way banks respond to an increase in the monetary policy interest rate. This result is similar to the one obtained for several other European countries (see Ehrmann et al. (this volume)). One possible explanation rests in the fact that, as previously shown, small banks are

significantly more liquid and capitalized than large ones.[10] This might counter-balance the effect of size, as far as size is taken as an indicator for information problems faced by banks when they look for external finance to compensate the decrease in deposits they may experience after a monetary policy tightening. A second explanation might come from the fact that small banks are often owned by larger ones. Thus, their size does not necessarily reflect their ability to raise funds nor their potential solvency problems. Another possible explanation comes from the identification problem we might have. Indeed, the interaction coefficients we get account for differences in the loan supply behavior of banks as long as one assumes that all banks face the same demand function as regards the interest rate elasticity. However, Baumel and Sevestre (2000) have shown that the elasticity of demand addressed to large banks is higher than that of the demand faced by small banks. Then, the interaction coefficient we get in our reduced form model results from the composition of two different effects of interest rate variations, which exhibit opposite magnitudes: for large banks (resp. small banks), the elasticity of supply may be low (resp. high) while that of demand is large (resp. small). This might explain why we get a non significant impact of size on bank lending.

4.3 The impact of capitalization

The third bank characteristic we have considered, namely capitalization, does not seem to impact significantly on bank lending behavior, everything else being equal. This result cannot be explained by a lack of precision due to the correlations between size, liquidity and capitalization. If this were the case, one would obtain significant coefficients when only one interaction is included in the model (see table 6.a in Ehrmann et al. (this volume)). Again, most banks with a low capitalization ratio are large banks, which may explain why this characteristic does not appear to impact on banks' loan supply. However, it might be the case that capitalization matters for small banks only. In that case, one would expect to get a significant positive coefficient when introducing the double interaction size-capitalization in the model. This is not what we have found when we have estimated a model with a double interaction size-capitalization with monetary policy, as we got an insignificant coefficient for this double interaction. Finally, the absence of influence of the capitalization ratio might also stem from the drawback of our accounting capitalization measure. Indeed, this ratio is quite different from the one used in the prudential regulation.[11]

[10] Those differences exist in the US, too. However, they are of a much smaller magnitude.
[11] The so-called Basle capitalization requirement (e.g. see Gambacorta (this volume) or Ehrmann et al. (this volume)).

5. Conclusion

The aim of this paper was to check the possible existence of a bank lending channel in France. For that purpose, we have estimated a dynamic reduced form model allowing for asymmetries in loan supply across banks, depending on their size, liquidity and capitalization. We have used a panel of 312 French banks observed quarterly over the period 1993-2000.

We find some asymmetry between liquid and illiquid banks, the latter being more sensitive to a monetary policy tightening. This result is in accordance with that obtained for several other countries of the Euro area (see Ehrmann et al. (this volume)). It constitutes an indication that, as far as they can, French banks sell part of their liquid assets in order to shield their loan portfolio from the effects of increases in the interest rate.

Contrary to what has been found for the US (e.g., see Kashyap and Stein (1995, 2000) and Kishan and Opiela (2000)), we do not find the two other banks' characteristics we consider (size and capitalization) to have any significant impact on bank lending.

Nevertheless, some more work needs to be done to get a better assessment of the influence of monetary policy decisions on bank lending. First, it would be probably more satisfactory to get an evaluation of the impact of those decisions on new loans granted by banks rather than on their outstanding amount. Indeed, banks cannot easily adjust their loan portfolio downwards, at least for long-term loans which represent a significant proportion of bank lending. Second, one should also have a look at the impact of monetary policy on the interest rate charged by banks to their customers.

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