

Bank Lending and Monetary Policy Transmission in Greece and Policy Implications

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Abstract: Based on a reduced-form equation derived from the demand for and supply of bank loans in Greece, this paper finds that the equilibrium bank loan is positively associated with industrial production, the Greek government bond yield and bank deposits and is negatively affected by the policy rate of the European Central Bank, the 10-year U.S. government bond yield and the EUR/USD exchange rate. The significant negative sign of the policy rate suggests that monetary easing (tightening) would increase (reduce) bank loan supply and confirms the existence of the bank lending channel.

Keywords: Bank lending channel, Monetary policy transmission, Policy rate, Bank deposits, Exchange rate

JEL Code Classification: E52, E51

1. Introduction

The recent global financial crisis affected the banking sector in Greece significantly. High unemployment and weak economic activities resulted in slow or negative growth of bank deposits and reserves. Toxic mortgage-backed securities and non-performing loans reduced the value and quality of bank assets. To reduce loan losses, banks were cautious in making loans. Bank consumer loans declined as much as 23.51% from a high of €36,485 million in February 2009 to a low of €27,906 million in April 2014. Bank corporate loans also dropped as much as 23.94% from a high of €133,181 million in March 2009 to €101,291 million in April 2014 (Bank of Greece). Bank deposits from corporations and households suffered a 32.09% decrease from a high of €237,531 million to a low of €161,297 million during December 2009 – April 2014 (Bank of Greece). In response to the global financial crisis and the sluggish economy in the European Union in general and the euro area in particular, the European Central Bank lowered the policy rates to reduce the cost of borrowing, increase the spread, and enhance banks' incentives to make loans. The marginal lending facility rate dropped from a high of 5.25% on July 9, 2008 to a low of 0.75% on November 13, 2013. The main refinancing operations rate also declined from the pre-crisis 4.25% to a low of 0.25% on November 13, 2013. The role that banks play in economic recovery mainly depends on the bank lending channel, which suggests that a change in monetary policy would affect bank loan supply.

This paper examines the bank lending channel in Greece. It is based on a simultaneous-equation model of bank loan demand and supply. Comparative static analysis is presented. A reduced-form equation is estimated. This paper differs from some of the previous studies (Brissimis and Delis, 2009; Gambacorta and Rossi, 2010; Brissimis, Garganas, and Hall, 2012) in several aspects. First, the sample covers the post crisis period. Second, global factors such as the exchange rate and the foreign interest rate are considered. A change in the exchange rate or the foreign interest rate may affect international capital movements and loan supply. Third, a

monetary policy instrument such as the policy rate is incorporated in the model in order to test whether bank loan supply would respond to a change in monetary policy.

2. Literature Survey

There are several recent studies examining the bank lending channel for the U.S., Greece and other related countries. Bernanke and Blinder (1988) show that bank credit demand is positively affected by real GDP, the deflator and the lagged credit demand and that the negative coefficient of the prime lending rate and the positive coefficient of the 3-month Treasury bill rate are jointly significant. Bernanke and Blinder (1992) find that rising federal funds rates reduce bank loans and raise the unemployment rate and that monetary policy transmission mechanism works through both bank loans and bank deposits.

Kashyap, Stein and Wilson (1993) reveal that contractionary monetary policy reduces bank loans and increases the amount of commercial paper, indicating that commercial paper is a substitute of bank loans. Kashyap and Stein (2000) show that illiquid banks are more likely to adjust their lending behavior in response to monetary policy changes.

Kishan and Opiela (2000) reported that loans from more capitalized banks are less responsive to monetary policy change whereas loans from the smallest and least capitalized banks are very responsive to monetary policy shifts.

Boivin and Giannoni (2002, 2006) indicated that during the post-1980 period, the effect of monetary policy shocks on output declines and that monetary policy has stabilized the economy more successfully due to stronger response to inflation expectations. Based on the factor augmented VAR model, Dave, Dressler and Zhang (2009) find that the bank lending channel is stronger than previously had expected.

Based on the Bernanke and Blinder (1988) model, Brissimis, Kamberoglou, and Simigiannis (2001) find evidence of the bank lending channel in Greece. They indicate that monetary policy has a considerable effect on bank loan supply, which, in turn, influences the Greek economic activities and that larger and more liquid banks can shield their loan portfolios from adverse effects of changes in monetary policy. Based on a sample of 16 OECD countries including Greece, Brissimis and Delis (2009) show that the bank lending channel only applies to Greece and Japan and that bank characteristics play insignificant roles in the loan supply function. Applying the cointegration and VECM techniques, Brissimis, Garganas, and Hall (2012) find support for the bank lending channel in Greece and that bank loan supply is accountable for consumer loan growth after credit liberalization.

Ehrmann, Gambacorta, Martinez - Pagés, Sevestre, and Worms (2003) find that banks with less liquidity would respond more strongly to monetary tightening and that bank size does not play an important role in banks' response to a change in monetary policy.

Gambacorta and Rossi (2010) show that there are two cointegrating equations for loan demand and supply in the euro area and that the impacts of monetary tightening on credit, GDP and prices are greater than the impacts of monetary easing. They find evidence of an asymmetric credit channel in the euro area.

Using a sample of 11 countries including Greece in the euro area, Cappiello, Kadareja, Kok Sorensen, and Protopapa (2010) reveal that there is evidence of a bank lending channel in the euro area. In addition, an increase in credit supply and loan growth has a significant positive impact on real GDP. The financial crisis beginning in mid-2007 impaired the balance sheet of banks and possibly reduced their loan supply.

Fotopoulos, Papapanagos and Siokis (2011) reveal that bank loan supply in the South Eastern European countries (SEE) is significantly influenced by monetary policy changes and that Greek banks shield negative impacts of monetary policy transmission and have positive impacts on economic growth in the SEE countries.

There are several studies which do not find support for the bank lending or credit channel. Markidou and Nikolaidou (2007) examine the credit channel of monetary policy transmission for Greece based on a sample during the period of 1995-2005. They indicate that the credit channel is ineffective based on two monetary policy instruments, namely, the interest rate and the monetary base. Brissimis and Delis (2007) find that the bank lending channel does not apply to 14 out of 16 OECD countries. Using a sample of 12 countries including Greece in the Eurozone, Yildirim (2013) reports that the policy interest rate seems not to have an effect on credit volume and that the credit channel does not work effectively during the sample period. On the other hand, the recent financial crisis has a positive impact on bank loans.

3. The Model

Extending Ehrmann, Gambacorta, Martinez - Pagés, Sevestre, and Worms (2003), Gambacorta and Rossi (2010), Brissimis, Garganas, Hall (2012), Hsing (2013) and other studies, we can express the demand for and supply of bank loans in Greece as:

$$L^d = A(R^l, R^b, Y) \quad (1)$$

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$$L^s = B(R^l, R^b, D, R^p, R^f, \varepsilon) \quad (2)$$

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where

L^d = demand for bank loans,

L^s = supply of bank loans,

R^l = the lending rate,

R^b = the interest rate on bonds,

Y = output,

D = bank deposits,

R^p = the policy rate,

R^f = the foreign interest rate, and

ε = the EUR/USD exchange rate measured as units of the euro per U.S. dollar.

An increase in bank deposits results in more excess reserves that banks can consider to supply loans (Bernanke and Blinder, 1988). Many central banks have employed the policy rate as a

major monetary policy instrument (Bernanke and Blinder, 1992; Kashyap and Stein, 2000; Kishan and Opiela, 2000; Vera, 2012).

The demand for bank loans is expected to have a negative relationship with the lending rate and a positive relationship with the interest rate on bonds and output. The supply of bank loans is expected to have a positive relationship with the lending rate and bank deposits and a negative relationship with the interest rate on bonds, the policy rate and the foreign interest rate. When the central bank lowers the policy rate, the cost of borrowing by banks decreases, the spread increases, and banks would have more incentives to increase loan supply.

Several studies have considered the exchange rate in monetary policy transmission mechanism (Sims, 1992; Peersman, 2004; Suzuki, 2004; Zanforlin, 2011). As the euro depreciates, international lenders may increase loan supply because of a lower cost of exchanging for the euro or a better financial position caused by more revenues from exports or may reduce loan supply due to decreased relative collateral values of domestic firms. These effects of the depreciation of the euro on bank loan supply are summarized as follows:

$$\partial L^s / \partial \varepsilon = \left(\frac{\partial L^s}{\partial C} \times \frac{\partial C}{\partial \varepsilon} \right) + \left(\frac{\partial L^s}{\partial EX} \times \frac{\partial EX}{\partial \varepsilon} \right) + \left(\frac{\partial L^s}{\partial V} \times \frac{\partial V}{\partial \varepsilon} \right) > or < 0, \quad (3)$$

where C, EX and V stand for the cost of exchanging for the euro, exports, and collateral values, respectively.

Solving for equations (1) and (2) simultaneously, we can express the equilibrium bank loan \bar{L} as:

$$\bar{L} = \bar{L}(Y, R^b, D, R^p, R^f, \varepsilon) \quad (4)$$

Comparative static analysis shows that the impact of a change in one of the exogenous variables on the equilibrium bank loan \bar{L} can be expressed as:

$$\partial \bar{L} / \partial Y = A_Y B_{R^l} / |J| > 0, \quad (5)$$

$$\partial \bar{L} / \partial D = A_{R^l} B_D / |J| > 0, \quad (6)$$

$$\partial \bar{L} / \partial R^p = A_{R^l} B_{R^p} / |J| < 0, \quad (7)$$

$$\partial \bar{L} / \partial R^f = A_{R^l} B_{R^f} / |J| < 0, \quad (8)$$

$$\partial \bar{L} / \partial R^b = (-A_{R^b} B_{R^l} + A_{R^l} B_{R^b}) / |J| > or < 0, \quad (9)$$

$$\partial \bar{L} / \partial \varepsilon = A_{R^l} B_\varepsilon / |J| > or < 0, \quad (10)$$

where $|J|$ is the Jacobian for the endogenous variables and has a negative sign.

4. Empirical Results

The data were collected from the *International Financial Statistics* published by the International Monetary Fund and the Bank of Greece. Bank loans and bank deposits are adjusted for inflation and measured in billion euros. The index for industrial production is selected to represent output and has a base year in 2005. The EUR/USD exchange rate measures units of the euro per U.S. dollar. An increase means appreciation of the U.S. dollar and depreciation of the euro. The interest rate on bonds is represented by the Greek government bond yield. The marginal lending facility rate is chosen to represent the policy rate. The foreign interest rate is represented by the 10-year U.S. government bond yield. The lending rate, the Greek government bond yield, the marginal lending facility rate, and the 10-year U.S. government bond yield are expressed as a percent. All the variables are transformed to the log scale so that the estimated coefficient is the elasticity. The sample ranges from 2001.Q1 to 2013.Q1 and has a total of 49 observations.

The ADF cointegration test on the residuals is applied to determine whether time series variables in equation (4) have a long-term stable relationship. The test statistic is estimated to be -3.4147, which is greater than the critical value of -2.9238 in absolute values at the 5% level. Therefore, these variables in equation (4) are cointegrated.

Table 1 presents estimated parameters, z values and other related statistics. The EGARCH model is applied in empirical work. As shown, 95.91% of the variation in bank loans can be explained by the six right-hand side variables. All the estimated coefficients are significant at the 1% level. The equilibrium bank loan is positively associated with industrial production, the Greek government bond yield and bank deposits and is negatively affected by the marginal lending facility rate, the 10-year U.S. government bond yield, and the EUR/USD exchange rate. If industrial production rises 1%, the equilibrium bank loan will increase by 0.8579%. The elasticity of the equilibrium bank loan with respect to bank deposits is estimated to be 0.8484, which is very close to the elasticity of the equilibrium bank loan with respect to industrial production. A 1% increase in the marginal lending facility rate is expected to reduce the equilibrium bank loan by 0.1159%. The impact of the EUR/USD exchange rate on the equilibrium bank loan is significant as the elasticity of -1.0686 has the largest value in absolute values.

To test another version, real GDP measured as an index with the base year of 2005 is chosen to replace industrial production in Table 1. Its positive coefficient of 0.3224 is significant at the 1% level, and the estimated value of adjusted R-squared of 0.9609 is slightly higher than 0.9591 as shown in Table 1. However, the negative coefficient of the 10-year U.S. government bond yield is insignificant at the 10% level.

5. Summary

This paper has examined the demand for and supply of bank loans and tested the bank lending channel for Greece. A reduced-form equation is estimated by the EGARCH model. A higher industrial production, a higher Greek government bond yield, more bank deposits, a lower marginal lending facility rate, a lower 10-year U.S. government bond yield, and an appreciation of the euro against the U.S. dollar would increase the equilibrium bank loan. There is support for the bank lending channel in Greece partly because the coefficient of the marginal lending facility rate has a negative sign and is significant at the 1% level. Monetary easing through open market purchases of Greek government bonds by the Bank of Greece is expected to increase bank

There are several policy implications. As the Greek economy continues to improve, there would be more bank deposits, which lead to more excess reserves and bank loan supply as well. The recent decision made by the European Central Bank to lower the marginal lending facility rate from 0.75% to 0.4% and the main refinancing operations rate from 0.25% to 0.15% to be effective on June 11, 2014 is expected to increase bank loan supply. The recent trend of the appreciation of the euro from 0.7994 euros per U.S. dollar in 2012.Q3 to 0.7301 euros per U.S. dollar in 2014.Q1 would help increase bank loan supply. The recent declining trend of lending rates is expected to help provide an incentive for borrowers to apply for bank loans but reduce the incentive for banks to increase bank loan supply.

Endnotes

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Table 1. Estimated Reduced-Form Regression of Bank Loans in Greece

	Coefficient (z-Statistic)
Log(industrial production)	0.8579 (6.7486)
Log(Greek government bond yield)	0.3262 (1600.3260)
Log(bank deposits)	0.8484 (30.2658)
Log(marginal lending facility rate)	-0.1159 (-6.0411)
Log(10-year U.S. government bond yield)	-0.1675 (-3.4704)
Log(EUR/USD exchange rate)	-1.0686 (-22.1949)
Intercept	7.1174 (13.5346)
Adjusted R-squared	0.9591
AIC	-2.9854
Schwarz criterion	-2.5993
F-statistic	125.9150
Probability(F-statistic)	0.0000
Estimation method	EGARCH
Sample period	2001.Q1-2013.Q1
Number of observations	49

Notes: The dependent variable is log(bank loans). All the coefficients are significant at the 1% level. The EUR/USD exchange rate is measured as units of the euro per U.S. dollar.