National University of Ireland, Galway

Ollscoil na hÉireann, Gaillimh

The Monetary Transmission Mechanism: Evidence and Implications for European Monetary Union

Stilianos Fountas Agapitos Papagapitos

Working Paper No. 35 June 1999

Department of Economics
Roinn na hEacnamaíochta

Working Paper Series

http://www.ucg.ie/ecn/

Abstract

We provide some evidence consistent with a heterogeneous credit channel of monetary policy transmission in the European Union. Using the techniques of cointegration and Error Correction Models, we have shown that the external finance premium is one important leading indicator of real economic activity in some EU countries, namely, Denmark, Finland, Ireland, Italy and the Netherlands. No evidence is found for Belgium, France, Germany and the UK. These findings imply that a common monetary policy implemented by the European Central Bank might be transmitted in different ways across the member countries of the monetary union, thus exacerbating existing regional disparities among the member countries.

Keywords: Monetary Policy Transmission, Credit Channel, Quality Spread.

JEL Classification: E44, E52

1. Introduction

There is by now consensus among economists that monetary policy is neutral in the long run but it does affect real economic activity in the short run (Eichenbaum, 1997). Recent evidence also shows that these output effects can last for more than two years in some cases (Bernanke and Blinder, 1992). There is, however, considerable disagreement on *how* monetary policy is transmitted to the real economy. A significant volume of primarily empirical research on the monetary transmission mechanism has already been produced for the US economy and surveyed in Bernanke (1993), Bernanke and Gertler (1995), Cecchetti (1995), Hubbard (1995) and Kashyap and Stein (1994). These studies were motivated by the US credit crunch of 1990-1991, as well as theoretical developments which combine informational imperfections with standard macroeconomic models. Overall, the evidence points to the importance of the banking sector in the transmission of monetary policy, a result consistent with the credit view, although it appears that this channel has lost some of its significance over time.

Until recently, the focus of European economists and policy makers had been the appropriate monetary policy strategy (monetary targeting, inflation targeting, etc.) that the European Central Bank (ECB) should pursue following the launch of the single European currency. European monetary integration has prompted significant interest in the study of structural and institutional differences in European national financial systems and, consequently, the transmission mechanism of monetary policy in individual European countries. Recent studies have attempted to test for the importance of the credit channel of the monetary transmission mechanism in individual European countries. Such studies include, Dale and Haldane (1995) for the UK; Buttiglione and Ferri (1994) for Italy; Escriva and Haldane (1994) for Spain; Garretsen and Swank (1998) for the Netherlands. In addition, some descriptive evidence for the EU countries is provided by Kashyap and Stein (1997). It is anticipated that a credit channel would be more relevant in some European countries than in the US financial system due to the greater share of bank-intermediated credit in total indebtedness of non-financial firms in Europe and, hence, the prevalence of bank-dependent firms. Furthermore, it is anticipated that due to the heterogeneity of

financial structure among European countries, the importance of the credit channel would differ among countries. For example, in countries with arm-length banking systems (such as the UK), bank-intermediated credit is small relative to countries with relationship banking (e.g., Germany). At the same time, however, information asymmetries are less significant in Germany due to a relationship-type banking system. Indeed, support for this asymmetric credit channel is found in the above studies as the evidence shows that a credit channel exists in the UK, Italy and Spain but not in Germany.

In this paper, we are interested in both the existence of a credit channel and the cross-country differences in the importance of this channel. It should be stressed at the outset that, since we are using aggregate data, we cannot provide direct evidence on the credit channel, because such evidence would hinge on an analysis of the behaviour of households, nonfinancial firms and banks. We attempt to provide indirect evidence for the existence of the credit channel by examining the predictive ability of the interest rate spread between private and government securities for fluctuations in real output. US evidence shows that this quality spread has performed very satisfactorily as a leading indicator of future real economic activity (Bernanke and Blinder, 1992; Estrella and Mishkin 1998; Friedman and Kuttner, 1992, 1998). In fact, Kashyap, Stein and Wilcox (1993) and Bernanke and Gertler (1995) argue in favour of using this spread as an indicator of a credit channel. Using the techniques of cointegration and error-correction models, we find that the spread predicts short-run output fluctuations for Denmark, Finland, Ireland, Italy and the Netherlands. These findings indicate that there exists some heterogeneity of the credit channel across European countries. They imply that common European monetary policy applied by the European Central Bank might have asymmetric effects across the member States, thus possibly exacerbating existing regional disparities.

The paper is organized as follows: Section 2 discusses the theoretical aspects of transmission mechanisms of monetary policy and the econometric methodology and section 3 describes the data and reports our main results. Finally, section 4 summarises the main conclusions and provides some policy implications.

2. Theory and methodology

2.1 Theoretical background and literature

From a theoretical point of view, the traditional Keynesian transmission mechanism, i.e., the money view, assumes perfect substitution between bond and loan finance on both the asset side of banks and liability side of businesses (Bernanke and Blinder, 1988). Hence, in explaining the magnitude, timing and distribution of monetary policy effects on the real economy, this channel appeals exclusively to interest-rate effects. However, credit market imperfections, owing to information asymmetries between borrowers and lenders, render such a perfect substitutability assumption highly implausible. The credit channel of monetary policy transmission complements the conventional money channel and, hence, tends to amplify and propagate the standard interest rate effects of monetary policy on real activity. The principal-agent problem that exists between lenders and borrowers leads to an external finance premium, i.e., a wedge between the cost of funds raised externally and the opportunity cost of internal funds. The supporters of the credit channel claim that monetary policy affects both the general level of interest rates *and* the magnitude of the external finance premium.

The credit channel of monetary policy transmission includes two additional mechanisms to the textbook IS/LM analysis of monetary policy effects that purport to analyse the relationship between changes in monetary policy stance and the size of the external finance premium: the balance sheet channel and the bank lending channel. The first channel works through changes in the financial position of borrowers. An improved financial position (e.g., higher net worth) would be associated with less moral hazard and, hence, a lower external finance premium. This would reduce the cost of borrowing and affect the borrower's investment plans. According to this argument, business cycle booms would be correlated with stronger financial positions that will propagate economy's growth. This financial accelerator principle has been given empirical support using firm and household balance sheet data (Bernanke, Gertler and Gilchrist, 1996).

The balance sheet channel of monetary policy predicts that changes in monetary policy stance affect the real economy through their impact on borrowers' financial positions. In particular, large firms enjoy relatively easy access to short-term financing using, among others, the commercial paper market, thus neutralising, in part, adverse changes in their financial positions. Small firms, on the other hand, have less flexibility in this respect (Gertler and Gilchrist, 1994). The balance sheet channel is also relevant for banks: higher interest rates reduce the market value of securities, thus eroding bank capital and the ability of banks to attract funds and supply loans. This mechanism was evident in the collapse of Japanese asset prices in the late 1980s and the ensuing recession, and the peso crisis of late 1994.

The second mechanism associated with the credit channel is the bank lending channel that involves the banking system. The operation of this bank lending channel hinges upon two necessary conditions: (i) bank loan supply being sensitive to monetary policy actions and (ii) the existence of bank-dependent borrowers (small and medium-size enterprises). The first condition is more stringent since the degree of bank loan supply sensitivity to monetary policy changes would depend on the availability of equally expensive alternative (to insured bank deposits) sources of bank finance. Bank loan supply would be insensitive to monetary policy if banks face a perfectly elastic demand for their open market liabilities. In this case, a reduction in bank core deposits arising from an open-market sale would be met by an increase in an equally costly source of funds, thus leaving the relative cost of funding for the bank, and therefore, loan supply unchanged. If, however, the cost of funds increases, banks would reduce their supply of loans, bank-dependent borrowers will be offered less or no credit, and the external finance premium will rise.

2.2 Methodology

Our objective is to provide indirect evidence for the importance of the credit channel in the transmission of monetary policy to the real economy. We consider four variables: output, the price level, the overnight money market rate and the interest rate spread between private and government debt. The identification of monetary policy

represents a contentious issue in the literature on the effects of monetary policy. There is, however, considerable evidence that monetary policy can be measured by changes in the overnight interbank rate (Federal Funds rate in the US, Bernanke and Blinder, 1992). At the same time, according to the money view, as monetary policy is transmitted through interest rate changes, the interest rate variable captures monetary policy effects consistent with the money channel. Furthermore, the interest rate spread that measures the external finance premium, captures monetary policy effects consistent with the credit channel. It is important to note, though, that, since the credit channel does not represent a completely independent channel (but, instead, tries to explain why monetary policy effects are stronger than predicted by the money channel), interest rate effects of monetary policy are also part of the credit channel (Bernanke and Gertler, 1995). By considering both interest rate effects, as well as external finance premium effects, we are able to separate the monetary policy effects that work through the different channels (Kashyap, Stein and Wilcox, 1993).

We examine the long run and short-run relationship among the four variables using cointegration techniques and error-correction models (ECM), respectively. An important advantage of this approach is that it allows us to account for a long-run relation among the four variables in shaping the short-run dynamics. In particular, by treating credit market conditions, proxied by the external finance premium, as endogenous, we avoid the criticism applied on forecasting exercises that treat a credit aggregate as an independent causal factor affecting the real economy (Bernanke and Gertler, 1995).

The error-correction regression for real output is as follows:

$$\Delta \ln Y_t = \alpha_0 + \alpha_1 T_{t-1} + \sum_{i=1}^{n} \beta_i \Delta \ln Y_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta \ln R_{t-i} + \sum_{i=1}^{n} \delta_i \Delta \ln P_{t-i} + \sum_{i=1}^{n} \varepsilon_i \Delta S_{t-i} + e_t \quad (1)$$

where Y, R, P and S stand for output, the overnight interest rate, the price level and the quality spread, respectively. If our variables are cointegrated, then the ECM will be of the above form, where T_{t-1} is the error-correction term (i.e., the lagged residual from the cointegration regression). Similar equations apply for the other three variables of our model.

3. Data and Results

3.1 Data

We use quarterly data for the period 1981-1997. Our sample includes nine European Union countries: Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, and UK. The overnight rate is proxied by the overnight money market rate (call money rate). Due to the unavailability of a long series of corporate bond rate data, the private long-term rate is measured by the corporate bond rate for France, Germany, Italy and the UK and by the bank loan prime rate in the rest of the countries. The use of the prime rate underestimates the size of the spread since this rate applies only to the best bank customers. The prime rate, like any other loan rate, is also a noisy variable since it does not consider the non-price costs of loans (e.g., collateral, covenants, etc.)[1]. The government long-term rate is proxied by the government bond rate. The price level is measured by the consumer price index (CPI). Finally, output is measured by the industrial production index (IPI). IPI and CPI data are taken from Datastream and the IFS published by the International Monetary Fund; interest rate data come from two sources: Datastream and national Central Banks.

3.2 Results

We first perform unit root tests on the following variables: the log of industrial production, the log of the CPI, the log of the overnight rate and the interest rate spread, defined as the difference between the log of the private sector interest rate and the log of the government interest rate. Using the ADF statistic, we establish that most series are stationary in first differences, i.e., I(1), with the exception of CPI which is I(2), a result consistent with other studies. We then proceed to test for cointegration between output, the first difference in the CPI, the overnight rate and the interest rate spread[2]

[1] The loan rate is also a noisy variable when used in capturing credit conditions, since banks may decide to lend to a less risky pool of borrowers following a contractionary monetary policy.
[2] The results of the unit root and cointegration tests are available upon request from the authors.

using the maximum eigenvalue test suggested by Johansen. Evidence for cointegration is found in all countries, except Belgium and the Netherlands. For cases where cointegration applies, we estimate an ECM where the differenced VAR includes an error-correction term that captures the short-run adjustment to the long-run equilibrium. In the rest of the cases, we estimate a differenced VAR.

Table 1 reports the estimated error-correction regressions for output using long-term spreads. The maximum number of lags is identical with that used in the cointegration tests. Insignificant lags have been deleted to derive a more parsimonious model unless this introduced autocorrelation in the error term. We report three diagnostics: adjusted R^2, and the F statistic versions of the Breusch-Godfrey test for autocorrelation and the ARCH test. Based on these results, some countries demonstrate evidence consistent with the credit channel. Strong evidence is found in Denmark, Finland, Ireland and Italy where the lagged spread predicts future output at the 1% significance level. In the rest of the countries, the spread has no predictive power[3]. The model for Germany is relatively poorly fit.

In Table 2 we report the estimated ECMs for Belgium, Ireland and the Netherlands, this time using the German overnight interest rate instead of the domestic-country overnight interest rate. The rationale is that these three countries are small open economies that were members of the Exchange Rate Mechanism (ERM) during our sample period. Therefore, given the leadership role of Germany in the ERM, and the lack of independent monetary policy in these countries, German monetary policy stance, captured by the German overnight interest rate, should influence output fluctuations[4]. The results are similar with the ones reported in Table 1, with the exception of the Netherlands, where the coefficient of the spread is negative and significant at 1%, thus providing evidence in favour of the credit channel.

Many of our results are consistent with the descriptive analysis of the importance of the credit channel in Kashyap and Stein (1997). By focusing on factors like the health

[3] Note that the spread does not enter the error-correction term for the UK, since in the estimated cointegration vector, the coefficient of the spread is insignificant according to a likelihood ratio test.

[4] Garretsen and Swank (1998) examine monetary transmission in the Netherlands using the German interest rate to measure monetary policy.

of the banking system, the share of small firms and small banks, and the availability of alternatives to bank credit, the authors predict that the credit channel would be very strong in Italy. They also conclude that the UK would be on the other side of the spectrum, a result broadly consistent with ours. Other results obtained by Kashyap and Stein (1997) are that the credit channel probably does not apply for Belgium (in agreement with our analysis) and should exist in Denmark and Ireland (in agreement with our results). Our finding that there is no evidence consistent with a credit channel in Germany can be explained in light of the fact that relationship banking is very strong in Germany, thus weakening asymmetric information frictions in the credit markets.

4. Concluding Remarks

This paper has provided evidence of the existence of a credit channel of monetary policy transmission in some European Union countries. Using the techniques of cointegration and ECMs, we have shown that the external finance premium is one important leading indicator of real economic activity in several EU countries, namely, Denmark, Finland, Ireland, Italy and the Netherlands. No evidence is found for Belgium, France, Germany and the UK. This evidence in favour of a potentially heterogeneous credit channel[5] has a very serious policy implication following the launch of the single European currency. In particular, a common monetary policy implemented by the ECB might be transmitted in different ways across the member countries of the monetary union, thus exacerbating existing regional disparities among the member countries. This conclusion is, of course, subject to the standard qualification that it is likely the regime shift identified with the inception of the EMU will alter the existing relationship between monetary shocks and the real economy.

Despite the limitations discussed earlier, our results are important for three reasons: First, accounting for the credit channel would provide a better understanding of the varying influence of changing institutional factors on the effectiveness of policy.

[5] Ramaswamy and Slok (1998) using VAR analysis find that considerable asymmetry applies with respect to the timing and size of the real effects of monetary policy in EMU countries. The authors, though, do not attempt to identify the channels of monetary policy transmission.

Secondly, the results point to the importance of integrating banking and securities markets in the common currency area along with the move to a single currency, in order to minimize the likelihood of asymmetric monetary policy transmission mechanisms. Thirdly, there are implications for the choice of the appropriate monetary policy strategy of the ECB, provided that price stability is not the overriding objective of monetary policymakers.

References

Bernanke, B. 1993. Credit in the Macroeconomy, Federal Reserve Bank of New York, *Quarterly Review,* 18: 50-70.

Bernanke, B. and A. Blinder. 1988. Credit, Money, and Aggregate Demand, *American Economic Review*, Papers and Proceedings, 78: 435-39.

Bernanke, B. and A. Blinder. 1992. The Federal Funds Rate and the Channels of Monetary Transmission, *American Economic Review,* 82: 901-921.

Bernanke, B. and M. Gertler. 1995. Inside the black box: the credit channel of monetary policy transmission, *Journal of Economic Perspectives*, 9: 27-48.

Bernanke, B., M. Gertler and S. Gilchrist. 1996. The Financial Accelerator and the Flight to Quality, *Review of Economics and Statistics*, 78: 1-15.

Buttiglione, L. and G. Ferri. 1994. Monetary policy transmission via lending rates in Italy: Any lessons from recent experience? *Banca d'Italia*, Discussion Paper No. 224.

Cecchetti, S. 1995. Distinguishing Theories of the Monetary Transmission Mechanism, Federal Reserve Bank of St. Louis, *Review,* 77: 83-97.

Dale, S. and G. Haldane. 1995. Interest rates and the channels of monetary transmission: Some sectoral estimates, *European Economic Review*, 39: 1611-1626.

Eichenbaum, M. 1997. Some thoughts on Practical Stabilization Policy, *American Economic Review*, Papers and Proceedings, 87: 236-239.

Escriva, J. and G. Haldane. 1994. The Interest Rate Transmission Mechanism: Sectoral Estimates for Spain, *Banco de Espana*, Discussion Paper No. 9414.

Estrella, A. and F. Mishkin. 1998. Predicting U.S. Recessions: Financial Variables as Leading Indicators, *Review of Economics and Statistics*, 80: 45-61.

Friedman, B. and K. Kuttner. 1992. Money, Income, Prices, and Interest Rates, *American Economic Review*, 82: 472-492.

Friedman, B. and K. Kuttner. 1998. Indicator Properties of the Paper-Bill Spread: Lessons from Recent Experience, *Review of Economics and Statistics*, 80: 34-44.

Garretsen, H. and J. Swank. 1998. The Transmission of Interest Rate Changes and the Role of Bank Balance Sheets: A VAR-analysis for the Netherlands, *Journal of Macroeconomics,* 20: 325-339.

Gertler, M. and S. Gilchrist. 1994, Monetary Policy, Business Cycles, and the Behaviour of Small Manufacturing Firms, *Quarterly Journal of Economics*, 109: 209-340.

Hubbard, G. 1995. Is there a credit channel for monetary policy? Federal Reserve Bank of St. Louis, *Review*, 77: 63-77.

Kashyap, A. and J. Stein. 1994. Monetary Policy and Bank Lending. In N. Gregory Mankiw (ed.), *Monetary Policy*, University of Chicago Press.

Kashyap, A. and J. Stein. 1997. The role of Banks in Monetary Policy: A survey with implications for the EMU, Federal Reserve Bank of Chicago, *Economic Perspectives*, XXI: 2-18.

Kashyap, A., J. Stein and D. Wilcox. 1993. Monetary policy and credit conditions: evidence from the composition of external finance, *American Economic Review*, 83: 78-98.

Ramasmamy, R. and T. Slok. 1998. The Real Effects of Monetary Policy in the European Union: What are the Differences? *IMF Staff Papers*, 45: 374-396.