The role of banks in monetary policy: A survey with implications for the European monetary union

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Much of the debate about European monetary union (EMU) has focused on the likely macroeconomic effects. On the benefits side, there is clearly the reduction in transactions costs that comes from eliminating all the competing currencies. For some countries there is also the possibility that the shift to the new European central bank will bring enhanced inflation-fighting credibility. If so, these countries will enjoy lower nominal interest rates and perhaps even lower real interest rates if they can eliminate an inflation risk premium. On the cost side, some countries may see their inflation-fighting credibility decline. In addition, all countries will presumably have less freedom to use monetary policy to stimulate their own economy.

While these issues are important, we believe another crucial factor is being overlooked: the banking system aspects of monetary policy under the EMU. This article reviews some recent work, which suggests that monetary policy has significant distributional effects that operate through the banking system. We briefly discuss how this bank transmission channel may operate in the EMU.

First, we describe the conceptual differences between the bank-centric view of monetary transmission and the conventional view, in which banks do not play a key role. The bank-centric theory hinges on two key propositions: that monetary interventions do something special to banks; and that once banks are affected, so are firms and/or consumers. Then we review the empirical evidence, which tends to support the bank-centric view. Finally, we look at how a common monetary policy will affect banks throughout Europe and how this, in turn, might influence real economic activity in different countries.

A byproduct of our work is that we have developed a large amount of documentation and experience working with U.S. bank-level data, which we describe in the appendix at the end of this article. The appendix also provides details of how researchers can access these data via the Federal Reserve Bank of Chicago's Web site.

Contrasting views of monetary transmission

Conventional monetary economics

The classic textbook treatment of monetary policy focuses on how the central bank's actions affect households' portfolios. In simple terms, household portfolios are allocated between

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"bonds," shorthand for all types of financial assets that are not used for transactions purposes, and money (which is the asset used in transactions). Importantly, money can be more than just currency, with checking accounts being the obvious substitute to include in narrow measures of money.

It is assumed that central banks can control the quantity of money. If the central bank can control one of the two asset types in household portfolios, it follows that by adjusting the relative supply of the two asset types, the central bank can control their relative prices. For simplicity, we often assume that transaction-facilitating assets do not pay interest. In this case, the relative price of money and bonds is the nominal interest rate. If we alter the characterization to allow transactions accounts to pay interest, the central bank will be able to influence the gap between this rate and the rate on assets with no transactions services.

Regardless of whether transactions accounts pay interest, the conventional view rests on two assumptions. First, there must be some well-defined asset called money, which is essential for transactions. Second, the monetary authority must be able to control (with some precision over intermediate horizons) the supply of money.

Historically, when demand deposits and currency were about the only assets used in transactions, it was easy to see how this control might work. Because the central bank is the only entity that can create currency, it can determine how much currency comes into circulation. Furthermore, the ability of banks (and other financial institutions) to create checking accounts has typically been limited by the requirement that banks hold reserves (which can be thought of as vault cash) against these accounts. By managing the rules regarding reserves, the monetary authority indirectly controls the noncurrency component of transaction balances.

Typically, the central bank decides both the level of reserves to be held against a given level of transactions balances and the types of assets that can be used as reserves. When the central bank wants more money in the economy, it provides the banks with more currency that can be used as reserves (say by trading reserves for other bank securities). Banks then lever up the reserves through lending and crediting the checking accounts of the borrowers who receive the funds. In this framework, the willingness of banks to lend matters only to the extent to which it influences the creation of transaction-facilitating assets, that is, deposits.

Once the supply of transactions accounts has been adjusted following the central bank's reserve injection, interest rates respond in a predictable manner. When more transactions balances become available to households, the valuation of these balances falls and money becomes cheaper to hold than before—that is, nominal interest rates fall. For this change in nominal rates to matter, one must assume that prices do not adjust instantly to the change in the money supply. Then with more money, people will have more *real* purchasing power, and the nominal interest decline will correspond to a lower real interest rate.

The major problem with the conventional theory of monetary policy is the sharp two-asset dichotomy that underlies the model. There is an increasing proliferation of assets, which, from the household perspective, mimic checking accounts but are not controllable by the central bank (for example, mutual funds with check writing privileges). As these non-reservable transactions-type accounts become more prevalent, the central bank's power over currency and transaction deposits becomes less relevant in the determination of interest rates. This does not mean the central bank will no longer be able to influence rates; however, we believe that the basic logic underlying the textbook model is becoming much less compelling.

The bank-centric view

In view of the above limitation of the conventional theory, a large literature has developed based on the assumption that there are three important asset types: money, bonds, and bank loans. In this context, the special response of banks to changes in monetary policy is their *lending* response (not just their role as deposit creators). Thus, the ambiguity over what constitutes money is much less important. For this mechanism to operate, it is essential that some spending that is financed with bank loans will not occur if the banks cut the loans (that is, there is no perfect substitute available for a bank loan). The assumed sensitivity of bank loan supply to monetary policy together with the assumed dependence of some spending on bank lending generate a number of predictions about how monetary policy will work.[1]

One basic prediction is that the firms and individuals whose creditworthiness is most difficult to gauge (that is, those borrowers about whom information is imperfect) will be most dependent on banks for financing. Because these borrowers face the extra cost of raising funds from third parties, they are not indifferent about the composition of their liabilities. Banks have a particular advantage in lending to such borrowers because they can specialize in information gathering to determine creditworthiness. Moreover, by developing repeat business, banks can stay informed about their customers. They are therefore better able to make prudent lending decisions than lenders that don't have access to this information.[2]

The question of who will fund the banks remains. Banks that lend to relatively small, little known borrowers will have collections of assets that are difficult to value. This implies that individual investors are not as well informed as bank management about the value of the bank's existing assets. Depending on the type of liability the bank issues to finance itself, this may create an adverse selection problem. Banks with high levels of opaque assets need to pay a relatively high interest rate to offset the risk associated with these assets. Some banks may prefer to make fewer loans than to pay the rates required to attract funds.

One way to overcome this problem is through deposit insurance. If banks can issue insured deposits, account holders need not worry about the lending decisions made by their bank. To fund themselves with insured deposits, banks typically have to allow the entity that is providing the deposit guarantee to oversee their lending decisions. In addition, they are usually required to put aside reserves (generally currency) against the insured deposits. This link between deposit insurance and reserve requirements gives the monetary authorities a powerful lever. In effect, the reserves allow banks to raise funds without having to generate comprehensive information about the quality of their own assets. (See Stein, 1995, for the formal model.)

In this context, a reduction in the supply of reserves has an impact beyond those emphasized in the conventional textbook description: It pushes the banks toward a more costly form of financing. Because of the extra premium that banks will have to pay to bring in noninsured deposits, the banks will make fewer loans after the reserve outflow. If the borrowers that lose their loans cannot obtain new funds quickly, their spending levels may fall. Because these consequences can be partially anticipated, banks and firms will hedge this risk. Banks will not fully loan out their deposits, holding some securities as a buffer stock against a reserve outflow. Similarly, firms will hold some liquid assets on their books in case a loan is withdrawn.

Nevertheless, there are good reasons to believe that such buffer stocks will not fully offset the effects of contractionary monetary policy. For one thing, buffer stocks are costly for the banks. Banks make money by making loans, not by sitting on securities that offer returns close to the rates the banks pay on deposits. Moreover, the tax code makes it inefficient for the banks to hold securities. As with any equity financed corporation, holding these types of assets imposes double taxation on the bank's shareholders.

In summary, unlike the traditional theory that emphasizes households' preferences between money and other less liquid assets, the new theory of monetary policy asserts that the role of the banking sector is central to the transmission of monetary policy. Specifically, two key factors shape the way in which monetary policy works: 1) the extent to which banks rely on reservable deposit financing and adjust their loan supply schedules following changes in bank reserves; and 2) the extent to which certain borrowers are bank-dependent and cannot easily offset these shifts in bank loan supply.

Empirical evidence on the role of banks in monetary policy

A growing literature tests the bank-centric theory described above. Although relatively little of this research has been done using European data, we will explain in a later section why the existing results suggest there may be powerful effects in Europe.[3]

The work (which mostly focuses on the U.S.) can be summarized by the following picture of monetary policy transmission. When the Federal Reserve tightens policy, aggregate lending by banks gradually slows down and there is a surge in nonbank financing, such as commercial paper. When this substitution of financing is taking place, aggregate investment is reduced by more than would be predicted solely on the basis of rising interest rates.

Small firms that do not have significant buffer cash holdings are most likely to trim investment (particularly inventory investment) around the periods of tight money. Similarly, small banks seem more prone than large banks to reduce their lending, with the effect greatest for small banks with relatively low buffer stocks of securities at the time of the tightening. Overall, the results suggest that monetary policy may have important real consequences beyond those generated by standard interest rate effects. Below, we review this evidence in detail.

Do banks change their supply of loans when monetary policy changes?

Perhaps the simplest aggregate empirical implication of the bank-centric view of monetary transmission is that bank loans should be closely correlated with measures of economic activity. Following changes in monetary policy, there is a strong correlation between bank loans and unemployment, GNP, and other key macroeconomic indicators (see Bernanke and Blinder, 1992). However, such correlations could arise even if the "bank lending channel" is not operative. The correlations may be driven by changes in the demand for bank loans rather than the supply of bank loans. For example, bank loans and inventories might move together because banks always stand willing to lend and firms finance desired changes in inventory levels with bank loans.

Kashyap, Stein, and Wilcox (KSW, 1993) use macroeconomic data to overcome the difficulty of separating the role of loan demand from loan supply. According to KSW, movements in substitutes for bank financing should contain information about the demand for bank financing. For example, if bank loans are falling while commercial paper issuance is rising, one can infer that bank loan supply has contracted.[4] KSW examine movements in the mix between bank loans and loan substitutes following changes in monetary policy. They find that when the Fed tightens, commercial paper issuance surges while bank loans (slowly) decline.

Hoshi, Scharfstein, and Singleton (1993) conduct an analogous set of tests using aggregate Japanese data. Specifically, they compare the behavior of bank loans subject to informal control by the Bank of Japan with loans from insurance companies that are the main alternative to bank financing. As predicted by the lending channel theory, they find that when the Bank of Japan tightens, the fraction of industrial loans coming from banks drops noticeably. Arguably, the Japanese evidence is less surprising because the Bank of Japan appears to exert some direct control over loan volume in addition to any indirect control that might come from changing reserves.

Evidence relying on changes in the aggregate financing mix has been questioned because alternative explanations exist that do not rely on bank loan supply shifts. For instance, one could argue that *large* firms that typically use commercial paper financing might tend to increase *all* forms of borrowing, while smaller firms that are mostly bank-dependent receive less of all types of financing. In this case, heterogeneity in loan demand rather than differences in loan supply would explain the results above. In response to this criticism, however, Kashyap, Stein, and Wilcox (1996) show that even among a composite of large U.S. firms, there is considerable substitution away from bank loans toward commercial paper.

Calomiris, Himmelberg, and Wachtel (1995) use data on individual firms to make a similar point. Using a sample of firms that are issuing commercial paper, Calomiris et al. show that when monetary policy tightens, commercial paper issuance rises and so does the trade credit extended by these firms. This finding suggests that these larger firms are taking up some of the slack created as their smaller customers lose their bank loans. While this mechanism partially offsets the impact of the loan supply shock, it does not eliminate the shock.

Recently, Ludvigson (1996) developed a test for loan supply effects that is immune to the loan demand explanation. Comparing the extension of auto credit by banks and finance companies, the author finds that bank lending to consumers declines relative to finance company lending when monetary policy tightens, as predicted by the lending channel. The vast majority of the borrowers in this case are individuals, so it is not possible to appeal to differences in large and small buyers to explain the pattern. Furthermore, Ludvigson finds that finance company borrowers default more than bank borrowers, so finance companies are not lending more after a monetary contraction simply because they have higher-quality customers. Thus, Ludvigson's findings strongly indicate a loan supply effect of monetary policy.

The search for loan supply responses to monetary policy has also been carried out using disaggregated bank data. The theory outlined above suggests that banks that have trouble raising external finance respond differently to a monetary policy tightening from banks that can easily raise uninsured external funds. One natural proxy for the ability to raise such financing is bank size. Particularly in the U.S. where there are thousands of banks, small banks tend not to be rated by credit agencies and, therefore, have trouble attracting uninsured nondeposit financing.

In Kashyap and Stein (1995), we created a composite of small and large banks to study this question. As predicted by the theory, we find that banks of different sizes use different forms of financing. Only the larger banks have much success in securing nondeposit financing. More importantly, we find that small banks' lending is more sensitive to Fed-induced deposit shocks than that of large banks.

While these results are consistent with the idea that policy shifts induce changes in loan supply, there is also a loan demand interpretation. In this case one would have to argue that the customers of small banks differ from the customers of large banks and that loan demand drops more for customers of small banks. To take account of this possibility, we conducted further tests at the individual bank level, comparing the behavior of different small banks (Kashyap and Stein, 1997). Because most U.S. bank-level data are collected for regulatory purposes rather than for use in research, bank-level analysis requires a considerable amount of effort to get the data into usable form. As mentioned earlier, one of the byproducts of this effort is that we have developed a large amount of documentation and experience working with these data. The appendix provides a description of the data, available on the Bank's Web site; table 1 also summarizes some of the data.

At the individual bank level, the theory predicts that banks that have difficulty making up for deposit outflows should typically hold a buffer stock of securities, so that they can reduce securities holdings rather than having to cut back loans. Consistent with this prediction, table 1 shows strong evidence that small banks hold a higher fraction of assets in cash and securities than large banks. The data in table 1 also bear out other predictions of the imperfect information theory, such as small banks not being able to borrow in the federal funds market (where collateral is not used).

In terms of the search for loan supply effects, the buffer stocks will make it more difficult to find lending responses to shifts in monetary policy. Nevertheless, our research suggests that securities holdings do not seem to completely insulate bank lending from monetary policy. Even among small banks where the tendency to hold buffer stocks is most pronounced, banks with more cash and securities at the onset of a monetary contraction respond differently from less liquid banks (Kashyap and Stein, 1997). Specifically, the liquid banks are much less prone to reduce their lending following a tightening of monetary policy. Gibson (1996) shows that this pattern holds over time: When the aggregate bank holdings of securities are low, lending is more responsive to monetary policy.

The accumulated evidence shows that the bank loan supply shifts when monetary policy changes. However, there are various ways in which this loan supply shock could be neutralized. For instance, borrowers could find other nonbank lenders to fully offset the shortfall in bank lending. As a result, we must go beyond data on the volume of lending alone to see if the lending channel has any real effects on economic activity.

Does spending respond to changes in bank loan supply?

KSW check whether the financing mix has any additional explanatory power for investment once other fundamental factors, such as the cost of capital, are taken into account. The authors find that the mix does seem to have independent predictive power for investment, particularly inventory investment. Similarly, Hoshi, Scharfstein, and Singleton (1993) find that in a four-variable vector autoregression (which includes interest rates), the credit mix variable is a significant determinant of both fixed investment and finished goods inventories. Thus, the Japanese and U.S. data give the same basic message.

Working at a lower level of aggregation, Ludvigson looks at whether the financing mix (which in this case separates bank loans and finance company lending) is an important predictor of automobile sales. The author finds that the mix is a significant predictor even controlling for income, auto prices, and interest rates. This evidence strikes us as particularly

TABLE 1

Composition of bank balance sheets

As of 1976:Q1	Below 75th percentile	75th to 90th percentile	90th to 95th percentile	95th to 98th percentile	98th to 99th percentile	Above 99th percentile
Number of banks	10,784	2,157	719	431	144	144
Mean assets *(1993 $ millions)*	32.8	119.1	247.7	556.6	1,341.5	10,763.4
Median assets *(1993 $ millions)*	28.4	112.6	239.0	508.1	1,228.7	3,964.6
Fraction of total system assets	0.128	0.093	0.064	0.087	0.070	0.559
Fraction of total assets in size category						
Cash and securities	0.426	0.418	0.418	0.408	0.396	0.371
Fed funds lent	0.049	0.040	0.038	0.045	0.045	0.025
Total domestic loans	0.518	0.531	0.531	0.531	0.539	0.413
Real estate loans	0.172	0.191	0.106	0.179	0.174	0.087
C&I loans	0.102	0.131	0.153	0.160	0.168	0.171
Loans to individuals	0.147	0.162	0.148	0.147	0.138	0.059
Total deposits	0.902	0.897	0.890	0.969	0.841	0.810
Demand deposits	0.312	0.301	0.301	0.313	0.327	0.248
Time and savings deposits	0.590	0.596	0.589	0.554	0.508	0.326
Time deposits > $100 K	0.067	0.095	0.119	0.139	0.143	0.156
Fed funds borrowed	0.004	0.010	0.019	0.039	0.067	0.076
Subordinated debt	0.002	0.003	0.004	0.005	0.006	0.005
Other liabilities	0.008	0.012	0.013	0.014	0.017	0.057
As of 1993:Q2						
Number of banks	8,404	1,681	560	336	112	113
Mean assets *(1993 $ millions)*	44.4	165.8	370.1	1,072.6	3,366.0	17,413.4
Median assets *(1993 $ millions)*	38.6	155.7	362.7	920.8	3,246.3	9,297.7
Fraction of total system assets	0.105	0.078	0.060	0.101	0.106	0.551
Fraction of total assets in size category						
Cash and securities	0.399	0.371	0.343	0.333	0.325	0.311
Fed funds lent	0.045	0.040	0.035	0.041	0.041	0.040
Total loans	0.531	0.562	0.596	0.594	0.599	0.587
Real estate loans	0.296	0.331	0.337	0.302	0.252	0.209
C&I loans	0.087	0.101	0.111	0.117	0.132	0.183
Loans to individuals	0.086	0.098	0.120	0.144	0.166	0.097
Total deposits	0.879	0.868	0.850	0.794	0.760	0.690
Transaction deposits	0.258	0.257	0.254	0.240	0.258	0.193
Large deposits	0.174	0.207	0.225	0.248	0.244	0.212
Brokered deposits	0.022	0.004	0.008	0.017	0.016	0.013
Fed funds borrowed	0.010	0.021	0.039	0.063	0.097	0.093
Subordinated debt	0.000	0.000	0.001	0.002	0.004	0.017
Other liabilities	0.013	0.021	0.026	0.054	0.059	0.129
Equity	0.098	0.090	0.084	0.086	0.080	0.072

Source: Kashyap and Stein (1997).

strong, because the mix variable is added to a structural equation that is already supposed to account for monetary policy.

Among other work using disaggregated data, perhaps the most intriguing studies focus on inventory investment. Inventory reductions are large during recessions and monetary policy is typically tight prior to recessions. However, the simple story that tight money and high carrying costs lead to inventory runoffs is undermined by the difficulty in documenting interest rate effects on inventories. The previously discussed aggregate findings provide some support for the view that monetary policy and financial factors may be important for inventory movements, even though standard security market interest rates do not have much predictive power for inventories.

Gertler and Gilchrist (1994) compare the aggregate investment of a sample of large firms with that of a sample of small firms, which are presumably more bank-dependent.

They find that the small firms' inventory investment is much more sensitive to changes in monetary policy than that of the large firms. The differences are large enough that as much as half of the aggregate movement in inventory investment two years after a major monetary tightening may be attributable to the small firms. The authors find similar effects in terms of sales.

Using individual firm data, Kashyap, Stein, and Lamont (1994) look at the differences in inventory investment between publicly traded companies with bond ratings and those without bond ratings. The non-rated companies are typically much smaller than the rated companies and are more likely to be bank-dependent. The authors find that during the 1982 recession, prior to which Federal Reserve policy was restrictive, the inventory movements of the non-rated companies were much more sensitive to their own cash holdings than were the inventory movements of the rated companies. (In fact, there was no significant liquidity effect for the rated companies.) They find a similar pattern for the 1974–75 recession, which also followed a significant tightening of monetary policy by the Fed.

In contrast, in other "easy money" periods there is little relation between cash holdings and inventory movements for the non-rated companies. For instance, during 1985 and 1986, when many argue that U.S. monetary policy was particularly loose, the correlation between inventory investment and cash holdings is completely insignificant. The difference in the cash sensitivity of inventory investment for the bank-dependent firms is precisely to be expected if loan supply is varying with monetary policy.

Subsequent work by Carpenter, Fazzari, and Petersen (1994) confirms these patterns using a sample that includes information on quarterly (rather than annual) adjustments in inventories. Similarly, Milne (1991) finds similar credit availability effects on inventory investment for British firms. Thus, several independent pieces of evidence now point toward the importance of loan supply effects.

Other work with disaggregated data shows cross-sectional differences among firms involving margins other than inventory investment. As mentioned above, Gertler and Gilchrist find differences in the sales response of large and small firms following a monetary policy shock. Gertler and Hubbard (1988) find differences in the correlation between fixed investment and cash flow for firms that pay dividends and those that do not pay dividends in recessions and normal periods. If we accept a low dividend payout ratio as a proxy for bank dependence and assume that monetary policy shifted prior to the recessions, we can read these results as supporting a bank lending channel.

Focusing on Japanese firms that are not part of bank-centered industrial groups and, therefore, are susceptible to being cut off from bank credit, Hoshi, Scharfstein, and Singleton (1993) find that when monetary policy is tight, liquidity is more important for independent firms' investment than in normal times.

Finally, Sharpe (1994) contrasts the employment adjustment of different sized firms to changes in the real federal funds rate. He finds that small firms' employment is more responsive than that of large firms. Furthermore, firms that are more highly leveraged tend to show greater sensitivity to funds rate shocks. If we assume that more highly leveraged firms are more bank-dependent, this finding is also consistent with the lending channel.

Taken together, these findings strongly support the view that banks play an important role in the transmission of monetary policy. The evidence from different countries, different time periods, and for different agents suggests that 1) restrictive monetary policy reduces loan supply by banks and 2) this reduction in loan supply depresses spending.

Implications for monetary transmission under the EMU

We believe the work reviewed above answers a number of questions about the ways consumers, firms, and banks respond to monetary policy. Furthermore, it implies that the degree of bank dependence in the economy and the extent to which central bank actions move loan supply are the key factors determining the importance of the lending channel. In light of the vast differences in institutions across Europe, this story could have important implications for how monetary policy operates under the EMU.

Consider a uniform tightening of monetary policy. Suppose one country has a set of mostly creditworthy banks and relatively few bank-dependent firms. In this case, the banks may be able to offset the contraction in reserves by picking up uninsured nondeposit financing in

the capital markets. Accordingly, bank lending will not fall by much. Moreover, if most firms can continue producing even if some bank loans are cut, the aggregate lending channel effect will be fairly weak.

In a country with many bank-dependent firms and a weak banking system, the impact might be quite different. Banks with poor credit ratings may not be able to attract uninsured funds to offset their deposit outflow. As the banks are driven to cut their lending, their customers will need to find other funding. If this funding is not available in the short run, a sizable spending drop may occur. Thus, a uniform contraction in monetary policy across the two countries may lead to a very asymmetric response, raising potentially problematic distributional issues.

This hypothetical comparison focuses on the differences in the aggregate conditions in the two countries. A key lesson from the work on the U.S. is that the banking-related effects of monetary policy are subtle and that micro-level studies are often required. Nevertheless, in light of the difficulty of getting reliable micro data for a large number of countries, we make an illustrative first pass at the problem with some, admittedly crude, aggregate-level calculations. We infer the degree of bank dependence in different countries by looking at the size distribution of firms and the availability of nonbank finance. To gauge loan supply effects, we study the size distribution of the banking industry and the health of the banks. These are no doubt highly imperfect proxies. We hope this exercise, which we view as a somewhat speculative first step, will spur researchers who have access to better data to build on our results.

Cross-country responsiveness of loan supply to policy changes

Since it is still too early to be certain which countries initially join the monetary union, we work with data for the following countries in the European Union: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and the UK. We report similar statistics for the U.S. and Japan, wherever possible.

As mentioned above, Kashyap and Stein (1995) show that small banks are more responsive to monetary tightening than large banks. If bank size is an appropriate proxy for the ability to access noninsured sources of funds, this contrast makes sense (in the context of the lending channel). In some European countries, even large banks may find it difficult to obtain nondeposit financing. We have not been able to find any good data on differences in bank financing options across countries, however, and must therefore rely on size proxies to infer the sensitivity of loan supply to monetary policy.

Our first size distribution indicator (shown in column 4 of table 2) is the three-firm concentration ratio for commercial banks (that is, the share of total commercial bank assets controlled by the three largest commercial banks) as reported by Barth, Nolle, and Rice (BNR, 1997). Although the statistics are a bit dated (from 1993), they cover all of the countries. However, the ratio covers only commercial banks and for some countries, such as Germany, commercial banks are of limited overall importance. The data shown in column 5 of table 2 have been rescaled to correct for this coverage effect; where BNR report the share of commercial bank assets relative to total bank assets, we restate the three-firm concentration ratio in terms of all bank assets.

Even after making this adjustment, looking at only the top three firms may be misleading. For example, consider a country with ten roughly equally sized banks versus a country that has three dominant banks and hundreds of small banks. Depending on the size of the large banks in the second country, small banks might appear to be more or less important than in the first country, even though there may be no small banks in the first country. This problem can occur where there is a sharp discontinuity in the size distribution of banks. To partially address it, we show five- and ten-firm concentration ratios, based on data for 1995 from the Bank for International Settlements (BIS). The BIS data are broader (relative to all banks not just commercial banks) and more current than the BNR measure but, regrettably, they are not available for all countries.

For the most part, the different size distribution statistics paint a similar picture. In Belgium, Netherlands, and the UK, the large banks appear to hold a dominant position. Conversely, Italy, Germany, and Luxembourg stand out as countries in which the smaller banks control a significant fraction of the assets. The limitations of the data preclude drawing any sharp distinctions among the remaining countries.

TABLE 2

Size distribution of banks in selected countries

Country	Range of banks covered by OECD	Banks covered by OECD in 1995	Total assets of 1995 OECD reporting banks (billions U.S. $)[a]	1993 commercial bank assets in the 3 largest commercial banks[b]	1993 assets of all credit institutions in 3 largest commercial banks[b]	1995 assets in 5 largest institutions[c]	1995 assets in 10 largest institutions[c]
				(- - - - - - - - - - - -	- - - - - percent - - - - -	- - - - - - - - - - - -	- - - - - - - - - - - - -)
Belgium	All banks	143	843.3	44	44	59[e]	73[e]
Denmark	Commercial and savings banks	114	166.7	64	NA	NA	NA
France	All banks	1,453	3797	64	33	47	63
Germany	All banks	3,500	4,151.4	89	24	17	28
Greece	Commercial banks	18	69.7	98	73	NA	NA
Ireland	Commercial banks[d]	434[d]	71.24[d]	94	76	NA	NA
Italy	All banks	269	1,519.7	36	28	29	45
Luxembourg	Commercial banks	220	612.9	17	17	NA	NA
Netherlands	All banks	173	916.5	59	59	81	89
Portugal	All banks	37	201.1	38	NA	NA	NA
Spain	All banks	318	951	50	34	49	62
UK	Commercial banks	40	1,184.1	29	NA	57[e]	78[e]
U.S.	Commercial banks	9,986	4,149.3	13	10	13	21
Japan	Commercial banks	138	6,733.9	28	NA	17[e]	28[e]

[a]Exchange rates are taken from 1996 IMF *Financial Statistics Yearbook*, p. 15. All domestic figures are converted into special drawing rights and then into dollars.
[b]Source is Barth, Nolle, and Rice (1997), table 3.
[c]Source is Bank for International Settlements, *Annual Report* (1996).
[d]These data are for 1993 and are taken from Barth, Nolle, and Rice (1997), table 3.
[e]These data are for 1994.

In addition to the data on bank size, we use a number of measures of bank profitability and capital. In principle, the uninsured liabilities of banks with high levels of capital should have lower credit risk. Thus, well-capitalized (or highly rated) banks should have a much easier time going to securities markets to raise funds in the face of a deposit shock. This implies that monetary policy would have less of an impact when banks are well capitalized.[5] However, for most countries, data on capitalization and creditworthiness are available only for the major institutions; smaller banks tend not to be monitored by the rating agencies that collect most of these statistics. Our benchmark measure of creditworthiness comes from Thomson BankWatch, one of the leading global bank rating agencies. According to its Web page, Thomson constructs ratings which:

"Incorporate a combination of pure credit risk with performance risk looking over an intermediate horizon. These ratings indicate the likelihood of receiving timely payment of principal and interest, and an opinion on the company's vulnerability to negative events that might alter the market's perception of the company and affect the marketability of its securities."[6]

Because these ratings (shown in column 1 of table 3) do not cover all the banks in each country, we supplemented the Thomson data with another measure of bank health. The OECD publishes a stylized income statement for banks in its member countries. The processing lags required to generate comparable data are such that 1995 data are just becoming available. To calibrate the Thomson sample to the broader OECD sample, we calculated the return on average assets (ROA) for both samples. To control for year-to-year volatility, we averaged the numbers over three years and the results are shown in table 3. The ROA estimates from the two sources are very similar. Table 3 also shows loan losses relative to loans from the Thomson data.

Looking across table 3, the countries seem to fall into three fairly distinct groups. The evidence for the first group, Netherlands, Luxembourg, and the UK, suggests that the banks are in good shape. (The U.S. is also in this group.) In the case of the second group, France and Italy, the numbers consistently show that the banking sectors are relatively weak, with high levels of bad loans and low profit rates. (Japan also belongs in this group.) The third group, comprising all remaining countries, falls somewhere in between.

Options for substituting toward nonbank financing

Our first measure of bank dependence is culled from employment data. Using information from the European Commission, we compare the importance of small firms in different countries. The data exclude the self-employed, but include very small firms employing between one and nine people. We believe monitoring costs for these micro firms are likely to be so high that they will have trouble attracting nonbank financing.[7] Because of the processing lags, the data we analyze are from 1990, but a comparison with similar statistics from 1988 suggests that these employment patterns are fairly stable over time.

Table 4 shows that the smallest firms generally account for a larger fraction of employment in Europe than they do in the U.S., although they vary significantly in importance from one European country to another. In Spain and Italy, more than 40 percent of the work force is attached to these firms, while in Belgium, Germany, and Luxembourg, they are of much more limited significance.[8] Similar heterogeneity exists for mid-sized and large firms.

The last column in table 4 reports the ratio of each country's share of total European employment to its share of the total number of enterprises. A ratio of one would be the typical size distribution for European countries. Ratios below one indicate a preponderance of smaller firms, while ratios above one indicate more larger firms.

Again, these data can be used to sort the countries into three categories. In Greece, Italy, Netherlands, Portugal, and Spain, smaller firms are most important. Germany, Luxembourg, and the UK are dominated by larger firms, with employment distributions that look much more like those of the U.S. The remaining cases are not clear cut.

The second indicator of bank dependence is based on the structure of capital markets across Europe. Ideally, we would like to have a measure of the switching costs firms would incur if they lost their bank financing. We would not expect these firms to be able to issue publicly traded securities directly. However, through trade credit, they may have access to funds raised in the securities markets (see Calomiris, Himmelberg, and Wachtel, 1995). Similarly, although equity financing is rarely an important source of funding for most firms, deep equity markets are often correlated with the existence of other public markets that might be tapped when bank credit contracts.[9]

Accordingly, table 5 provides information from the World Bank on stock market capitalization across different countries. The table also shows OECD data on the public bond markets for each country. However, these data are only for firms listed on the specific exchanges shown in the table and, in some cases, this significantly understates the size of the bond market (for example, in the U.S. where only bonds of the NYSE firms are counted). The bottom line is in the last two columns of the table, which show the ratio of stock market capitalization to gross domestic product (GDP) and the ratio of public bonds to GDP. Subjectively weighting these two measures, we conclude that the availability of nonbank finance is greatest in Belgium, Denmark, and the UK. Conversely, Greece, Italy, and Portugal appear to be the least developed by this metric.

TABLE 3

Bank health in selected countries

Country	Fiscal 1995 Thomson average rating of tracked banks (no. of banks)[a]	Thomson estimated ROA for major banks, 1993–95 (average no. of major banks)	OECD profit before tax relative to assets, 1993–95 (average no. of rated banks)	1995 Thomson estimated loan losses relative to loans for major banks (no. of major banks)
Belgium	B (8)	0.28 (54)	0.23 (147)	NA (NA)
Denmark	B/C (3)	0.55 (74)	0.52 (113)	0.91 (86)
France	B/C (22)	0.15 (298)	0 (1,569)	2.56 (269)
Germany	B/C (24)	.22 (205)	0.26 (3,627)	0.17 (204)
Greece	B (9)	0.39 (22)	0.84 (19)	0.57 (23)
Ireland	B (3)	1.03 (29)	NA (NA)	0.78 (28)
Italy	C (30)	–0.01 (57)	0.11 (296)	7.47 (57)
Luxembourg	B (3)	0.6 (128)	0.36 (220)	0.14 (127)
Netherlands	A/B (3)	0.57 (52)	0.5 (174)	NA (NA)
Portugal	B/C (4)	0.46 (48)	0.62 (36)	3.61 (46)
Spain	B/C (14)	0.20 (101)	0.45 (317)	4.09 (105)
United Kingdom	B (25)	1.84[b] (6)	0.67 (38)	1.21[b] (6)
United States	B (29)	1.23 (29)	1.18 (10493)	0.74 (29)
Japan	C (10)	–0.06[c] (10)	–0.07 (139)	3.96[c] (10)

[a]Thomson normally requires banks to pay to be evaluated. In some cases struggling banks decide not pay for the rating but Thomson assigns a rating anyway (although it may not store all of the financial information for these banks). The country averages pertain to all banks for which a rating was assigned.

The Thomson rating scale is as follows:

A—Company possesses an exceptionally strong balance sheet and earnings record, translating into an excellent reputation and very good access to its natural money markets. If weakness or vulnerability exists in any aspect of the company's business, it is entirely mitigated by the strengths of the organization.
A/B—Company is financially very solid with a favorable track record and no readily apparent weakness. Its overall risk profile, while low, is not quite as favorable as for companies in the highest rating category.
B—Company is strong with a solid financial record and is well received by its natural money markets. Some minor weaknesses may exist, but any deviation from the company's historical performance levels should be limited and short–lived. The likelihood of significant problems is small, yet slightly greater than for a higher rated company.
B/C—Company is clearly viewed as a good credit. While some shortcomings are apparent, they are not serious and/or are quite manageable in the short term.
C—Company is inherently a sound credit with no serious deficiencies, but financial statements reveal at least one fundamental area of concern that prevents a higher rating. Company may recently have experienced a period of difficulty, but those pressures should not be long term in nature. The company's ability to absorb a surprise, however, is less than that for organizations with better operating records.
C/D—While still considered an acceptable credit, the company has some meaningful deficiencies. Its ability to deal with further deterioration is less than that of better rated companies.
D—Company financials suggest obvious weaknesses, most likely created by asset quality considerations and/or a poorly structured balance sheet. A meaningful level of uncertainty and vulnerability exists going forward. The ability to address further unexpected problems must be questioned.
D/E—Company has areas of major weakness that may include funding and/or liquidity difficulties. A high degree of uncertainty exists about the company's ability to absorb incremental problems.
E—Very serious problems exist for the company, creating doubt about its continued viability without some form of outside assistance, regulatory or otherwise.

[b]United Kingdom data are averaged for two years only.

[c]Japanese data cover fiscal years 1995 through 1997.

Predicted potency of the lending channel under the EMU

Given the noisy nature of our data, it is not possible to make strong claims about how important the lending channel might be in different countries. However, we believe the proxies reviewed above provide some interesting information, particularly at the extremes of their respective distributions. To summarize these results, we assigned each country a letter grade (from A to C) for each of our four factors. A grade of "A" indicates the *least* sensitivity to monetary policy.

Table 6 shows these grades and an overall grade (shown in the last column) based on a subjective weighting of the factors. The UK emerges as the country for which the evidence most clearly suggests a relatively weak lending channel. UK banks are in relatively good

TABLE 4

1990 size distribution of employment in selected countries

	% of total Euro 12 employment	% in firms with fewer than 10 people	% in firms with 10–499 people	% in firms with 500+ people	% of total enterprises in Euro 12	Ratio of share of employment to share of enterprises
EURO 12	100	30.3	39.4	30.3	100	1.00
Belgium	3.0	17.0	47.7	35.3	3.5	0.86
Denmark	1.8	31.6	49.1	19.3	1.8	1.00
France	15.5	28.0	41.0	31.0	13.9	1.12
Germany	23.2	18.3	45.6	36.1	14.8	1.57
Greece	NA	NA	82.7	17.3	NA	NA
Ireland	0.25	NA	NA	NA	.072	3.46
Italy	15.7	42.5	37.8	19.7	21.5	0.73
Luxembourg	0.2	15.1	40.6	25.5	0.1	2.00
Netherlands	NA	30.1	45.4	24.5	NA	NA
Portugal	3.0	24.3	54.7	21.0	4.2	0.71
Spain	10.5	45.8	38.9	15.3	17.0	0.62
United Kingdom	20.9	27.1	39.1	33.8	17.2	1.22
United States	107	12.0	41.4	46.6	NA	NA

Notes: Greek data only cover NACE 1–4 and 67; employment figures only cover establishments with an average of 10 or more employees.
Irish data only cover enterprises in NACE 1–4 averaging 3 employees or more and NACE establishments averaging 20 employees or more.
Data are reported for 3–19 employees or 20 plus employees. NA indicates not available.
Source: Commission of the European Communities, *Enterprises in Europe, Third Report*, Brussels, Belgium (1994).

shape, there are not a lot of small firms, and firms have many other financing options. Belgium and Netherlands also appear to be on the relatively insensitive end of the spectrum. Netherlands has large, creditworthy banks, and Belgium appears to be in moderately good shape in terms of both loan supply sensitivity and bank dependence.

At the opposite end of the spectrum, Italy is clearly the country in which we would expect strong effects of monetary policy, based on each of the factors we have studied. Portugal also fits into this part of the distribution.

In the remaining countries, the picture is less clear. For example, in Germany and Luxembourg there are many small banks, but bank health appears at least adequate and large firms are relatively important. Our data are not sufficiently precise to identify more than the extreme cases.

Conclusions

Research strongly suggests that banks play a role in the transmission of monetary policy. The factors that determine the significance of this role are the degree of bank dependence on the part of firms and consumers and the ability of banks to offset monetary-policy-induced deposit outflows. Based on the best available data, we find considerable differences in these dimensions across member countries of the European Union.

When it goes into effect, the EMU may provide answers to key questions regarding the potency of the bank lending channel. Given the wide heterogeneity in bank health, a sudden shift in monetary conditions (such as an increase in interest rates by the European central bank) would provide a live test of this mechanism. In the meantime, our research suggests that it would be desirable to consider integration in banking and securities markets in tandem with the move to a single currency. European

TABLE 5

Nonbank financing options

Country	Stock exchange tracked by World Bank	1995 listed firms on exchange tracked by World Bank	1995 market capitalization (world rank)	1995 GDP	Exchange for bond market data	Public bonds of traded firms	Equity value as a % of GDP	Public bonds as a % of GDP
			(- - - - -U.S. $ billions- - - - -)		*(year)*	*(U.S. $ billions)*		
Belgium	Brussels	143	104.96 (22)	269.2	Brussels (1995)	235.0	0.39	0.87
Denmark	Copenhagen	213	56.22 (27)	175.2	Copenhagen (1995)	301.1	0.32	1.72
France	Paris	450	522.05 (5)	1,549.2	Paris (1993)	662.9	0.34	0.43
Germany	German Stock Exchange Inc.	678	577.37 (4)	2,420.5	Frankfurt (1995)	1,223.8	0.24	0.51
Greece	Athens	99	10.16 (NA)	111.8	Athens (1989)	17.5	0.09	0.16
Ireland	Irish Stock Exchange	80	25.82 (37)	60.1	Not shown separately	NA	0.43	NA
Italy	Italian Stock Exchange Council	250	209.52 (13)	1,091.1	Milan (1994)	760.5	0.19	0.70
Luxembourg	Luxembourg	61	30.44 (36)	16.8	Luxembourg (1989)	1.5	1.81	0.09
Netherlands	Amsterdam	387	356.48 (8)	396.9	Amsterdam (1995)	0.294	0.90	0.00
Portugal	Lisbon	169	18.36 (39)	103.2	NA	NA	0.18	NA
Spain	Madrid	362	197.79 (14)	557.4	Madrid (1995)	27.7	0.35	0.05
United Kingdom	London	2,078	1,407.74 (3)	1,099.7	Ireland and UK (1993)	554.4	1.28	0.50
United States	Combined NYSE, AMEX, NASDAQ	7,671	6,857.62 (1)	6,981.7	New York (1995)	2,495.9	0.98	0.36
Japan	Combined all major exchanges[a]	2,263	3,667.29 (2)	4,960.7	Tokyo (1994)	1,789.6[b]	0.74	0.36

[a]The Japanese exchanges include Fukoka, Hiroshima, Kyoto, Nagoya, Niigata, Osaka, Sapporo, and Tokyo.
[b]Japanese bond data cover both domestic and foreign firms.

Sources: *Emerging Stock Markets Factbook*, International Finance Corporation (1996); OECD, "OECD financial statistics, part 1," *Financial Statistics Monthly*, various issues, and OECD, *Non-Financial Enterprises Financial Statements* (1995).

TABLE 6

Summary of factors affecting the lending channel

Country	Importance of small banks	Bank health	Importance of small firms	Availability of nonbank finance	Overall predicted potency
	(Table 2)	(Table 3)	(Table 4)	(Table 5)	
Belgium	A	B	B	A	A/B
Denmark	B	B	B	A	B
France	B	C	B	B	B/C
Germany	C	B	A	B	B
Greece	B	B	C	C	B/C
Ireland	B	B	B	B	B
Italy	B	C	C	C	C-
Luxembourg	C	A	A	B	B
Netherlands	A	A	C	B	A/B
Portugal	B	C	C	C	C
Spain	B	B	C	B	B
United Kingdom	A	A	A	A	A

Note: A grade of "A" indicates low effect of lending channel sensitivity to monetary policy; "C" indicates high sensitivity.

banking regulations have officially been harmonized for several years. However, the health of the banking system varies significantly from one country to another, and few banks have begun lending outside their own borders. Countries with weak banking systems might benefit from the entry of foreign banks into their markets. The development of deeper securities markets that would be available to all European firms could also help offset a potential credit crunch.

APPENDIX

The data shown in table 1 and used in Kashyap and Stein (1995 and 1997) are taken from the quarterly regulatory filings made by all U.S. commercial banks. These reports, commonly referred to as Call Reports, contain detailed quarterly balance sheet and income statement data for all banks. In addition to this basic information, the reports contain data on a variety of off-balance-sheet items, a special supplement on small business lending that is collected as part of the June Call Report, geographic information, and the holding company status of the banks.

The Federal Reserve Bank of Chicago is now making the most popular items from the Call Reports available through its Web site. Initially, the post-1990 data will be available; eventually data going back to 1976 will be online. The data for each quarter are stored in a SAS transport data set, which has been compressed in a zip format. The zipped files are typically 4.5 megabytes and expand to about 48 megabytes when they are uncompressed. It took us about 15 minutes to download the 1995 fourth quarter file in our tests. You can access the data at www.frbchi.org/rcri/rcri_database.html. (The site also shows current reporting forms filled out by the banks.)

To supplement the raw Call Report data, the Bank's research staff is making a file available that lists all the mergers between U.S. commercial banks from 1976 onward. This merger file can easily be combined with the Call Report data for a number of projects, for example, an event study analysis. We have used the file to screen out banks for which mergers make the accounting statements discontinuous.

The Bank's Web site also contains a simple data access program. This program allows a user to create consistent time series for several of the major items on the banks' balance sheets. Similarly, there is documentation describing the known breaks in all of the series.

A picture of the Web site appears on the following page.

Go To: http://www.frbchi.org/rcri/rcri_database.html

Report of Condition and Income Database

The Report of Condition and Income database contains selected data for all banks regulated by the Federal Reserve System, Federal Deposit Insurance Corporation, and Comptroller of the Currency. The financial data are on an individual bank basis and were selected from the following schedule: assets and liabilities, income, capital, off-balance-sheet transactions, risk-based capital, and other memoranda items. Files are available quarterly and only for downloading purposes.

About the Data

Documentation files:

Data Description contains a list of all the variables in this database.

Data Definitions contains the definitions of the variables and notes on forming consistent time series.

Data Access contains information on how to import the zipped SAS files into various software packages and a sample SAS program.

Sample Form shows the reporting form currently used to collect the data.

Merger Data

The merger file contains information that can be used to identify all bank acquisitions and mergers since 1976. These data can be merged into the Call Report data.

Quarterly Call Report Data

Each quarterly data file contains income and balance sheet items for all the banks. The files are zipped using PKZIP. The files are in SAS transport data file format. The files are about 4.5 megabytes in compressed form and about 48 megabytes when expanded.

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1990	1st	2nd	3rd	4th
1991	1st	2nd	3rd	4th
1992	1st	2nd	3rd	4th
1993	1st	2nd	3rd	4th
1994	1st	2nd	3rd	4th
1995	1st	2nd	3rd	4th
1996	1st	2nd	3rd	4th

Document: Done

NOTES

[1]Throughout all of what follows we are implicitly relying on the conventional assumption that there is imperfect price adjustment. See Bernanke and Gertler (1995), Cecchetti (1995), Hubbard (1995), and Kashyap and Stein (1994) for other surveys of this literature.

[2]See Diamond (1984) for a formal treatment of this problem.

[3]See Borio (1996) and Berran, Coudert, and Mojon (1996) for two exceptions.

[4]A finding that these forms of financing move in opposite directions following a monetary contraction should not be taken as an indication that those firms that are cut off from banks are the same ones that begin issuing commercial paper. A much more realistic mechanism is that smaller firms that are cut off from bank lending receive increased trade credit, and the trade credit is supplied by larger firms that can access the commercial paper market.

[5]For the U.S., Kashyap and Stein (1994) note that things may have worked differently in the credit crunch of the early 1990s. If a regulatory risk-based capital standard binds banks at the margin, then the banks' loan supply can become disconnected from changes in monetary policy. In this case, the binding capital requirement can generate a "pushing on a string" problem for the central bank, in which monetary policy becomes *less* effective.

[6]Description of Thomson issuer ratings from www.bankwatch.com, as of July 17, 1997. We thank Christopher Tang for supplying the BankWatch data and answering our questions about them.

[7]One caveat to this assumption is that if firms are part of a holding company structure that creates the appearance of many small firms in order to skirt certain regulations, then it is possible that these firms may have access to the internal capital market of the holding company.

[8]Of course, the Gertler and Gilchrist numbers shown earlier demonstrate that small firms generally may account for a much larger fraction of fluctuations than suggested by their average share of the aggregate economy.

[9]For example, Demirgüç-Kunt and Levine (1996) show that stock market capitalization tends to be fairly highly correlated with the ratio of domestic credit to GDP.

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