

THE BANK LENDING CHANNEL OF MONETARY POLICY IN PORTUGAL*

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1. INTRODUCTION

The mechanism by which monetary policy is transmitted to the real economy remains a central topic of debate in macroeconomics. Considerable research has recently examined the role played by banks in the transmission of monetary policy aiming at uncovering a credit channel and assessing the relative importance of the money and credit channels.

The money channel of monetary policy (also known as the interest rate channel) is the primary mechanism at work in conventional macro models: given some degree of price stickiness, an increase in the nominal interest rates (for example) translates into an increase in the real rate of interest, and the user cost of capital. These changes lead in turn to a postponement in consumption, or a reduction in investment spending. But as Bernanke and Gertler (1995) point out, the macroeconomic response to policy-induced interest rates changes is considerably larger than implied by conventional estimates of the interest elasticities of consumption and investment. This observation

suggests that mechanisms other than the interest rate channel may also be at work in the transmission of monetary policy.

One such alternative path is the so-called bank lending or credit channel. Because banks rely on reservable deposits as an important source of funds, contractionary monetary policy, by reducing the aggregate volume of bank reserves, will reduce the availability of banks loans. And because a significant subset of firms and households rely heavily on bank financing, a reduction in loan supply will depress aggregate spending. It is this additional transmission mechanism that is known in the literature as the bank-lending channel.

Distinguishing the relative importance of the money and credit channels is useful for various reasons. First, understanding which financial aggregates are impacted by monetary policy would improve our understanding of the link between the financial and the real sectors of the economy. Second, a better understanding of the transmission mechanism would help monetary authorities and analysts to interpret movements in financial aggregates. Finally, more information about the transmission mechanism might lead to a better choice of intermediate targets. In particular, if the credit channel is an important part of the transmission mechanism, then the banks' asset items should be the focus of more attention.

The importance of the credit channel depends on the extent to which banks rely on deposit financing and adjust their loan supply schedules following changes in bank reserves (for a given bank-dependency of the borrowers). The aim of

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this paper is just to show that bank loan supply depends on bank deposits and thus, monetary policy by affecting bank deposits is also able to shift loan bank supply schedules.

As the credit or lending channel operates through shifts in loan-supply schedules, uncovering the credit channel implies distinguishing shifts in loan-supply from shifts in loan demand schedules brought about by monetary policy shocks.

At the empirical level, the bulk of the most relevant literature has tried to uncover the lending channel through the estimation of a reduced form equation for the bank credit market, with variables in first differences (i.e., stationarised variables). This paper adds to this area of research, but departs from previous studies on several aspects. In particular it is argued that the reduced form approach requires strong identifying restrictions and that it does not allow estimating the relevant parameters. As an alternative we suggest a “structural approach” which amounts to directly estimate bank loan-supply schedules, with variables in levels. For that purpose we resort to very recent panel data cointegration techniques.⁽¹⁾

The main conclusion of the paper is that there is a banking lending channel in the transmission of monetary policy in the Portuguese economy and that the importance of this channel is larger for the less capitalised banks. Size and liquidity do not appear to be relevant bank characteristics in determining the importance of the lending channel.

The remainder of this paper is organised as follows. Section 2 briefly characterises the main changes underwent by the Portuguese banking sector during the eighties and the nineties. Section 3 describes the new approach aimed at identifying and estimating the importance of the bank-lending channel. Section 4 reports the empirical results for Portugal and section 5 summarises the main conclusions.

2. MONETARY POLICY AND BANKING SECTOR DEVELOPMENTS IN PORTUGAL DURING THE NINETIES

Since the early eighties the Portuguese financial system underwent a fundamental liberalisation process beginning with the opening up of the banking sector to private initiative in 1983.⁽²⁾ In this period the first steps towards the elimination of the administrative controls on interest rates and credit growth were also taken. Moreover the explicit restrictions on the composition of banks’ assets were removed and the legally imposed segmentation of banking activities was gradually eliminated, culminating in the establishment of universal banking in 1992.

Under a significantly more competitive environment the number of banks increased from 14 in 1984 to 27 in 1989 and 58 in 1997.⁽³⁾ As in the other European countries, international competition motivated several waves of take-overs, especially after 1994. However, the number of banks continued to increase, entry being largely dominated by foreign institutions.

Another important step in the liberalisation of the Portuguese banking system was the re-privatisation process that started in 1989, gradually transferring to private management most of the banking business. Since 1993, the main reforms were directed to the harmonisation of procedures and regulations within the EU, namely the capital adequacy rules.

In the monetary and exchange rate policy front, after having abandoned the crawling peg regime in October 1990, the escudo joined the European exchange rate mechanism in April 1992. In December of the same year the remaining restrictions on international capital flows were removed.

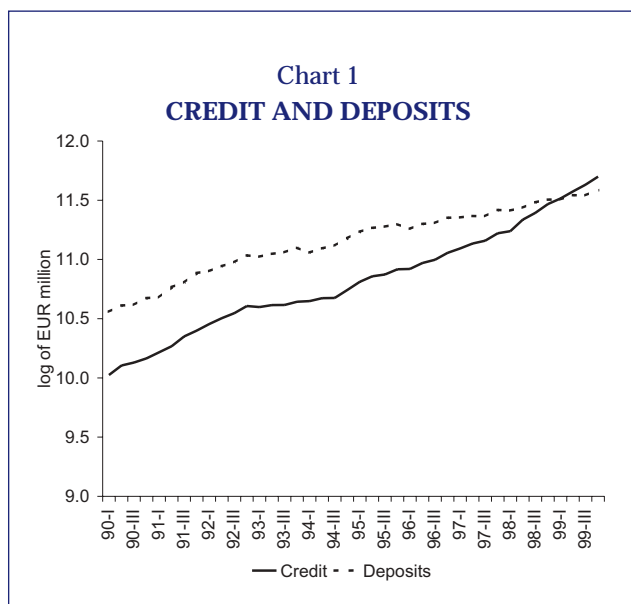
The continuous decline of inflation since the early nineties and the stability of the exchange rate after 1993 allowed the sustained reduction of interest rates. The process of nominal convergence increased the prospects of EMU participation, which in turn facilitated exchange rate stability and con-

(1) For technical details the interested reader is referred to Farinha and Marques (2001).

(2) The establishment of private investment companies, which were later transformed into investment banks, was authorised in 1979.

(3) Excluding the co-operative institutions, whose number is relatively large (160 in 1998), but only account for nearly 3 per cent of the credit institutions’ total assets.

Chart 1
CREDIT AND DEPOSITS



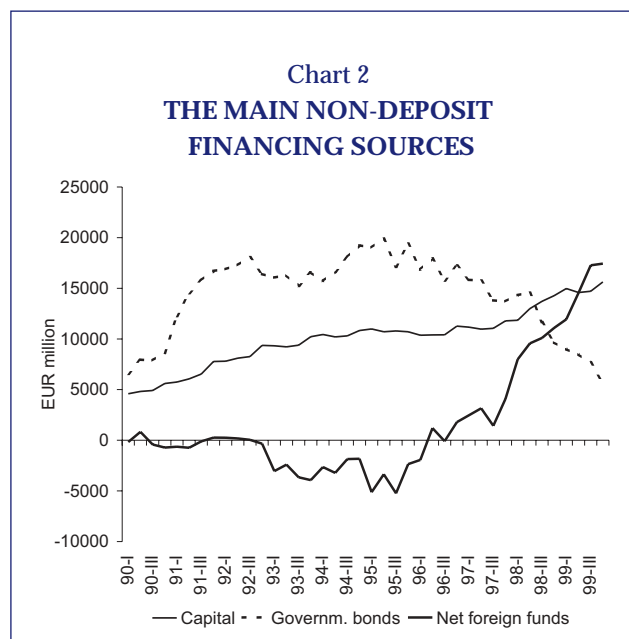
vergence. These developments were reflected in a substantial decrease in the exchange risk premium of the escudo since mid-1995.

The sustained and significant reduction of both short and long run nominal interest rates, perceived as being permanent, reduced the liquidity constraints of the economic agents thus contributing to the strong growth in overall credit demand observed in this period.

Chart 1 shows aggregate quarterly figures on the evolution of bank loans granted to the private non-financial sectors of the economy as well as the evolution of aggregate deposits held with the banks by the private non-financial sectors.⁽⁴⁾ After the deceleration in the recession period between 1992 and 1994, in 1995-1997 credit resumed the upward trend of the early nineties (average annual growth rate in real terms of 14 per cent in this period compared to 16 per cent in 1991) and strongly accelerated in 1998 and 1999 (annual growth rate in real terms of 24 per cent). Until 1994 deposits behave very much like credit, but from 1995/1996 onwards they clearly exhibit a much smaller growth rate (5.2 per cent in real terms during the period 1995-1997 and 6 per cent in 1998/1999).

(4) The figures analysed in this section have been computed from non-consolidated data on the sample of 18 bank conglomerates for which consistent series throughout the period 1990-1998 may be obtained. In December 1998, the credit and deposits in these 18 banks amounted to 96 per cent and 98 per cent of the total credit and total deposits, respectively. This is also the sample of banks used in the econometric estimations presented below.

Chart 2
THE MAIN NON-DEPOSIT
FINANCING SOURCES



These apparently diverging developments in credit and deposits have been the consequence of the elimination of controls to the international capital flows, on the one hand, and a significant reduction of the exchange risk of the escudo on the other, that enhanced the integration between the Portuguese and the international money markets.

Chart 2 presents the evolution of the main non-deposits financing sources. It can be seen that the increase in the growth rate of loans coincided with a decrease of the government bonds in banks' portfolios and an increase in the (net) funds obtained in the international money markets. Banks partly substituted their investment in government securities by credit to private non-financial sectors. This whole process seems basically to have started in 1995 and accelerated in 1998. In fact, the weight of government securities in banks' balance sheets declined significantly from 19.5 per cent of total assets in 1992 to 5.7 per cent in 1998 (13.4 per cent in 1995).

3. IDENTIFYING THE BANK LENDING CHANNEL — AN ALTERNATIVE APPROACH

At the empirical level, the bulk of the most relevant literature has tried to uncover the lending channel through the estimation of a reduced form equation for the bank credit market, with variables in differences (see, for instance, Kashyap and Stein (1995), Favero *et al.* (1999)). The estimated equation

is generally a dynamic version (in differences) of the static model:

$$\ln(C/P)_t = \theta_0 + \theta_1 \ln y_t + \theta_2 \ln y_t z_{it} + \theta_3 r_t + \theta_4 r_t z_{it} + \theta_5 \pi_t + \theta_6 \pi_t z_{it} + \theta_7 z_{it} \quad [1]$$

where $(C/P)_t$ stands for bank loans (in real terms), y_t for a scale variable (usually GDP), π_t for the inflation rate, r_t for the monetary policy interest rate and z_{it} for a measure of a bank specific characteristic (size, liquidity or capitalisation).

Under this approach, which we shall denote as the “reduced form approach”, the fact that the estimated θ_3 is (significantly) negative and θ_4 is (significantly) positive is taken as evidence of the existence of the bank-lending channel. The idea is that if the effect of monetary policy on bank lending is larger for the smaller, less liquid or less capitalised banks this can only be due to the existence of the bank-lending channel.

In order to motivate the alternative econometric approach we develop a simple IS/LM model for the money and credit markets, which draws heavily on Bernanke and Blinder (1988). The model, which in our view allows a better understanding of the identifying restrictions underlying the reduced form equation [1], is composed of four equations: money demand (total deposits held with a typical bank), money supply, loan demand and loan supply schedules. For space reasons we skip the details of the model and discuss only the loan-supply schedule, which reads as follows (below each coefficient is the corresponding expected sign according to economic theory):

$$\ln(C/P)_{it}^s = \alpha_{01} + \alpha_1 \ln(D/P)_{it} + \alpha_2 \ln(D/P)_{it} z_{it} + \alpha_3 \underset{(+)}{I_t} + \alpha_4 \underset{(-)}{i_t} + \alpha_5 \underset{(-)}{\pi_t} \quad [2]$$

Equation [2] postulates that banks loan supply in real terms, (C/P) , depends on the level of total deposits in real terms held by the private sector with the banks, (D/P) , on the inflation rate, π_t , as a measure of uncertainty in the economy as well as on the loan, I_t , and bond, i_t , interest rates.⁽⁵⁾ Assets held by banks in the form of bonds are seen as

substitutes for loans, held mainly for liquidity reasons.

The null $\alpha_1 \neq 0$ in [2] captures the idea that banks cannot shield their loan portfolios from changes in monetary policy, i.e., from changes in deposits brought about by monetary policy and plays a central role in our analysis as it constitutes a key necessary condition for the existence of the lending channel. If banks were able to replace lost deposits with other sources of funds, such as certificates of deposits or new equity issues, or by selling securities, we would expect α_1 not to be significantly different from zero.

The term $\alpha_2 \ln(D/P)_{it} z_{it}$ intends to capture the idea that shifts in the supply curve brought about by monetary policy changes depend on some banks' specific characteristics (size, liquidity, capitalisation, etc.) measured by z_{it} . In principle we expect that $\alpha_2 < 0$ so that loan-supply shifts are larger for small, less liquid or less capitalised banks.

To see how the lending channel operates in the model, let us assume, for instance, that the central bank increases the discount rate. This will reduce the equilibrium quantity of money in the economy, i.e., deposits in our model, through the interaction between money supply and money demand. In turn, the drop in deposits held by the private sector with the banks shifts the loan supply schedule inwards if $\alpha_1 > 0$ in [2]. It is this additional transmission mechanism — the inward shift in supply of loans — which is known in the literature as the bank-lending channel.

Also important is the coefficient α_3 as it determines the slope of the supply curve. Of course for that inward shift to occur the supply curve cannot be horizontal. In other words we need the additional assumption that α_3 in [2] is finite. Thus to test the existence of the credit channel and evaluate its importance we need to estimate α_1 and α_3 in equation [2]. The credit channel is the more important the larger α_1 (the larger the extent to which banks rely on deposit financing) and the smaller α_3 .

Solving the model for the four endogenous variables one obtains a reduced form equation for bank credit that looks very much like equation [1]. From such equation it is possible to discuss the restrictions on the coefficients of both money and loan demand and supply schedules, which are

(5) As explained below this supply schedule may be justified in theoretical terms in the context of a profit-maximizing bank, in which the amount of deposits is out of the control of the bank being determined by central bank monetary policy.

necessary in order to guarantee that proper conclusions on the existence of the lending channel can be drawn from a reduced form equation such as [1].⁽⁶⁾

In our opinion, some of these restrictions are very stringent. For this reason we will follow a different approach which consists of directly estimating the supply curve [2]. This alternative approach has the advantage of allowing one to get direct point estimates of the relevant coefficients, which is not the case of the “reduced form” approach.

We assume that deposits as well as the bond interest rate are exogenous at the bank level, so that we may stick to a “structural model” consisting only of a loan demand equation and a loan supply equation. The assumption of deposits exogeneity is probably the major limitation of our approach, but, in fact, this seems to be an issue deserving further research also at the theoretical level.

Of course our model also raises an identification as well as an estimating issue. Given that it is composed of only two “structural” equations with $I(1)$ variables the identification problem amounts at guaranteeing that we are able to distinguish the supply from the demand equation. We may discuss the identifying restrictions by resorting to the cointegration approach. Within the cointegration framework we may consider our two-equation model as corresponding to the long-run equilibrium relations of a two equation cointegrating VAR model with exogenous regressors. In this context we need to assume the existence of two single cointegrating vectors (one for the supply schedule and one for the demand equation) and that the exogenous regressors are themselves not cointegrated (see for instance, Johansen (1995) and Pesaran and Shin (1998)). In this case, the identifying condition requires that we impose one restriction in each cointegrating vector (besides the normalization condition). This restriction may of course be a zero coefficient restriction, which amounts at excluding one exogenous regressor from each equation. In other words, the basic idea is that the supply curve is identified provided the loan demand curve includes at least one explanatory variable that does not enter the supply equation. Under the assumption that deposits and the

bond interest rate are exogenous at the bank level, we see that the supply curve [2] is identified provided we assume that the demand curve includes a scale variable (GDP, for instance) as an additional regressor (in turn, the demand curve would be identified because the supply curve includes $\ln(D/P)$ as an additional exogenous regressor).⁽⁷⁾

Let us now address the estimation issue. So far in the literature the empirical models, using panel data, have been estimated with variables in first differences to circumvent the potential non-stationarity problem arising from the time-series dimension of the data. However it is well known that in most cases this approach does not solve the inconsistency problem, especially if the estimated model still includes specific effects and lagged endogenous variables.⁽⁸⁾

On the other hand, this approach neglects from the start the possibility of a levels relation among the relevant variables. In other words these approach discards the possibility of a long run effect of monetary policy on deposits and credit. This is at odds with the usual approach in the literature, which postulates levels relationships for the money and credit equations.

We estimate our model in levels using recently developed cointegration techniques for panel data. Some of these techniques allow obtaining (super) consistent estimators for the parameters of our supply equations even when some of the regressors are correlated with the residuals.⁽⁹⁾ These, being static equations should be seen as cointegrating relations, whose coefficients are the long run effects.

Our estimated loan-supply functions are generalisations of equation [2] in that they include two additional regressors: bank capital and the cost of external financing alternative to deposits and capital, s_t . The basic equation reads as:

(7) We note that these would also be the identifying restrictions should we approach the identification issue within the conventional stationary framework (see Intriligator *et al.* (1996) and Zha (1997)).

(8) See Alvarez and Arellano (1998) for a survey on the asymptotic properties of various estimators, in dynamic panels, with stationary regressors.

(9) On this issue, see for instance, Phillips and Moon (1999), Kao and Chiang (2000), Pedroni (1996), Pesaran, Shin and Smith (1999), Binder, Hsiao and Pesaran (2000), Pesaran and Shin (1995). Interesting surveys on the subject are Phillips and Moon (2000), Baltagi and Kao (2000) and Banerjee (1999).

(6) For a lengthy discussion of these “identifying” restrictions see Farinha and Marques (2001).

$$\ln(C/P)_{it}^s = \alpha_{0i} + \alpha_{1(+)} \ln(D/P)_{it} + \alpha_{2(+)} \ln(K/P)_{it} + \alpha_{3(+)} I_t + \alpha_{4(-)} I_t + \alpha_{5(-)} S_t + \alpha_{6(-)} \pi_t \quad [3]$$

We may justify this generalisation on econometric as well as on economic grounds. From an econometric point of view the introduction of capital in [3] aims at preventing that deposits appear as the single “scale” variable, which could bias the results towards favouring the conclusion of the existence of the credit channel. From an economic point of view we may justify equation [3] in the context of the model developed in Courakis (1988), in which banks maximise profits (by deciding on the amounts of assets and liabilities they control) conditional on the items they cannot control (capital and/or deposits, for instance). Under this framework our loan supply can be seen as resulting from a profit maximising behaviour of a bank in which both deposits and capital are treated as exogenous. The bank is assumed to choose the volume of credit, securities and external finance, in order to maximise the expected profits for a given level of deposits and capital.

The possibility of other forms of external financing alternative to deposits and capital (money market funds, certificates of deposits, etc.) is taken into account by introducing into the credit equation an interest rate representing the cost of such funds, s_t .⁽¹⁰⁾

4. EMPIRICAL EVIDENCE USING PORTUGUESE MICRO BANK DATA

In the estimations we use balance sheet information on a sample of 18 bank conglomerates for which consistent quarterly data throughout 1990/1-1998/4 is available.⁽¹¹⁾

As expected, given the evolution of credit and deposits described in section 2, some preliminary tests showed that in the last years of the sample the relation between credit granted to private sector and deposits underwent a huge structural

break. In order to minimise the corresponding damaging consequences for the estimated models we excluded the data for 1998 from the sample. So, we finally used 8 years of quarterly data for 18 bank conglomerates.

We estimated our equations by POLS, (Pooled OLS) PCOLS, (Panel bias corrected OLS) DPOLS (Dynamic panel OLS) and the PFMOLS (Panel fully modified OLS) estimators (see, Kao and Chiang (2000)).⁽¹²⁾ The results obtained by the first three estimators are basically similar. In such regressions most coefficients appear non-significantly different from zero or wrong signed. In contrast the results supplied by the PFMOLS estimator are quite reasonable in terms of both sign and magnitude. The fact that we are using a small sample, the correlation in the residuals as well as the endogeneity of some of the regressors probably explains these differences.⁽¹³⁾ For this reason, below we only present and comment the PFMOLS results.

The estimated equations are displayed in Table 1. Below each coefficient is the computed t -statistic, which is asymptotically normal distributed. For each equation several cointegration tests were computed. The null of a unit root in the residuals was always rejected, so that all the equations presented in Table 1 are valid cointegrating relations.

Column 1 displays the results of our basic specification [3]. It can readily be seen that all the coefficients are statistically significant and exhibit the expected sign for a loan-supply function. Even though the estimated coefficients of I_t and S_t do not seem to be much different in absolute terms, the null hypothesis of their being equal in magnitude is statistically rejected. In fact the t -statistics for this restriction are always larger than two (see, bottom line of Table 1).

Given that the coefficient of $\ln(D/P)$, α_1 , is

(12) We used the NPT 1.2 econometric package recently developed by Chiang and Kao (2001).

(13) The properties specific to the FMOLS estimator probably explain the differences in the results. For instance, it is known that the POLS estimator is consistent, but not super-consistent, if the regressors are correlated with the residuals and may exhibit substantial biases in finite samples. Simulation results also show that the PCOLS estimator does not significantly improve over simple POLS (see, for instance, Baltagi and Kao (2000)). In contrast PFMOLS is super-consistent even when the regressors are correlated with the residuals.

(10) Actually the reported equations in the next section only include two (and not three interest rates). Due to strong colinearity we are not able to separately estimate the three coefficients. We dropped i_t from the equation, as in fact it turned out not to be significant in preliminary regressions.

(11) During the nineties a process of take-overs has taken place. However many of the institutions involved did not effectively merged, but rather constituted bank conglomerates.

Table 1

PFMOLS ESTIMATES OF EQUATION [3]

Regressors.....	(1)	(2)	Size		Liquidity		Capitalisation	
			(3)	(4)	(5)	(6)	(7)	(8)
$\ln(D/P)_t \ln$	0.615 (24.83)	0.721 (28.99)	0.676 (14.61)	0.49 (10.86)	0.633 -18.38	0.717 -21.34	0.409 (14.97)	0.713 (26.26)
$\ln(D/P)_t \cdot z_{it}$			0.156 (8.16)	0.049 (2.80)	-0.051 (-0.75)	0.027 (0.54)	-3.947 (-16.23)	-0.747 (-6.97)
$\ln(K/P)_t$	0.156 (3.00)		-0.525 (-10.11)		0.13 (2.74)		0.47 (7.89)	
$\ln(K/P)_t \cdot z_{it}$			-0.101 (-3.03)		0.022 (0.13)		6.462 (12.14)	
I_t	19.318 (15.00)	16.734 (12.96)	17.953 (16.14)	22.262 (18.91)	14.787 (12.1)	12.839 (10.34)	22.187 (18.01)	16.617 (12.4)
$I_t z_{it}$			0.523 (0.81)		101.926 (8.40)	111.513 (9.30)	24.639 (1.79)	
s_t	-15.905 (-11.85)	-14.442 (-10.77)	-11.767 (-10.22)	-16.11 (-13.24)	-11.835 (-9.55)	-10.801 (-8.59)	-17.096 (-13.63)	-13.595 (-10.08)
$s_t z_{it}$			-1.41 (-2.26)		-72.969 (-6.38)	-79.466 (-7.10)	13.953 (1.04)	
π_t	-2.504 (-2.24)	-1.114 (-1.02)	-7.538 (-7.66)	-6.476 (-6.45)	-0.47 (-0.45)	0.635 (0.61)	-5.114 (-4.70)	-3.069 (-2.76)
z_{it}			0.411 (5.04)	0.214 (3.55)	-8.213 (-13.27)	-9.005 (-14.26)	-6.589 (-5.15)	-0.444 (-1.32)
Spread restriction....	(4.3)	(2.98)	—	(8.79)	—	—	—	(3.81)

Legend:

t -statistics in parenthesis.

$\ln(D/P)$ = natural log of total deposits deflated by the consumer price index.

$\ln(K/P)$ = natural log of total capital deflated by the consumer price index.

I_t = interest rate on long term loans in decimals (five year loans).

s_t = short term interest rate on Portuguese money market in decimals.

π_t = inflation rate in decimals (fourth differences of log CPI).

z_{it} = measure of bank specific characteristic (size, liquidity or capitalisation).

significantly positive and the coefficient of I_t , α_3 , is finite we conclude that there is evidence of the existence of a bank-lending channel in the transmission of monetary policy in Portuguese bank data.

By comparing the results in columns 1 and 2 we also see that the conclusion on the existence of the credit channel does not depend on whether or not the estimated regression includes bank capital as an additional regressor.

The remaining regression results reported in Table 1 interact the explanatory variables in our basic equation with three bank specific characteristics, which are usually seen as potential important sources of bank heterogeneity: size, liquidity and capitalisation. These three variables are denoted by z_{it} in Table 1. In the case of size and capitalisation the z_{it} variable is taken in the form of differences from each time period average, i.e.,

$$z_{it} = x_{it} - \frac{1}{N} \sum_{i=1}^N x_{it} = x_{it} - \bar{x}_t \quad [4]$$

where x_{it} stands for the log of total assets, as a measure of size and for the capital ratio as a capitalisation indicator. By defining size and capitalisation in this way we ensure that the z_{it} variable captures pure differential effects. In case of liquidity the z_{it} variable is taken in the form of differences from a per-bank average, i.e.,

$$z_{it} = x_{it} - \frac{1}{T} \sum_{t=1}^T x_{it} = x_{it} - \bar{x}_i \quad [5]$$

where x_{it} stands for the liquidity ratio as a measure of bank liquidity.⁽¹⁴⁾ This definition allows one to account for periods of general (positive or negative) excess liquidity for the banking sector as

(14) The rationale for equation [5] is explained in Farinha and Marques (2001).

whole, which is likely to have been the case in the Portuguese banking system, during most of the sample.

Let us now take the model in column 3 of Table 1. The fact that the coefficient on $\ln(D/P)_{it} z_{it}$ is positive means that the coefficient on deposits is lower for small banks and so in the Portuguese case the supply of loans of small banks is less deposit dependent than that of large banks. In other words, everything else equal, we would conclude that the credit channel is less important for small banks. However, we saw in section 3 that in order to evaluate the relative importance of the bank lending-channel we need to look at the coefficient of deposits as well as at the coefficient of the loans interest rate. Thus, in terms of Table 1, to evaluate the relative magnitude of the lending channel for two different banks one has to look both at the coefficient of $\ln(D/P)_{it} z_{it}$ and the coefficient of $l_t z_{it}$, as the effect of a decrease in the coefficient of deposits could be offset by an increase on the coefficient of the loans-interest rate, and vice-versa.

As it turns out that the coefficients on the interaction terms $l_t z_{it}$ and $s_t z_{it}$ are both not statistically different from zero we may definitely conclude that small Portuguese banks are less dependent on deposits than large banks or, in other words, the bank-lending channel appears to be less important for small banks.⁽¹⁵⁾ We recognise that the lack of evidence of larger non-deposit external financing costs for smaller banks does not come as a large surprise in the Portuguese case. Portugal is a small country with a not very large number of banks in which even the smaller banks are large enough not to be discriminated in the access to markets for non-deposits external funds.

Columns 5 and 6 display the models with liquidity as the bank specific characteristic. The first important point to note is that the coefficient of $\ln(D/P)_{it} z_{it}$ and that of $\ln(K/P)_{it} z_{it}$ are not statistically different from zero. The fact that the coefficient of $\ln(D/P)_{it} z_{it}$ is zero means that in the

Portuguese case the dependence of banks on deposits does not vary with the bank liquidity ratio.⁽¹⁶⁾ On the other hand, it turns out that the coefficient of the loans interest rate is lower for illiquid banks⁽¹⁷⁾ (as the coefficient of $l_t z_{it}$ is positive) and this means that the supply curve is flatter. This reduces the importance of the credit channel for the illiquid banks. This apparently counterintuitive result is not surprising because the Portuguese banks displayed a huge liquidity ratio at the beginning of the sample period due to the existence of credit ceilings and compulsory minimum ratios of public debt. Moreover, there is some evidence suggesting that it might have been the case that the banking system as a whole operated under overall excess liquidity conditions during most of the sample period. So, it may well be the case that the coefficients of $l_t z_{it}$ and of $s_t z_{it}$ appear significantly different from zero because they are capturing the effects of a potential structural break occurring in the period, as we shall see below. All in all, a sensible conclusion, in this case, seems to be that liquidity in the Portuguese banks, during the nine-ties has not played the role of a shield against monetary policy shocks.

Columns 7 and 8 display the two models estimated with the capitalisation ratio as the interaction variable. In this case we have the coefficient of $\ln(D/P)_{it} z_{it}$ negative and the coefficients of $l_t z_{it}$ and $s_t z_{it}$ equal to zero, and thus, we can definitely conclude that the lending-channel appears to be more important for less capitalised banks.

Of course, these conclusions are valid under the implicit assumption that the models estimated in Table 1 are stable. But if we look again at Charts 1 and 2 we immediately realise that during 1996 and 1997 the credit growth rate increased relative to the deposits growth rate, coinciding with the increase in the external non-deposits funds coming from abroad. This fact raises the question of whether the conclusions above still apply once we

(15) We note that the coefficient of $\ln(K/P)$ in column [3] is wrong signed, but the above conclusion still holds for the model in column [4], which was estimated after dropping $\ln(K/P)_{it}$ and $\ln(K/P)_{it} z_{it}$ and after checking that the coefficients on $l_t z_{it}$ and $s_t z_{it}$ were still statistically not different from zero. However in column [4] the estimated coefficient of $\ln(D/P)_{it} z_{it}$ is much smaller and the t -statistic is not very high in relative terms.

(16) We note that this conclusion depends on the fact that the liquidity variable is defined as in [5]. If we rather define liquidity as in [4] the coefficient of $\ln(D/P)_{it} z_{it}$ appears significantly different from zero and negative. This result shows that the way the z_{it} is defined really matters for the empirical analysis.

(17) Note that an illiquid bank is one for which the current liquidity ratio is below the sample average liquidity ratio.

allow for the possibility of a structural break in the last two years of the sample.

To investigate this issue we “interacted” the variables in our basic specification (3) with a dummy variable, which is zero for the first six years of data (1990/1 to 1995/4) and equals 1 for the two last years of the sample (1996/1 to 1997/4).

The evidence strongly suggests the existence of a structural break occurring in the two last years of the sample, as the coefficients of the variables of the model interacted with the dummy variable are in general significantly different from zero. However the most important point is that all the relevant conclusions drawn above from Table 1 remain valid. In particular we still conclude that the dependence of banks on deposits does not vary with the bank liquidity ratio and that the lending channel is more important for the less capitalised banks.⁽¹⁸⁾

5. CONCLUSIONS

This paper investigates the existence of a bank-lending channel using quarterly data on the Portuguese banks for the period 1990-1997. This transmission channel operates through shifts in the bank-loan supply schedules brought about by the reduction in the availability of bank deposits following a contractionary monetary policy shock.

In contrast to previous approaches which basically resort to (dynamic) reduced form equations for bank credit with variables in differences, this paper proposes an alternative approach by estimating directly a loan supply schedule with variables in levels, thereby exploring recent cointegration results for nonstationary panel data.

We conclude for the existence of a bank-lending channel in Portuguese data and that the importance of this channel is larger for the less capitalised banks. Size as well as liquidity does not appear to be relevant bank characteristics to determine the importance of the bank-lending channel.

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(18) For a full discussion of the results see Farinha and Marques (2001).

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