# Is there a bank lending channel in Tunisia?

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This paper aims to investigate the relevance of bank lending channel of monetary policy in Tunisia by using disaggregated bank level data set. To avoid this ambiguity, a panel of annual balance sheet data on 10 Tunisian banks used to test whether lending responses to a change in monetary policy differs, depending on the balance sheet strength of a bank. The empirical evidence has stated that monetary policy shocks is significantly and negatively influenced the banks' loan supply, and therefore has supported the existence of bank lending channel in Tunisia. In addition, several bank characteristics variables namely capitalization, size and liquidity in the transmission of monetary policy is studied. Size revealed to be an important bank characteristic that affects the way Tunisian banks react to monetary policy changes.

#### **1. Introduction**

For an effective monetary policy to be formulated, it is necessary to understand how monetary policy actions are transmitted into the economy and the role that the financial sector plays in this process. Studies about the transmission of monetary policy in Tunisia are scarce. This paper attempts to start to fill this gap, by estimating for the second time the effectiveness of the bank lending channel in Tunisia.

The basic theoretical explanation of monetary policy transmission, the so called interest rate channel (IRC), suggests that monetary policy shocks propagate through the economy in the following way: an expansionary monetary policy leads to a fall in the real interest rate thus lowering the cost of capital; this reduced cost of capital causes an

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increase in investment spending, which increases aggregate demand, and, ultimately, output (and vice-versa, for monetary contractions). The functioning of this channel rests on the assumption that there are two assets in the economy: money and interest bearing bonds.

More recently, a substantial research on alternative monetary transmission mechanisms has been undertaken, aiming at explaining how changes in the short-term nominal interest rates can induce changes in the level of investment, which should be affected only by the real long-term interest rate. Mishkin (1997) lists nine such mechanisms, which can be broadly divided into two categories: those operating through asset prices and those operating through credit markets. The bank lending channel is the one of the channels that operate through the credit markets.

The concept of the bank lending channel rests on the assumption that there are three assets available for businesses and households in an economy - money, bonds and bank deposits: adding deposits creates a role for banks in the transmission of monetary policy. The bank lending channel operates as follows: a contraction in the money supply by the central bank decreases bank deposits and forces the commercial banks to cut on lending. The decrease in loans makes loan-dependent business and consumers reduce aggregate demand. As a result, output is affected. Hence, the economic significance of the bank lending channel depends on: a) the existence of bank dependent borrowers and b) the quantitative impact of a central bank's monetary policy on the supply of bank loans. Since the first condition usually holds for most economies, empirical studies have concentrated on testing whether a central bank can affect the supply of bank loans. They typically study individual bank data, testing the assumption that banks with different size, liquidity or level of capitalization should respond differently to policy shocks (see Kashyap and Stein 2000). Lending responses, if they emanate from loan supply changes, should be larger for banks with - for example - "weaker" balance sheets, which are more likely to have difficulties substituting lost deposits with external forms of finance.

We use a panel of annual balance sheet data on 10 Tunisian banks from 1990 to 2008 and test whether lending responses to a change in monetary policy differs, depending on the balance sheet strength of a

bank. Our results indeed suggest that banks (especially private ones) with lower than average assets are more affected by monetary policy actions than average banks, which is consistent with bank lending channel hypothesis.

We first present a brief overview of theoretical work on the bank lending. Then we present the model to be used here. Afterwards, the presentation of results of our estimations and conclusions are discussed.

#### 2. A brief overview of the recent literature on the lending channel

According to the bank lending channel theory, monetary policy affects the supply of bank loans through an imperfect market for bank debt. A restrictive monetary policy leads to a drop in bank deposits. Only banks that have a larger share of liquid assets or that are bigger are able to shield their lending relationships from the monetary policy shock (see Mishkin 1996). Smaller banks have to draw on their liquid assets, whereas larger banks have better access to external finance due to their size. Hence, they do not have to reduce their lending as strongly as smaller or less liquid banks (see Bernanke and Gertler 1995). The same may be true for banks with a bigger capital-to-assets ratio, as market participants may perceive highly capitalized banks as being less risky. Consequently, it should be more expensive for less capitalized banks to access external finance. Further, if debtors do not have perfect substitutes for loans, banks' restrictive lending behaviour results in added costs to them. As a consequence, the bank lending channel would be an additional real economic effect to the conventional channels, which would not exist under a perfect market for debt.

Kashyap and Stein (1993) list three conditions (based on Bernanke and Blinder 1988) for a distinct bank lending channel to exist:

1. Firms should not be able to completely compensate a reduced supply of commercial bank loans from other sources;

2. The central bank must be able to affect the supply of credit;

3. There must be imperfections in the adjustment of the aggregate price level.

The third condition is an overall requirement for the effectiveness of monetary policy, and is usually met. So, to test the existence of the lending channel, one has to verify that conditions 1 and 2 are satisfied for a given economy.

With respect to the first condition, Kashyap and Stein (1993) conclude that if a contractionary monetary policy reduces the supply of loans, loan-dependent firms will be affected adversely. The second condition requires an empirical examination in each particular economy. There are institutional arrangements that weaken the power of the bank lending channel. Three of the most important ones are the existence of capital adequacy requirements, the existence of reserve requirements and the participation of non-banking financial institutions in the supply of loans. Capital adequacy and reserve requirements restrict the supply of loans that a bank can make, thereby leaving less room for loan responses to monetary policy actions. The central bank also cannot control loans issued by non-banking financial institutions, which implies a lower overall capacity to affect the loans' supply to the economy. Kashyap and Stein conclude that an average bank should respond by cutting back on loans, as only well-capitalised banks can raise external finance and thus their lending would be less affected by policy changes.

### 3. The model

As in the majority of studies using bank-level data, our empirical specification is based on Kashyap and Stein (1995), designed to test whether banks react differently to monetary policy shocks. In particular, we want to test the effect of bank capitalization and assets on the response of loans to changes in monetary policy. The theory predicts that better capitalized banks should be less sensitive to changes in policy, while the impact of asset size is ambiguous. The explanatory variable of primary interest is  $i_t$ , an exogenous indicator variable describing monetary policy shocks. We will use the Tunisian money market rate as the policy indicator.

The effect of monetary policy on bank loans depends, as explained above, on the balance sheet strength of a bank. We include a second set of explanatory variables that is the interaction between the change in  $i_t$  and a measure of balance sheet strength of a bank. As indicated above,

the theory suggests capital and asset size as measures of bank strength. Empirical papers typically use asset size  $(A_{it})$ , liquidity  $(LIQ_{it})$ , or capitalization  $(CAP_{it})$ . We nclude all three of them into our specification.

We also have to include lags of both dependent and explanatory variables to allow for dynamic effects. The model specification is as follows in equation below:

$$\begin{split} \Delta \log L_{it} &= \alpha_1 \Delta \log L_{i(t-1)} + \sum_{j=0}^2 \beta_j \Delta P M_{t-j} + \gamma z_{i(t-1)} \\ &+ \sum_{j=0}^2 \delta_j [\Delta P M_{t-j} z_{i(t-1)}] + \sum_{j=0}^2 \varphi_j \Pi_{t-j} \\ &+ \sum_{j=0}^2 \eta_j \Delta \log Y_{t-j} + \mu_i + \varepsilon_{it} \end{split}$$

where  $\Delta \log L_{it}$  is the growth rate of loans of bank i in year t. The data on loans and all other balance sheet items is taken directly from the balance sheet of banks.

#### $\Delta PM_{t-i}$ change in the annualised Tunisian money market rate.

 $z_{i(t-1)}$  vector of the three variables capturing the balance sheet strength of a bank Asset size (S<sub>it</sub>), Liquidity (Liq<sub>it</sub>) and Capitalization (CAP<sub>it</sub>). Asset size is total assets (in TND), while liquidity and capitalization are calculated as ratios of bank liquid assets and equity capital to total assets, respectively.

$$S_{it} = logA_{it} - \frac{1}{N} \sum_{i} A_{it}$$
$$Liq_{it} = \frac{liq_{it}}{A_{it}} - \frac{1}{T} \sum_{i} (\frac{1}{N_t} \sum_{i} \frac{liq_{it}}{A_{it}})$$
$$Cap_{it} = \frac{C_{it}}{A_{it}} - \frac{1}{T} \sum_{i} (\frac{1}{N_t} \sum_{i} \frac{C_{it}}{A_{it}})$$

Is there a bank lending channel in Tunisia?

 $\Delta log Y_{t-j}$  is the growth rate of real GDP and  $\Pi_{t-j}$  is the annual inflation rate. The coefficients on the  $\Delta PM_{t-j}$  terms capture the response of an average bank to a monetary shock, while the coefficients on  $z_{i(t-1)}$ cross terms describe how the response differs for differently capitalized banks. For an operational lending channel to exist it is sufficient that all coefficients on  $\Delta PM_{t-j}$  are negative (and significant) and the coefficients on the  $z_{i(t-1)}$  and  $\Delta PM_{t-j}$  cross products are positive (and significant).

#### 4. Data and estimation results

In this work we use annual data covering 1990-2008. We have bank balance sheet data for 10 Tunisian banks, provided by BankScope<sup>2</sup>, real GDP, the inflation and money market rate provided by the International Financial Statistics (IMF).

Our aim is to test for the existence of the bank lending channel in Tunisia. In terms of our specification, this implies that all coefficients  $\Delta PM_{t-j}$  on should be negative (and significant) and the coefficients on  $z_{i(t-1)}$  and  $\Delta PM_{t-j}$  cross products should be positive (and significant).

With respect to the monetary policy impact, we find that, in all model specifications (**Table 1**), the long-run multipliers of monetary policy have the expected negative sign and are significantly different from zero for the average bank in the sample. Better still, this finding is robust with regard to the inclusion of each of the bank characteristics considered. In sum, the results of Tunisia tend to confirm that the bank lending channel may exist.

The most important feature of the empirical estimates in the case of Tunisia is that only the linear effects of bank size is significant and has a correct sign; the other two banks characteristics, namely capitalization and liquidity do not play any role at least in their direct (linear)

<sup>&</sup>lt;sup>2</sup> BankScope is a publicly available database provided by Bureau Van Dijk, that covers balance sheet data on banks in all Eastern European countries, although not the full population in each. It has been used in the majority of the published papers for the euro area that are based on micro data on bank so far.

relationship to loans behaviour. As for the distributional effects of monetary policy due to bank characteristics, only that due to size is statistically significant. The first order interactions terms of liquidity and capitalization do not seem to play an important role in shaping the reaction of Tunisian banks to monetary policy changes; this finding seems to vary across the specifications. Though the cross products of size with monetary policy indicator alternate in sign (the coefficient on  $\Delta PM_t size_{t-1}$  is negative and that on  $\Delta PM_{t-1}size_{t-1}$  is positive), the total effects is nonetheless positive as predicted by the theory. The negative sign signifies that the bigger the bank, the more its lending was affected by the monetary policy conditions. In contrast, the positive sign implies that the bigger the bank, the less its lending reacted to the monetary policy conditions. What is rather important for policymaker is rather the total effect which is positive as expected indicating, by the same way, that big banks react, on average, less to changes in policy. In sum, the distributional effects (the significant non linear relationship between size and loans growth) as well as linear effects of size speak about the existence of a bank lending channel in Tunisia.

Finally, the effects of the macroeconomic variables (real GDP growth and inflation) is somewhat mitigated. The long-run elasticity of loans to real GDP growth is always positive and statistically significant as expected in all the specifications. However, the response of loans to inflation is non significant, albeit positive. This finding could be explained by the fact Tunisia did witness a high inflation period.

 Table1: The Determinants of Banks' Loan Supply Function: System

 GMM estimation

Variables	1	2	3	4	5	6	7	8
ΔLog L (-1)	0.189*	* 0.176**	0.168**	0.21**	0.181***	0.190**	0.164**	0.167**
	(0.0768	) (0.087)	(0.081)	(0.092)	(0.0645)	(0.085)	(0.0767)	(0.086)
$\Delta MP$	-0.005	2 -0.0119*	-0.0076	-0.014**	-0.0072	-0.011*	-0.0085	-0.013
	(0.0046	) (0.00654)	(0.00587)	(0.0068)	(0.0061)	(0.0067)	(0.0055)	(0.00689)
$\Delta$ MP(-1)	0.003	5 0.0044	0.00463	0.00532	0.0028	0.00376	0.0028	0.00343
	(0.0046	) (0.0052)	(0.0057)	(0.0063)	(0.0058)	(0.0052)	(0.0055)	(0.0059)
Size(-1)	-0.09	5 -0.16**					-0.074	-0.078
	(0.069	) (0.0565)					(0.066)	(0.071)
ΔMP *Size(-1)	-0.027*	* -0.025*					-0.029*	-0.027*
	(0.015	) (0.014)					(0.018)	(0.0164)
$\Delta$ MP(-1)*Size(-	1) 0.035*	* 0.037**					0.036**	0.032**
	(0.0171	) (0.0165)					(0.0153)	(0.0135)
Liq(-1)			0.000723	0.000564			0.000034	0.000062
			(0.0023)	(0.00165)			(0.000754)	(0.000743)
$\Delta$ MP *Liq(-1)			0.00083	0.00031			0.000097	0.000093
			(0.00018)	(0.000187)			(0.00017)	(0.00020)
$\Delta$ MP(-1)*Liq(-1	)		-0.00028	-0.000234			-0.000087	-0.000085
			(0.00034)	(0.00037)			(0.00027)	(0.00028)
Cap(-1)					0.0031	0.0035	0.0037	0.00324
					(0.0088)	(0.0078)	(0.0067)	(0.0087)
$\Delta$ MP *Cap(-1)					0.0013	0.0012	-0.00087	-0.0007
					(0.0015)	(0.00146)	(0.0016)	(0.00157)
$\Delta$ MP(-1)*Cap(-	1)				-0.00167	-0.00175	0.000077	-0.00022
					(0.00185)	(0.00173)	(0.00147)	(0.00136)
Y		-0.18		-0.153		-0.069		-0.0423
		(0.212)		(0.242)		(0.25)		(0.27)
Y(-1)		0.24**		0.22*		0.25**		0.212**
		(0.12)		(0.17)		(0.115)		(0.0976)
П		-0.039		-0.0216		-0.135		-0.182
		(0.417)		(0.412)		(0.445)		(0.395)
Π(-1)		0.719		0.775		0.543		0.497
		(0.69)		(0.607)		(0.587)		(0.685)
Constant	0.0556**	* 0.0567***	0.0498***	0.0567***	0.0612***	0.0578***	0.071***	0.0651***
	(0.0178)	(0.031)	(0.018)	(0.0342)	(0.031)	(0.0356)	(0.019)	(0.027)
Sargan	103.17*	129.88*	95.03*	128.74*	94.26*	129.87*	153.03*	149.83*
test Nb. of	10	10	10	10	10	10	10	10
banks		••				10	10	10
Nb. of	170	170	170	170	170	170	170	170
observatio								

Notes: \*\*\*, \*\*, and \* indicate significance levels at 1, 5, and 10 percent, respectively.

# 5. Conclusion

The existence of the bank lending channel has important implications for the conduct of monetary policy by a central bank. The literature predicts that if the bank lending channel is present, banks would cut back on lending in response to monetary contraction and undercapitalized banks would be more affected than larger, better capitalized banks. This happens because for the former it is more difficult to compensate the reduction in deposits with funds from other external sources. Tests for the existence of the bank lending channel usually classify banks according to some measure of balance sheet strength, like capitalization or asset size, and then estimating the lending responses to a monetary shock. This paper uses capitalization, bank assets and liquidity as "separating" variables.

This work, using annual data covering 1990-2008 and applying GMM estimator, finds signs that the bank lending channel is operational in Tunisia. Size revealed to be an important bank characteristic that affects the way Tunisian banks react to monetary policy changes.

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