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Economic Activity and Credit Market Linkages: New Evidence From Italy

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We investigate the interactions between the real economy and credit markets in Italy, focusing in particular on how the business cycle influences the risks of the banks' loan portfolio (i.e. the real effect), and in turn how the credit market affects the real economy (i.e. the credit supply effect). We find evidence of both effects, with the former conveyed primarily by the creditworthiness of large firms. Moreover, we disentangle credit supply shocks due to factors inside the banking sector (the bank lending channel) from those outside the banking sector (the borrower's balance-sheet channel), and find that both channels have a negative and significant effect on gdp growth.

(*J.E.L.*: *E32, E44, G28, G01, G21*).

1. Introduction

The Great Financial crisis of 2008 has witnessed an increasing degree of interaction between the real economy and financial markets, in particular with the banking sector (see among others, D'Apice and Ferri, 2010; Claessens *et al.*, 2010; Stiglitz, 2010; Fiordelisi *et al.*, 2014). Over the years, in fact, deregulation led to significant changes on the financial system, allowing financial companies and other intermediaries to expand the aims of their businesses and, at the same time, to explore new profitable opportunities. As a result, the financial sector has rapidly grown in size and in terms of its contribution to overall economic activity. By contrast, such deregulated environments can also be more volatile, contributing to the build-up of financial imbalances, which, in turn, can easily generate macroeconomic instability. Unsurprisingly, the presence of factors that have increased the vulnerability of the macro-economy to financial system stress pushed several governments and central banks to foster the

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The paper's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the Italian Banking Association.

development of measures aimed at re-gaining financial stability for overall macroeconomic performance.

Understanding the transmission channels that exist between the real and financial sectors of the economy is of primary importance when assessing financial stability, especially when the goal of policy makers and regulators is to determine the overall impact of development and policy actions on the state of the economy. In fact, on the one hand, the state of the business cycle affects incomes, profits and, thus, by extension, the balance sheets and the creditworthiness of various economic players. On the other hand, financial conditions of banks and other intermediaries have a clear influence on the overall economy.

The purpose of this paper is precisely to investigate the linkages between the real economy and credit markets in the Italian economy, using macro data. More specifically, we study how the business cycle influences credit markets and in particular the risk of the banks' loan portfolio (i.e. the real effect) and, in turn, how credit shocks affect the real economy (i.e. the credit-supply effect). By estimating a linear vector autoregression model (VAR), we find evidence of both real and credit supply effects in Italy. In particular, with regard to the real effect, we find that the sensitivity of banks-loans' default rate to the business cycle is conveyed primarily by the creditworthiness of large firms, whereas, on the contrary, the sensitivity of the households-based loans' default rate to the business cycle is not statistically significant.

Moreover, to further analyse the main sources of linkages between the real economy and credit markets, we consider two different types of credit supply shocks. More precisely, using data from the Bank Lending Survey provided by the ECB, we distinguish the supply shifts originated by factors inside the banking sector (i.e. the bank lending channel), from those originated by factors outside the banking sector (i.e. the borrower's balance-sheet channel). In this regard, we find that both types of credit linkages generate a significant impact on economic growth, exhibiting a quite similar magnitude. However, when considering credit to firms, credit supply shocks originated by factors inside the banking sector have greater effects on the economic growth than shocks determined by outside factors. On the contrary, when considering credit to households, we find stronger effects in the case of shocks driven by outside factors.

Several papers have investigated the interactions between the macroeconomic system and financial markets, finding that the role of credit markets in driving business cycles varies substantially according to the class of models considered. Specifically, in models with no frictions and complete markets, shocks originating in credit markets play only a minor role in explaining business cycles, whereas, on the contrary, when financial imperfections are present, financial shocks can translate into much larger cyclical fluctuations in the real economy due to the wealth effect operating

through firms and households' balance sheets.[1] To the best of our knowledge, the empirical evidence about the interactions between the macroeconomic system and the banking sector using macro-data in Italy is quite limited. In this regard, a first attempt to fill this gap is Marcucci and Quagliariello (2008). Using a linear VAR-model, they estimate the real and the credit-supply effect in the Italian banking sector from 1985 to 2005, finding clear evidence that supports the presence of the former, but only little evidence in favour of the latter.

Outside Italy, many empirical papers have focused on the bilateral relationship between the dynamics of business cycles and shocks to credit markets, focusing in particular on the real effect. For example, Pesola (2001) highlights that the banking crises in the Nordic countries were remarkably affected by the high level of both corporate and households' indebtedness along with a GDP growth below the forecasts. Similar evidence is provided in cross-country comparisons by Bikker and Hu (2002), Laeven and Majoni (2003) and Valckx (2003). Moreover, Gambera (2000) provides evidence of the link between a small number of macroeconomic variables and non-performing loan ratio in the United States. Similarly, Hoggarth *et al.* (2005) report that both UK banks' total and corporate write-offs are significantly related to the state of the business cycle. Regarding the Spanish economy, instead, Salas and Saurina (2002) show that during economic booms intermediaries tend to expand their lending activity, often relaxing their selection criteria, whereas during downturns bad loans remarkably increase. On the contrary, the empirical evidence documenting the existence of a credit-supply effect using macro data is less abundant. For instance, Bernanke and Lown (1991) acknowledge that credit crunch affects negatively borrowers, however, they do not find any significant evidence in favour of worsening the recessionary conditions. On the contrary, Peek *et al.* (2003) find that several real-macroeconomic variables, in particular the GDP components that are more dependent on banks loans, such as inventories, are influenced by loan supply shocks. Moreover, Bordo and Haubrich (2010), by analyzing cycles in money, credit and output from 1875 and 2007 in the United States, show that financial stress events worsen cyclical downturns.

More recently, a vast literature has investigated the recent sovereign debt crisis in Europe focusing, in particular, on its effects on the supply of credit and the business cycle. For instance, Guerrieri *et al.* (2013) propose an international business cycle model to understand the causes of sovereign default and study its effects on bank credit crunch and the international transmission of business cycles. Moreover, Balduzzi *et al.* (2014), Acharya *et al.* (2015) and Bottero *et al.* (2015) analyse firms' real decisions and find

[1]In other words an increase—respectively decrease—in asset prices improves the agent's net worth thus improving—respectively reducing—her ability to borrow, invest and spend.

significant evidence of the real effects of the sovereign crisis. Regarding the credit supply, Bofondi *et al.* (2013) investigate the impact of the European sovereign crisis on bank lending in Italy, in terms of both quantities and prices. By overcoming the difficulties arising from (i) the identification of purely exogenous sovereign shocks and (ii) disentangling demand from supply effects, they provide significant evidence of credit restrictions after the sovereign crisis. Additional evidence on the nexus between sovereign debt and credit supply are Gennaioli *et al.* (2014a,b). In their model government defaults destroy the balance sheets of domestic banks, thus leading to declines in their private lending; they also test these predictions using data from a large panel of countries.[2]

Over the years several approaches have been proposed by the academic literature to identify credit supply shocks. Some papers, in fact, use instrumental variables (e.g. Paravisini, 2008) or look for natural experiments (Peek and Rosengren, 1997, 2000; Ashcraft, 2005) that generate exogenous (to demand) credit supply shocks. On the contrary, Khwaja and Mian (2008) propose a new empirical methodology for identifying the bank lending channel based on firms' borrowing from multiple banks. Using firm fixed effects in first-differenced data, in fact, they compare the heterogeneity of the same firm's loan growth across different banks and conclude that the estimated difference in loan growth must be attributable to differences in banks' credit supply shocks. Moreover, Gilchrist and Zakrajšek (2012) use a novel credit spread index, constructed from the prices of individual corporate bonds traded in the secondary market, to identify credit supply shocks. These authors employ an empirical credit-spread pricing model to decompose such index into two components, and show that the residual component, that is the excess bond premium, strongly captures the credit supply conditions. Our approach differs from these papers since it is based on survey data provided by the ECB to proxy the overall credit supply conditions of the banking system.

For what concerns the information content of the euro area Bank Lending Survey for aggregate credit and output growth, de Bondt *et al.* (2010) find evidence in favour of the existence of a bank lending, balance sheet and risk-taking channel of the monetary policy. They also suggest that price as well as non-price conditions and terms of credit standards do matter for credit and business cycles. Moreover, Ciccarelli *et al.* (2010) separate credit supply and demand in the euro-area using Bank Lending Surveys provided by the ECB. Their VAR model highlights that: (i) the credit channel is active through the balance-sheets of households, firms and banks; (ii) the credit channel amplifies the impact of a monetary policy shock on GDP and inflation; (iii) for business loans, the impact through the

[2]Additional contribution include, among the others, Ahtik and Albertazzi (2014), De Marco (2014) and Popov and Van Horen (2015).

(supply) bank lending channel is higher than through the demand and balance-sheet channels. For household loans the demand channel is the strongest; (iv) during the crisis, credit supply restrictions to firms in the Euro area and tighter standards for mortgage loans in the US contributed significantly to the reduction in GDP.

Finally, regarding the Italian economy, Angeloni *et al.* (1995) and Gambacorta (2001) are the first to provide some evidence in favour of the credit channel of monetary policy, whereas Gambacorta and Mistrulli (2004) find that well-capitalized banks are better in shielding their credit supply from monetary shocks and that their lending policies are less procyclical. Moreover, using a panel of Italian banks, Quagliariello (2004) finds that loan loss provisions and bad debts increase in bad macroeconomic times, whereas Filosa (2008) provides an application of macro stress testing to the Italian banking system to explore the sensitivity of Italian banks to selected macro shocks, finding that the behaviour of non-performing loans is only weakly procyclical. More recently, Del Giovane *et al.* (2011) give an assessment of the relative importance of loan supply and demand factors during the period of credit contraction in 2008–2009, by combining micro-data on loan prices with information on credit standards from the Italian banks participating to the ECB's Bank Lending Survey. They find that both demand and supply have played a relevant role, especially for lending to firms. Albertazzi and Bottero (2014) exploit disaggregated bank-firm data to investigate the dynamics of foreign versus domestic credit supply in Italy around the period of the Lehman collapse, showing that foreign lenders restricted credit supply more sharply than their domestic counterparts.[3] Finally, Bonaccorsi di Patti and Sette (2012), by employing Italian bank lending data to firms, study the transmission of shocks affecting bank balance sheets to the volume and cost of credit granted to business borrowers and to the probability of banks accepting loan applications from new borrowers during the 2007–2008 financial crisis. Their results indicate that supply conditions worsened most for the banks that were most exposed to the interbank market and for those that made the most use of securitization. While the initial capital position of banks did not significantly affect their lending, the deterioration of bank capitalization as proxied by charge-offs and profitability had a significant impact.

The remainder of the paper is structured as follows. In section 2 we present our model, whereas in section 3 we discuss the empirical evidence, focusing in particular on the real and the credit supply effects. section 4

[3]Albertazzi and Marchetti (2010) analyse the effects of the recent financial crisis on credit supply finding evidence of a contraction of credit supply associated to low bank capitalization and scarce liquidity. They also document that larger less-capitalized banks reallocated loans away from riskier firms, thus contributing to credit pro-cyclicality.

looks in more details at the credit supply effect, whereas the stability of parameters is analysed in section 5. Finally, section 6 offers conclusions and indicates the policy implications.

2. Methodology

In order to investigate the linkages between the real and banking sectors in the Italian economy we employ a VAR methodology. Unlike panel or cross-section models, such approach captures the interactions among real and financial variables, allowing us to perform a stress-test scenario in order to quantify the effect of the shocks.

Specifically, using Italian data from 2002 to 2015 at the quarterly frequency,[4] we estimate the following model:

$$(1) \qquad \mathbf{Y_t} = \mathbf{c} + \boldsymbol{\varphi_1}\mathbf{Y_{t-1}} + \boldsymbol{\varphi_2}\mathbf{Y_{t-2}} + \boldsymbol{\theta_1}\mathbf{X_{t-1}} + \boldsymbol{\theta_2}\mathbf{X_{t-2}} + \boldsymbol{\varepsilon_t},$$

where $\mathbf{Y}$ is the 5-dimensional vector of endogenous variables described below, $\mathbf{X}$ represents the exogenous variable,[5] $\mathbf{c}$ is the 5-dimensional vector of intercepts, $\boldsymbol{\varphi_1}$ and $\boldsymbol{\varphi_2}$ (respectively $\boldsymbol{\theta_1}$ and $\boldsymbol{\theta_2}$) are the 5-by-5 (respectively 5-by-1) matrices representing the coefficients of the lagged endogenous (respectively exogenous) variables, and ε_t is the vector of error terms.[6]

We consider the following vector of endogenous variables $\mathbf{Y_t} =$ **[gdp_growth infl exchange_rate default_rate cred_supply]'**, whereas the exogenous variable $\mathbf{X_t}$ is given by **policy_rate**, that is the policy rate of the European Central Bank (ECB). The latter, in fact, does not react to the specific developments in the domestic economy and thus, in our sample, can be easily considered exogenous. In particular, the variables *gdp_growth, infl, policy_rate* and *exchange_rate* are meant to capture the structure of the macroeconomic system, in line with earlier literature (see, among others, Hoggarth *et al.*, 2005), whereas the variables *default_rate* and *cred_supply* refer to the banking sector.

More precisely, as shown in Tables 1 and 2 and in Figures 1–4, these variables are:

—*gdp_growth* is the quarter over quarter annualized variation of the real domestic product. In our sample *gdp_growth* has a mean equal to −0.2 percent, a maximum of 4.6 percent and a minimum of −14.5 percent.

[4]More precisely, our sample spans the period 2002:Q4–2015:Q4.

[5]The *X* variables are called exogenous (or independent) variables because they appear only in the right-hand-side of the system (1), whereas, on the contrary, the *Y* variables are called endogenous because they are determined inside the system of interest.

[6]We choose two lags based on the Schwarz' Bayesian Information Criterion.

—*infl* is the quarter over quarter annualized variation of consumer price index. Its mean is 0.4 percent and its standard deviation is 0.3 percentage points (hereafter pp).

—*policy_rate* is the policy rate of the ECB. In our sample, *policy_rate* has a mean equal to 1.6 percent, a maximum of 4.3 percent and a minimum of 0.1 percent.

—*exchange_rate* corresponds to the quarter over quarter annualized variation of the real effective exchange rate and proxies the competitiveness of the country. It is important to underline that, even though the nominal exchange rate is exogenous in our sample period, the real rate is not, since it clearly depends on relative price changes, which, instead, may react to internal economic developments. In our sample, its mean is 0 percent and its standard deviation is 4.4 pp.

—*default_rate* is the ratio of banks' new bad debts at time *t* over the bank's performing loans at time *t-1*.[7] This ratio, in fact, measures the bank borrowers' default rate and captures the incidence of the real effect on bank's portfolio risks. In particular, we use the flow of new non-performing loans rather than the stock of non-performing loans to better highlight the effect of the economic cycle. In our sample, *default_rate* has a mean equal to 1.4 percent, a maximum of 1.8 percent and a minimum of 1 percent. Furthermore, to further investigate the transmission channels of the real effect, in the following section we also disentangle the bank loans granted to firms from those granted to households and compute the corresponding default rates.

—*cred_supply* is constructed used the information contained in the data provided by the ECB Bank Lending Survey and proxies the overall credit supply conditions of the banking system. Since January 2003, in fact, the national central banks of the Eurozone, in cooperation with the ECB, have been conducting a survey on the conditions of supply and demand for credit, known as the ECB Bank Lending Survey – BLS.[8] Specifically, we compute the variable *cred_supply* using the answers provided by the Italian banks to questions 1 and 10 of the questionnaire. In such questions, in fact, bank loan officers are asked for their views about the tightening of credit supply of their banks to: (i) firms

[7]We compute this variable in two ways: (i) as the number of new bad debts at *t* over the number of performing loans at *t-1*; (ii) as the value of new bad debts at *t* over the value of performing loans at *t-1*. For both measures, our results do not change.

[8]See the Appendix for further details.

Table 1: Variables and Sources

Variables	Definitions	Sources
Economics activities		
gdp_growth	GDP (quarter over quarter annualized variation)	Istat
Prices		
infl	Consumer Price Index (quarter over quarter annualized variation)	Istat
Interest rates		
policy_rate	Policy rate of the Bank of Italy up to 1999 and of the ECB afterwards.	Bank of Italy—ECB
Exchange rates		
exchange_rate	Real effective exchange rate of the Italian lira up to 1999 and the euro after that (quarter over quarter annualized variation)	IMF
Default (real channel)		
default_rate	Ratio of the number of loans classfied as bad debts in t to the outstanding number of performing loans in t-1 (flows, total economy)	Bank of Italy
default_firms	Ratio of the number of loans classfied as bad debts in t to the outstanding number of performing loans in t-1 (flows, firms)	Bank of Italy
default_large_firms	Ratio of the number of loans classfied as bad debts in t to the outstanding number of performing loans in t-1 (flows, large firms)	Bank of Italy
default_small_firms	Ratio of the number of loans classfied as bad debts in t to the outstanding number of performing loans in t-1 (flows,small firms)	Bank of Italy
default_husehlds	Ratio of the number of loans classfied as bad debts in t to the outstanding number of performing loans in t-1 (flows, households)	Bank of Italy
Credit supply (Broad credit channel)		
cred_supply	Mean of cred_supply_firms and cred_supply_house	ECB
cred_supply_firms	Diffusion index of BLS Lending Standard Index related to firms (1)	ECB
cred_supply_house	Mean of the diffusion index of BLS Lending Standard Index related to the approval of loans to households for house purchase and to the approval of consumer credit and other lending to households (10).	ECB
Credit demand		
cred_dem	Mean of cre_dem_firms and cre_dem_house	ECB
cre_dem_firms	Diffusion index of BLS Demand Conditions Index related to firms (6)	ECB
cre_dem_house	Mean of the diffusion index of BLS Demand Conditions Index related to loans to households for house purchase and to consumer credit and other lending to households (18).	ECB
Credit supply (bank lending channel) inside		
inside	Mean of the diffusion index related to cost of funds and bank balance sheet constraints that affected bank's credit standards as applied to the approval of loans or credit lines to enterprises (2.A), to the approval of loans to households for house purchase	ECB

continued

Table 1: Continued

Variables	Definitions	Sources
	(9.A) and o the ECB approval of consumer credit and other lending to households (11.A). See appendix 1 for further details.	
inside_firms	Mean of the diffusion index related to cost of funds and bank balance sheet constraints that affected bank's credit standards as applied to the approval of loans or credit lines to enterprises (2.A). See appendix 1 for further details.	ECB
inside_households	Mean of the diffusion index related to cost of funds and bank balance sheet constraints that affected bank's credit standards as applied to the approval of loans to households for house purchase (9.A) and to the of consumer credit and other lending to households (11.A). See appendix 1 for further details.	ECB
Credit supply (borrower's balance sheet channer)		
outside	Mean of the diffusion index related to perception of risk in the approval of loans or credit lines to enterprises (2.C); in the approval of loans to households for house purchase (9.C) and in the approval of consumer credit and other lending to households (11.C). See appendix 1 for further details.	ECB
outside_firms	Mean of the diffusion index related to perception of risk in the approval of loans or credit lines to enterprises (2.C). See appendix 1 for further details.	ECB
outside_households	Mean of the diffusion index related to perception of risk in the approval of loans to households for house purchase (9.C) and in the approval of consumer credit and other lending to households (11.C). See appendix 1 for further details.	ECB

Notes: The description of all the variables employed in our empirical analysis together with their sources are provided.

(question 1); and (ii) households for house purchase and consumer credit (question 10). In particular, the five possible answers[9] are first transformed into an ordinal scale ranging from 1, in the case of 'contributed considerably to tightening of credit standards' answer to −1, in the case of 'contributed considerably to easing of credit standards' answer, with steps of 0.5. Then, *cred_supply* is computed as the weighted average of these values with weights equal to the

[9]Each question belonging to the Bank Lending Survey allows for five possible answers, and more precisely: (i) contributed considerably to tightening of credit standards; (ii) contributed somewhat to tightening of credit standards; (iii) contributed to basically unchanged credit standards; (iv) contributed somewhat to easing of credit standards; (v) contributed considerably to easing of credit standards.

Table 2: Summary Statistics

Variables	Mean	Median	Max.	Min.	Std. Dev.	Obs.	Stationaiy
gdp-growth	−0.2	0.5	4.6	−14.5	3.0	53	Yes
infl	0.4	0.4	1.2	−0.2	0.3	53	Yes
policy_rate	1.6	1.3	4.3	0.1	1.3	53	Yes
exchange_rate	0.0	0.0	8.6	−11.5	4.4	53	Yes
default_rate	1.4	1.4	1.8	1.0	0.2	53	Yes
default_firms	2.3	2.3	3.5	1.5	0.7	53	Yes
default_large_firms	2.9	2.9	5.2	1.4	1.3	53	Yes
default_small_firms	2.2	2.2	3.2	1.5	0.5	53	Yes
default_households	1.4	1.4	1.8	1.0	0.2	53	Yes
cred_supply	0.07	0.07	0.47	−0.16	0.13	53	Yes
cred_supply_firms	0.10	0.07	0.50	−0.19	0.15	53	Yes
cred_supply_house	0.02	0.00	0.41	−0.21	0.12	53	Yes
cred_dem	0.02	0.05	0.30	−0.39	0.16	53	Yes
cre_dem_firms	0.01	0.00	0.36	−0.38	0.16	53	Yes
cre_dem_house	0.05	0.09	0.52	−0.45	0.26	53	Yes
inside	0.02	0.00	0.38	−0.08	0.06	53	Yes
inside_firms	0.02	0.00	0.38	−0.08	0.06	53	Yes
inside_households	0.02	0.00	0.39	−0.06	0.07	53	Yes
outside	0.11	0.07	0.44	−0.05	0.11	53	Yes
outside_firms	0.14	0.10	0.55	−0.06	0.14	53	Yes
outside_households	0.05	0.02	0.31	−0.05	0.07	53	Yes

Notes: The summary statistics of the variables used in the paper (see section 2 and Table 1 for further details are provided).

percentage of response to each possible answer (see also Table 1 and Figure 3). Given our conversion scale of the answers, the possible range of this variable goes from −1 to +1.

3. Empirical Evidence

In order to investigate the linkages between the real economy and credit markets in Italy, and more precisely how the economic activity and the banking sector react in response to some external shocks, we use the Cholesky decomposition and compute the orthogonalized impulse response function (OIRF) associated to our VAR model (1).

Figure 5 shows the results of such impulse response function. In the first column we report the effects of a one-standard-deviation shock to the error term of the *gdp_growth* equation. Interestingly, we notice that *gdp_growth* reaches its maximum in the first quarter, and then comes back to the pre-shock value after five quarters. As a result of this shock, and in line with our expectations, the default rate drops significantly, reaching its trough (−0.034 pp) after three quarters and slowly reverting back to zero. Finally, the elasticity between the gdp growth and the default rate, evaluated in correspondence of their maximum points, is about 1 percent. This result confirms the presence of the real effect in the Italian economy, namely the

Figure 1: Dynamics of Macroeconomic Variables

Notes: In the figures, we show the dynamics of the variables capturing the structure of the macroeconomic system, that is *gdp_growth, infl, policy_rate* and *exchange_rate,* over the period 2002:Q4–2015:Q4. See Table 1 for definitions and sources and Table 2 for their summary statistics.

significant influence of the business cycle on the banks' loan portfolio risks. Moreover, the low level of elasticity is in line with the observed loan risk dynamics in Italy during the 2008–2009 period, when a cumulative loss of 6.5 pp in the gdp pushed the default rate from 1.1 to 1.6 (+0.5 pp). These results confirm the resilience of the Italian banking system (Caprio *et al.*, 2014).

We can now investigate the existence of a credit-supply effect. In this regard, the last column of Figure 5 reports the effects of a one-standard-deviation shock to the error term of the *cred_supply* equation, which, as explained in section 2, proxies the overall credit supply conditions of the banking system. We notice that the impact upon *gdp_growth* is immediately significant, reaching the highest departure from its pre-shock value, that is −1.2 pp, in the second quarter, and lasts about three quarters. This is a clear evidence of credit supply effects in the Italian economy, in which a reduction of credit supply has a negative impact on the business cycle.

3.1. Firm-Based Default Rate

In this section, we use our VAR model to investigate the sensitivity of different borrowers' types to the business cycle. We start by focusing on the production side of the economy. More specifically, here we compute the

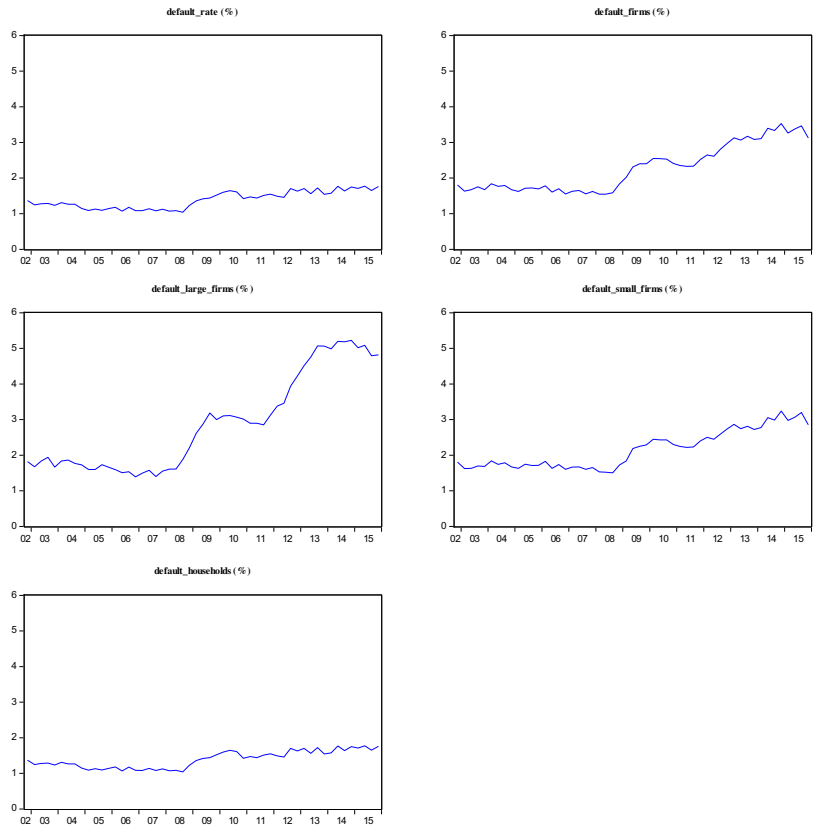

Figure 2: Dynamics of Default-Rate Variables

Notes: In the figures, we report the dynamics of the default-rate variables employed in the paper, that is *default_rate, default_firms, default_large_firms, default_small_firms*, and *default_households,* over the period 2002:Q4–2015:Q4. See Table 1 for definitions and sources and Table 2 for their summary statistics.

default rate not taking into account the whole economy's bank loans, as done in the previous section, but only considering the set of bank loans granted to firms. The corresponding variable is *default_firms*, and in our sample it has a mean equal to 2.3 percent, a maximum of 3.5 percent and a minimum of 1.5 percent (see Table 2). Similarly, to be consistent with the loans granted to firms, we use the variable *cred_supply_firms* instead of *cred_supply* since the former better proxies the overall credit supply conditions to firms, whereas the other variables of the system of equations (1) do not change.[10]

[10]See the Appendix for more information about the construction and the content of the BLS variables.

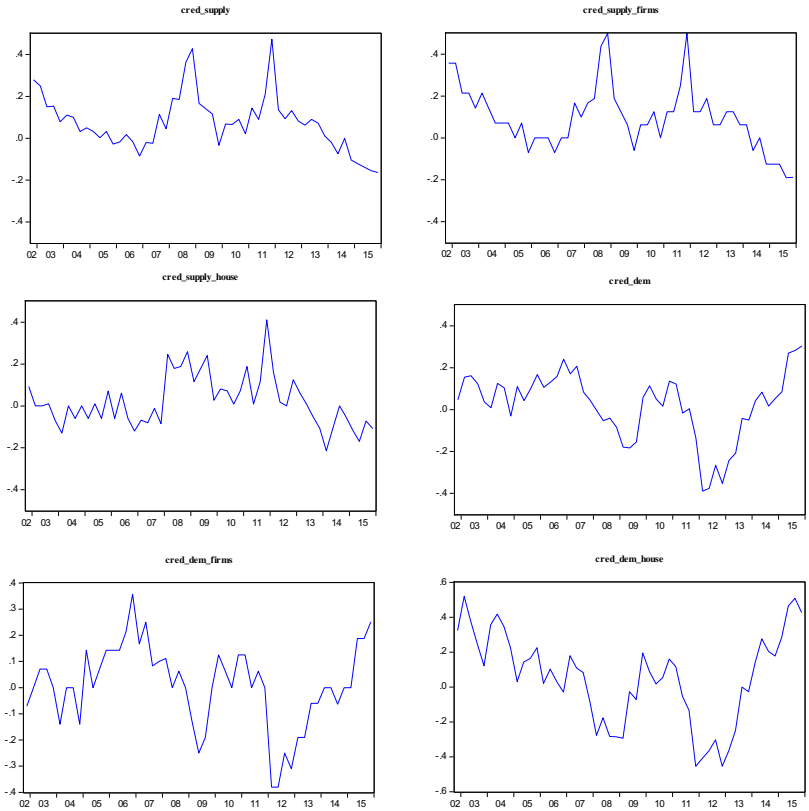

Figure 3: Bank Lending Survey Variables Dynamics

Notes: The figures show the dynamics of the BLS variables proxying the credit supply conditions, that is *cred_supply, cred_supply_firms*, and *cred_supply_house*, and the demand of credit, that is *cred_dem, cred_dem_firms,* and *cred_dem_house,* over the period 2002:Q4–2015: Q4. See Table 1 for definitions and sources and Table 2 for their summary statistics.

Figure 6 shows the orthogonalized impulse response function corresponding to a shock to the error term of *gdp growth* equation. In line with our expectations, the firm-based default rate drops significantly: again, the real effect is particularly pronounced, being significant from the third to the seventh quarter after the shock, and reaches its minimum (−0.8 pp) after five quarters, whereas the elasticity between the gdp growth and the default rate, evaluated in correspondence of their maximum points, is about 2.1 percent.

Next, we divide all the bank loans granted to firms in two subsamples based on whether the amount lent is higher or lower than €500,000; then, for each sub-group, we compute the corresponding default rate. In this way, the variable *default_large_firms* proxies the default rate of large corporations (i.e. loans higher than €500,000); whereas

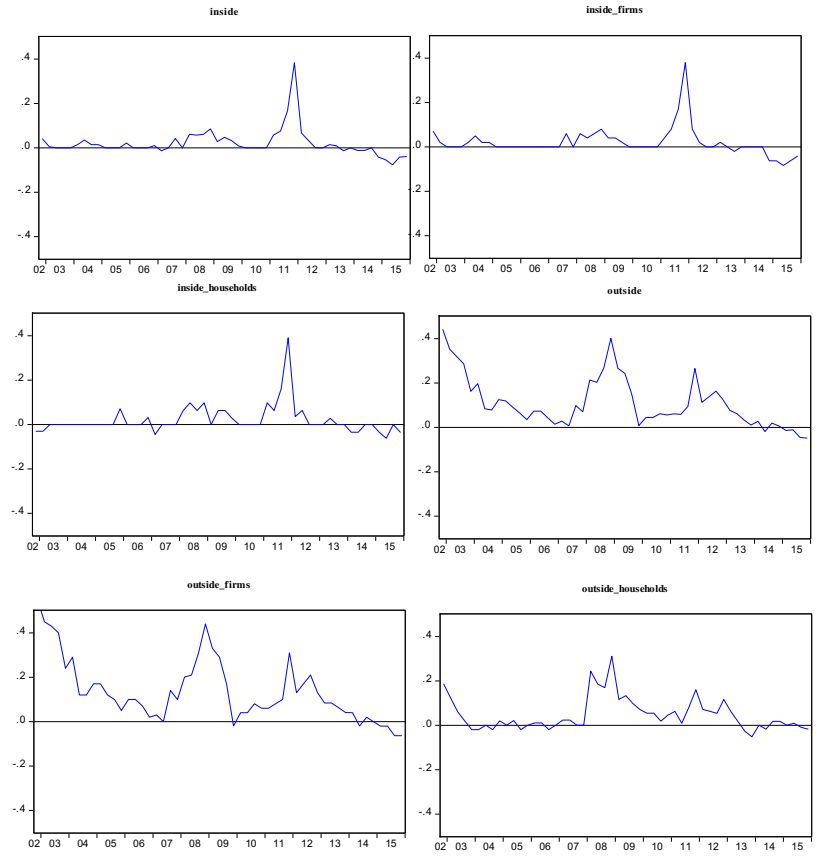

Figure 4: Inside and Outside factors

Notes: The figures plot the dynamics of the BLS variables proxying the supply curve shifts originated by factors inside the banking sector, that is *inside*, *inside_firms*, and *inside_households*, and outside the banking sector, that is *outside*, *outside_firms*, and *outside_households*, over the period 2002:Q4–2015:Q4. See Table 1 for definitions and sources and Table 2 for their summary statistics.

default_small_firms proxies the default rate of small corporations (i.e. loans lower than €500,000). It is noteworthy that the default rate of large firms is not only higher on average (2.9% vs. 2.2%) but also more volatile than the default rate of small firms. In fact, the standard deviation of *default_large_firms* is equal to 1.3 pp whereas the standard deviation of *default_small_firms* is equal to 0.5 pp (see Table 2).

Figure 7 shows the orthogonalized impulse response function associated to the setting in which the default rate is computed taking into account only firms' loans higher than €500,000. The incidence of the real channel is particularly strong and persistent: the effect of the gdp

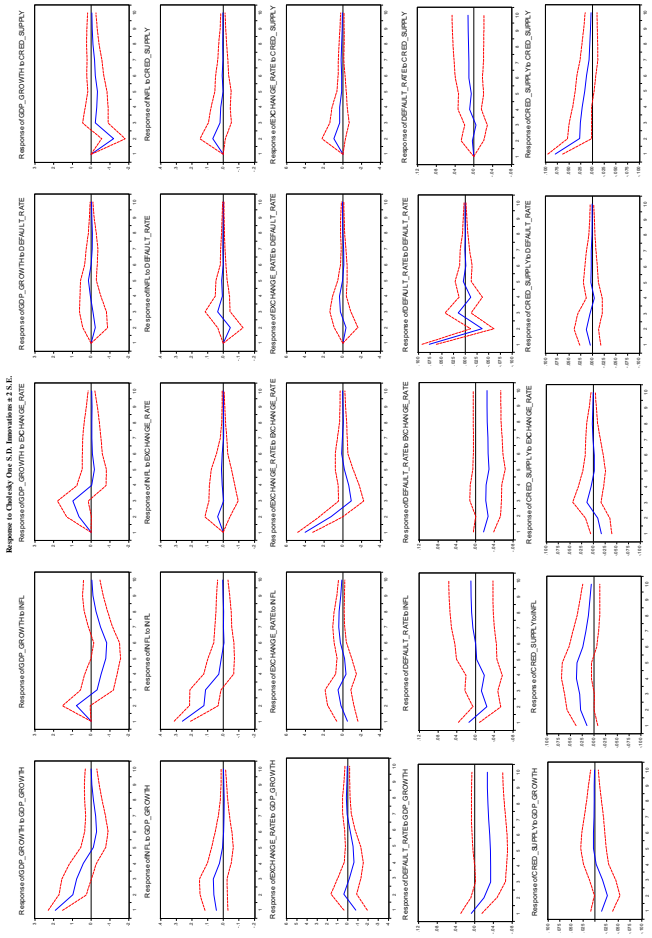

Figure 5: Impulse Response Function – VAR Model (1)

Notes: The figures show the Impulse Response Function associated to the VAR model (1). Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes five endogenous variables, i.e. *gdp_growth*, *infl*, *exchange_rate*, *default_rate*, *cred_supply*, and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 1 in section 2 for more information and Table 1 for a detailed definition of the variables.

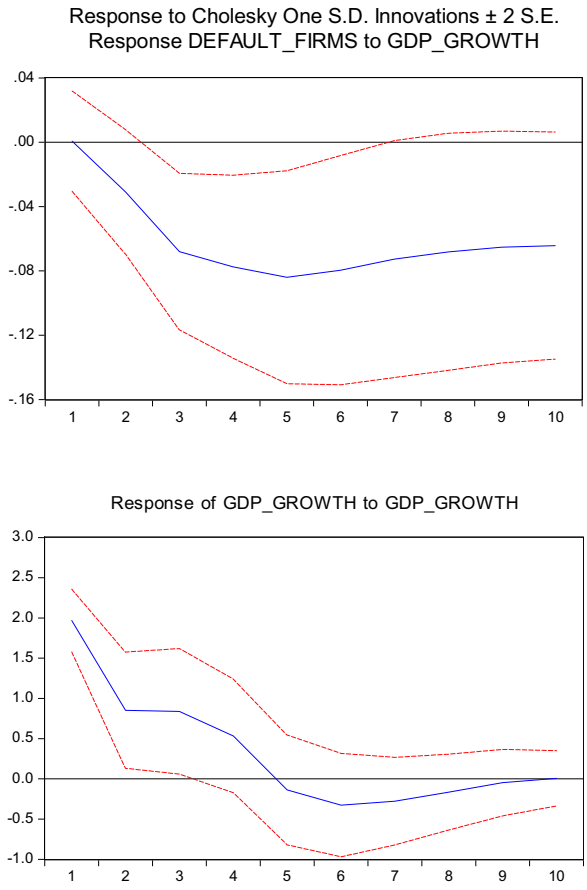

Figure 6: Impulse Response Function – Firm-Based Default Rate (*default_firms*)

Notes: The figures show the Impulse Response Function associated to the VAR model in which only the set of bank loans granted to firms are taken into account. Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes five endogenous variables, i.e. *gdp_growth, infl, exchange_rate, default_firms, cred_supply_firms,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 1 in section 2 for more information and Table 1 for a detailed definition of the variables.

growth shock on the large-firm's default rate is significant from the second to the eighth quarter and reaches its strongest effect (−0.19 pp) after six quarters. Here, the elasticity between the gdp growth and the default rate, evaluated in correspondence of their maximum points, is about 4.8 percent.

Figure 8, instead, exhibits the impulse response function associated to the setting where only firms' loans lower than €500,000 are used to compute the default rate. In this case, the impact of a exogenous shock to *gdp_growth* on such small-firms' default rate is significant from the fourth

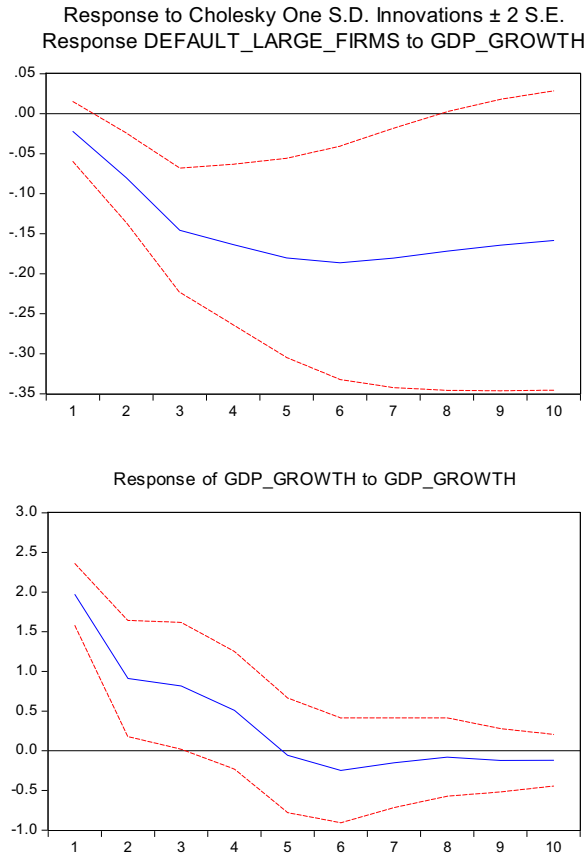

Figure 7: Impulse Response Function – Large Firm-Based Default Rate (*default_large_firms*)

Notes: The figures show the Impulse Response Function associated to the VAR model in which only the bank loans granted to large firms are taken into account. Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes five endogenous variables, i.e. *gdp_growth, infl, exchange_rate, default_large_firms, cred_supply_firms,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 1 in section 2 for more information and Table 1 for a detailed definition of the variables.

to the fifth quarter after the shock and reaches its minimum (−0.06) after five quarters, whereas the elasticity between the gdp growth and the default rate, evaluated in correspondence of their maximum points, is about 1.6 percent.

3.2. *Household-Based Default Rate*

In this section, we investigate the interactions between the macroeconomic system and that part of the banking sector which involves

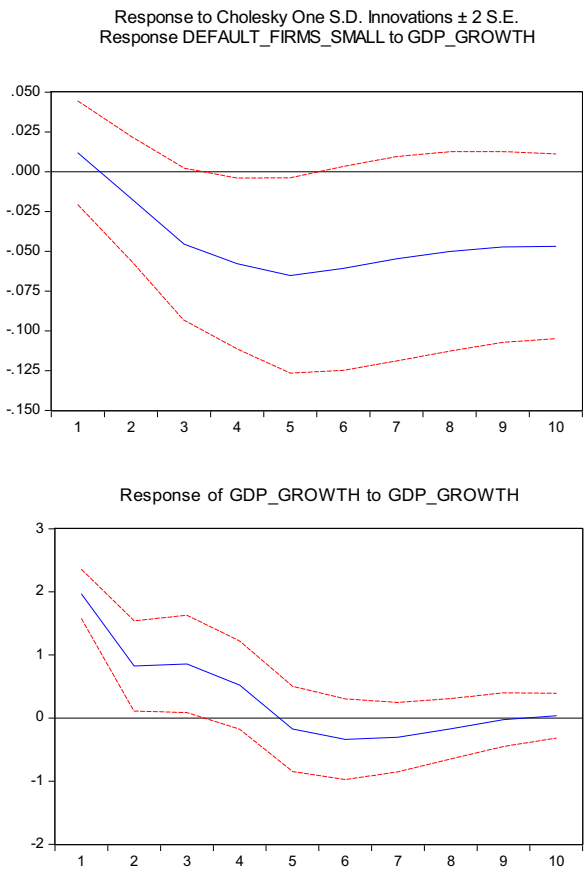

Figure 8: Impulse Response Function – Small Firm-Based Default Rate (*default_small_firms*)

Notes: The figures show the Impulse Response Function associated to the VAR model in which only the bank loans granted to small firms are taken into account. Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes five endogenous variables, i.e. *gdp_growth, infl, exchange_rate, default_small_firms, cred_supply_firms,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 1 in section 2 for more information and Table 1 for a detailed definition of the variables.

households. Specifically, here we compute the default rate taking into account only the bank's loans granted to households. The resulting variable, that is *default_households*, has a mean equal to 1.4 percent, a maximum of 1.8 percent and a minimum of 1 percent (see Table 2). Similarly, to be consistent with the loans granted to households, we use the variable *cred_supply_house* instead of *cred_supply* since the former better proxies the overall credit supply conditions to households. Figure 9 shows that, in this setting, the incidence of the real effect is not statistically significant. In

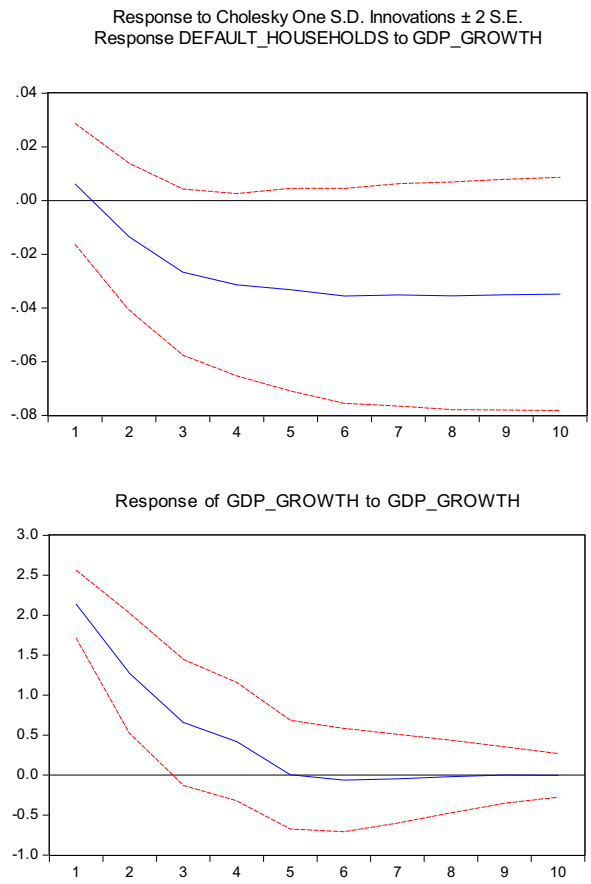

Figure 9: Impulse Response Function – Household-Based Default Rate (*default_households*)

Notes: The figures show the Impulse Response Function associated to the VAR model in which only the bank loans granted to households are taken into account. Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes five endogenous variables, i.e. *gdp_growth, infl, exchange_rate, default_households, cred_supply_house,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 1 in section 2 for more information and Table 1 for a detailed definition of the variables.

fact, by computing the orthogonalized impulse response function, we find that the impact of a shock to the gdp growth does not produce significant effects on the household-based default rate.

Overall, our results indicate that the sensitivity of the default rate to the business cycle is conveyed primarily by the creditworthiness of the firms, whereas, on the contrary, the sensitivity of the households-based default rate to the business cycle is not statistically significant. Furthermore, we

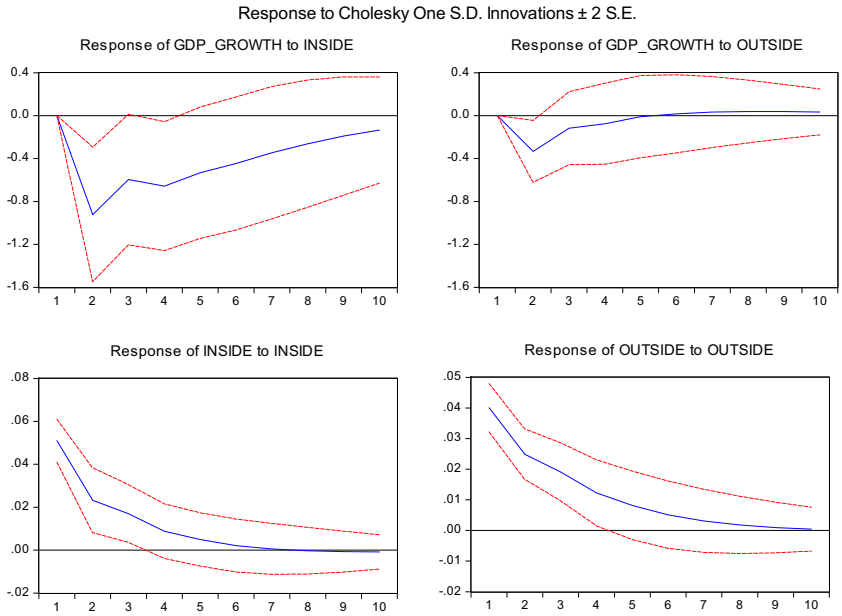

Figure 10: Impulse Response Function −VAR Model (2)

Notes: The figures show the Impulse Response Function associated to the VAR model (2). Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes six endogenous variables, i.e. *gdp_growth, infl, exchange_rate, cred_dem, inside* and *outside,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 2 in section 4 for more information and Table 1 for a detailed definition of the variables.

find that the size of the loan matters: large firms, in fact, exhibit the highest sensitivity to the business cycle.

4. Inside the Credit Channel

The previous section has highlighted the importance of the business cycle on banks' loan portfolio risks, particularly in the case of loans granted to firms. At the same time, however, we have considered the credit supply as a unique mechanism of influence, without any distinction between the sources of credit supply shocks. In this section, instead, we are interested in opening the black box and understanding better the main sources of linkages between credit markets and the real economy, focusing precisely on the credit supply effect. To this end, we consider two different cases of credit supply linkages: the bank lending channel and the borrowers' balance-sheet channel. The first sub-channel is related to supply curve shifts

originated by factors inside the banking sector such as, for example, liquidity and capital problems, difficulties to access the wholesale funding markets and so forth. As the quality of potential borrowers is held constant, these shifts are called 'pure' supply shocks (or 'credit crunch'). On the contrary, the second sub-channel is related to supply curve shifts originated by factors outside the banking sector such as, for example, higher borrowers default probability due to lower economic growth or negative industry specific outlook. In this case, the shifts of supply curve are due to the change in the quality of potential borrowers and their effects on the real economy get through the borrower's net worth, cash flow and liquidity.

To this purpose, the variable *cred_supply* used in section 2 is not appropriate anymore, since it does not allow to disentangle the shifts of credit supply attributable solely to the behaviour of banks (i.e. the inside factors) from those due to the evolution of the real economy on the borrowers' balance sheets (i.e. the outside factors). Therefore, in this section we use more detailed data from the Bank Lending Survey and compute two variables, that is *inside* and *outside*, that capture the factors inside and outside the banking system and proxy respectively the bank lending channel and the borrowers' balance sheet channel.

More precisely, *inside* is constructed using the answers provided by the Italian banks to questions 2A, 11A and 14A of the questionnaire, whereas *outside* using the answers to questions 2C, 11C and 14C. In such questions, in fact, bank loan officers are asked for their views about the tightening of credit supply of their banks and the influence of various factors affecting the supply of credit to: (i) firms (question 2); (ii) households for house purchase (question 11); and (iii) households for consumer credit (question 14). As already explained in the case of the variable *cred_supply*, the five possible answers to these sets of questions are transformed into an ordinal scale ranging from 1, in the case of 'contributed considerably to tightening of credit standards' answer to -1, in the case of 'contributed considerably to easing of credit standards' answer, with steps of 0.5. Then, each variable is computed as the weighted average of these values with weights equal to the percentage of response to each possible answer.[11] Given our conversion scale of the answers, the possible range of each variable goes from -1 to $+1$.

4.1. Empirical Evidence

In order to understand the sources of linkages between credit markets and the real economy, we consider the following VAR model in which we

[11]See Table 1 and Figure 4 for more information about the variables *inside* and *outside,* and the Appendix for detailed information about the questionnaire for loans or credit lines to enterprises and households characterizing the ECB Bank Lending Survey.

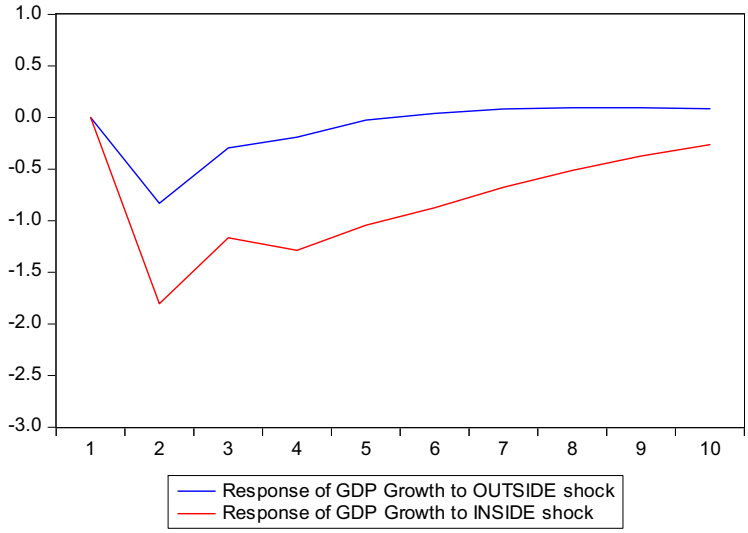

Figure 11: Response of GDP growth to 0.1 tightening in *outside* and *inside* variables

Notes: The figure below shows the response of *gdp_growth* to a 0.1 increase in the diffusion indices of *outside* and *inside*. The specification of the VAR model (2) includes six endogenous variables, i.e. *gdp_growth, infl, exchange_rate, cred_dem, inside* and *outside,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 2 in section 4 for more information and Table 1 for a detailed definition of the variables.

disentangle the bank lending channel from the borrowers' balance-sheet channel:

$$(2) \qquad \widehat{\mathbf{Y}}_t = \mathbf{c} + \boldsymbol{\varphi}_1 \widehat{\mathbf{Y}}_{t-1} + \boldsymbol{\varphi}_2 \widehat{\mathbf{Y}}_{t-2} + \boldsymbol{\theta}_1 \mathbf{X}_{t-1} + \boldsymbol{\theta}_2 \mathbf{X}_{t-2} + \boldsymbol{\varepsilon}_t,$$

where $\widehat{\mathbf{Y}}_t = $ **[gdp_growth infl exchange_rate cred_dem inside outside]'** is the vector of endogenous variables, and $\mathbf{X}_t = $ **[policy_rate]'** is the exogenous variable. In particular, the BLS variable *cred_dem* is computed using the answers provided by the Italian banks to questions 6 and 18 of the questionnaire and proxies the credit demand. Finally, it is worthwhile underlining that, in equation (2), we do not include the variable capturing the default rate, since in this section we are interested in investigating the nature and the transmission channels of credit supply shocks.

Figure 10 reports the results of the orthogonalized impulse response function associated to our VAR model (2). Also in this framework, the incidence of the credit supply effect is relevant: in fact, both types of supply shocks, proxied respectively by the *inside* and *outside* banking system's factors, have a negative and significant effect on *gdp_growth*. In particular,

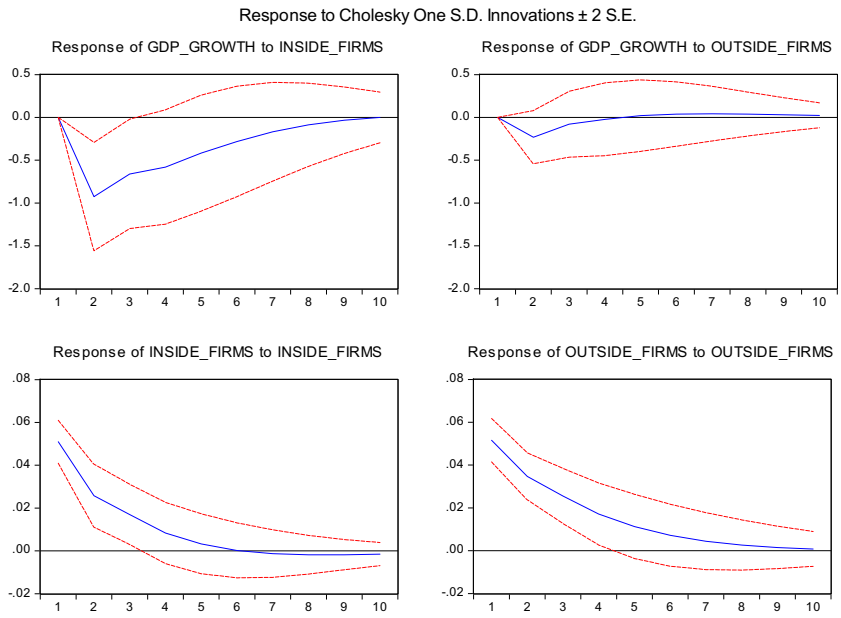

Figure 12: Impulse Response Function – Firm-Based Supply Shocks

Notes: The figures show the Impulse Response Function associated to the VAR model (2) in which only the bank loans granted to firms are taken into account. Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes six endogenous variables, i.e. *gdp_growth, infl, exchange_rate, cred_dem_firms, inside_firms* and *outside_firms,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 2 in section 4 for more information and Table 1 for a detailed definition of the variables.

from a financial stability angle, supply shocks due to outside factors are similar to banking system pro-cyclical episodes,[12] whereas supply shocks due to inside factors are similar to credit crunch episodes.[13] To compare the relative impact of the two types of shocks, Figure 11 shows that a tightening of *outside* by 0.1 causes a fall in the gdp growth that reaches a minimum of −0.8 pp after two quarters. On the contrary, an equivalent tightening of *inside* determines a fall in the gdp growth that reaches a minimum of −1.8 pp after two quarters.

In other words, leftward shifts of the credit supply curve due to both factors, that is inside the banking system such as capitalization or liquidity

[12]In which, for example, lower economic growth increases the default probability of borrowers. In turn, this reduces the supply of credit which leads to even lower economic growth.

[13]In which, for example, bank funding problems lead to a direct reduction of credit supply, thus affecting the economic growth.

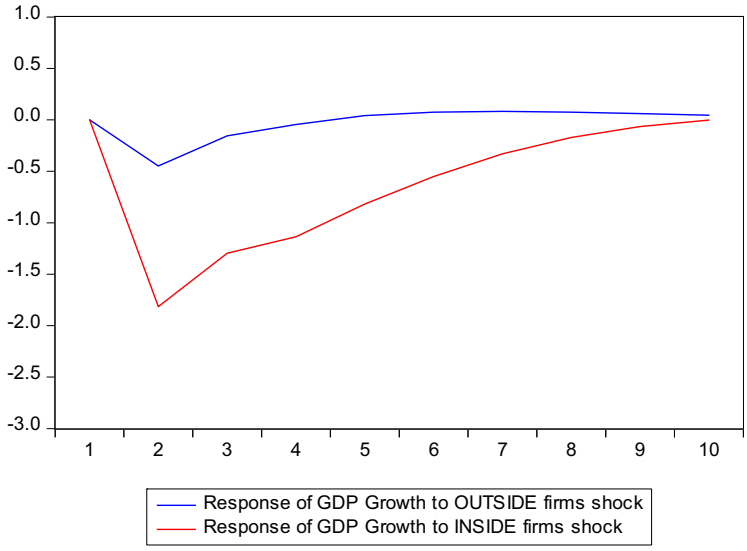

Figure 13: Response of *gdp_growth* to 0.1 tightening in *outside_firms* and *inside_firms*

Notes: The figure shows the response of *gdp_growth* to a 0.1 increase in the diffusion indices of *outside_firms* and *inside_firms*. The specification of the VAR model includes six endogenous variables, i.e. *gdp_growth, infl, exchange_rate, cred_dem_firms, inside_firms* and *outside_firms,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 2 in section 4 for more information and Table 1 for a detailed definition of the variables.

problems, and outside the banking system such as an increase of the bank's costumers default probability, have negative effects on economic growth.

4.2. Firm-Based Supply Shocks

Consistently with the analysis performed in the previous section, and taking into account the two sources of credit supply described above, here we concentrate our attention on how the business cycle is influenced by sector-specific credit supply shocks. Again, we start by focusing on the production side of the economy. To this end, by restricting the factors proxying both types of credit supply shocks only to bank loans provided to the firms, that is using respectively answers to questions 2.A and 2.C, we compute the two diffusion indices *outside_firms* and *inside_firms.* Next, employing such variables in the VAR model (2) in place of *inside* and *outside*, we can compute the resulting orthogonalized impulse response function. Similarly, to be consistent with the loans or credit lines granted to firms, we also use the variable *cred_dem_firms* instead of *cred_dem* since the former better proxies the overall credit demand of firms.

Figure 12 shows that a contraction of the credit supplied to firms due to inside factors of the banking system has negative and significant effects on *gdp_growth*. On the contrary, credit supply shocks due to outside factors do not produce significant effects on economic growth. Moreover, to compare the relative impact of the two types of shocks (even though shocks to *outside firms* are not significant), Figure 13 shows that a tightening of *outside_firms* by 0.1 causes a fall in the gdp growth that reaches a minimum of −0.5 pp after two quarters. On the contrary, and more importantly, an equivalent tightening of *inside_firms* determines a fall in the gdp growth that reaches a minimum of −1.8 pp after two quarters.

4.3. Households Supply Shocks

In this section, we investigate the relationship between households credit market and economic activity. To this end, we compute the two diffusion indices *outside_households* and *inside_households* by restricting the factors proxying the two types of supply shocks only to bank loans provided to households, that is using respectively answers to questions

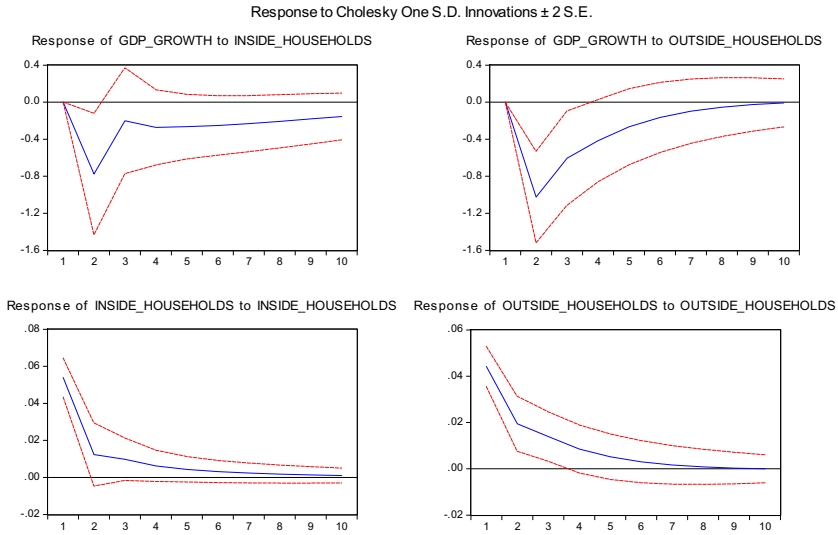

Figure 14: Impulse Response Function − Household-Based Supply Shocks

Notes: The figures show the Impulse Response Function associated to the VAR model (2) in which only the bank loans granted to households are taken into account. Specifically, they plot the response to Cholesky one S.D. Innovations (±2 standard errors) in the variables. The specification of the VAR model includes six endogenous variables, i.e. *gdp_growth, infl, exchange_rate, cred_dem_house, inside_house* and *outside_house,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 2 in section 4 for more information and Table 1 for a detailed definition of the variables.

11.A-14.A and 11.C-14.C. Similarly, we replace the variable *cred_dem* with *cred_dem_house* since the latter better proxies the overall credit demand of households.

Figure 14 shows that a contraction of the credit granted to households, due to both inside and outside factors of the banking system, has negative and significant effects on *gdp_growth*. In addition, to compare the relative impact of these two types of shocks, Figure 15 shows that a tightening of *outside_households* by 0.1 causes a fall in the gdp growth that reaches a minimum of −2.4 pp after two quarters. On the contrary, an equivalent tightening of *inside_households* determines a fall in the gdp growth that reaches a minimum of −1.5 pp after two quarters.

Overall, our results highlight two important aspects in terms of financial stability. First, credit shocks due to factors inside the banking system have a higher impact on credit provided to firms than outside factors, since the latter are not even significant; situations typically defined as credit crunch episodes. On the contrary, credit shocks due to factors outside the banking system have a higher impact on credit provided to households.

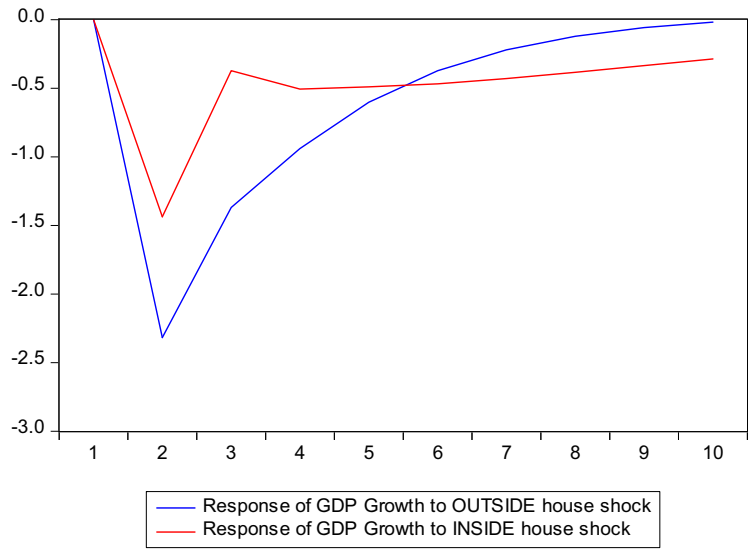

Figure 15: Response of *gdp_growth* to 0.1 tightening in *outside_household* and *inside_household*

Notes: The figure shows the response of *gdp_growth* to a 0.1 increase in the diffusion indices of *outside_house* and *inside_house*. The specification of the VAR model includes six endogenous variables, i.e. *gdp_growth, infl, exchange_rate, cred_dem_house, inside_house* and *outside_house,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 2 in section 4 for more information and Table 1 for a detailed definition of the variables.

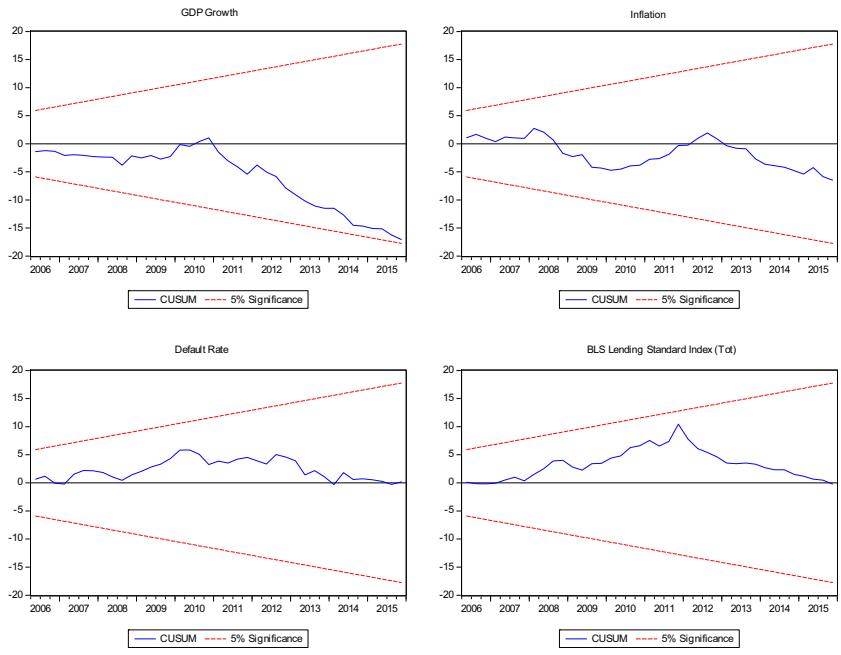

Figure 16: CUSUM Test on VAR Model (1)

Notes: The figures plot the CUSUM test based on the cumulative sum of the recursive residuals together with the 5% significance lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines. The specification of the VAR model includes five endogenous variables, i.e. *gdp_growth, infl, exchange_rate, default_rate, cred_supply,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 1 in section 2 for more information and Table 1 for a detailed definition of the variables.

5. Stability of Parameters

In this section, we focus on the stability of parameters of our models. In fact, since the data sample covers the recent financial crisis, the estimated parameters may not be constant over time. To address this issue, we use the CUSUM test[14] on recursive residuals. Figure 16 shows the corresponding results for the VAR model (1). We notice that none of the equations presents evidence of a significant parameters' instability. More importantly, starting from the end of 2010, the gdp growth equation starts exhibiting a tendency towards instability, which implies a possible overestimation of economic growth. However, this tendency is never significant in our sample period.

[14]The CUSUM test (Brown, Durbin, and Evans, 1975) is based on the cumulative sum of the recursive residuals. Such test detects the parameters' instability if the cumulative sum goes outside the area defined by the two confidence-interval lines.

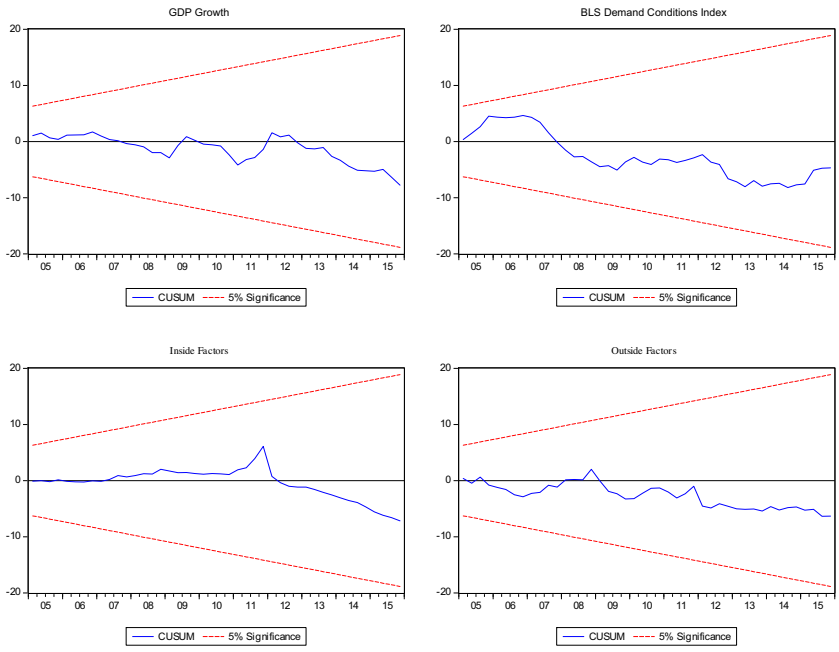

Figure 17: CUSUM Test on VAR Model (2)

Notes: The figures plot the CUSUM test based on the cumulative sum of the recursive residuals together with the 5% significance lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines. The specification of the VAR model includes six endogenous variables, i.e. *gdp_growth, infl, exchange_rate, cred_dem, inside* and *outside,* and one exogenous, i.e. *policy_rate*, over the period 2002:Q4–2015:Q4. See Model 2 in section 4 for more information and Table 1 for a detailed definition of the variables.

On the contrary, the specification of the default rate and credit supply conditions equations seem quite stable over time.

Finally, we also compute the CUSUM test to VAR model (2). Again, as shown in Figure 17, none of the equations exhibits a significant instability of the parameters, that is the specifications of the variables gdp growth and the two proxies of credit supply linkages (i.e. *inside* and *outside*) appear quite stable over time.

6. Conclusions and Policy Implications

The aim of this research is twofold. First, we investigate the interactions between the real economy and credit markets in Italy, and, in particular, how the business cycle influences the risks of the banks' loan portfolio (i.e. the real effect), and, in turn, how the credit market affects the

real economy (i.e. the credit supply effect). In this regard, we find that a gdp shock has a significant effect on the borrowers' default rate. This result confirms the presence of the real effect in Italy, namely the significant influence of the business cycle on the banks' loan portfolio risks. At the same time, we also find a clear evidence of the credit supply effect, in which a reduction of credit supply has a negative impact on the business cycle. From a policy perspective, these results highlight, on the one hand, the necessity to restore an adequate level of economic growth to preserve the stability of the banking system and, on the other hand, the importance of an healthy banking system to sustain such growth. Moreover, we also disentangle the bank loans granted to firms from those granted to households and find that the credit risk of households is not influenced by the business cycle. On the contrary, the credit risk of firms is sensible to the business cycle, but small-sized enterprises seem less exposed than large firms. This result supports the adoption of a financial regulation that allows for lower capital requirements in the case of loans granted to small enterprises (i.e. the so-called SMEs Supporting Factor considered by the new CRD4/CRR).

The second objective of this research is to disentangle credit supply shocks originated by factors inside the banking system (i.e. the bank lending channel) from those originated by outside factors (i.e. the borrower's balance-sheet channel). On this issue, we find that both types of supply shocks have a negative and significant effect on gdp growth. In the sectorial analysis, however, we find that, in the case of loans granted to firms, a contraction of the credit supplied due to outside factors does not produce significant effects on economic growth; on the contrary, credit supply shocks due to inside factors (i.e. credit crunch) have a negative and significant effects on gdp growth. These results highlight that, on the one hand, effective supervisory actions aimed at preventing adverse movement in the variables that affect the endogenous factors of credit supply (e.g. capital, liquidity and access to markets) are necessary to reduce the probability of credit crunch situations; on the other hand, it should be avoided that the regulation itself creates artificial situations of imbalance, such as the so-called 'capital exercise' conducted by the EBA in 2011 (Draghi, 2012).

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Appendix

In this Appendix, we provide useful information about the content of the variables *cred_supply, cred_supply_firms, cred_supply_house, cred_dem, cred_dem_firms, cred_dem_house, inside_firms, inside_house, outside_firms* and *outside_house* employed in our analysis. Recall, in fact, that such variables have been constructed using the data provided by the ECB Bank Lending Survey (BLS). Below, we report the corresponding BLS questions.[15]

[15]See Berg *et al.* (2005) for further details about the bank lending survey for the Euro area.

Bank lending survey (BLS) for the euro area: The questionnaire

Please rate the contribution of the factors to the tightening or easing of credit standards using the following scale:

– – = contributed considerably to tightening of credit standards
– = contributed somewhat to tightening of credit standards
○ = contributed to keeping basically unchanged credit standards
+ = contributed somewhat to easing of credit standards
+ + = contributed considerably to easing of credit standards
NA = not applicable.

Question 1: Over the past three months, how have your bank's credit standards as applied to the approval of loans or credit lines to enterprises changed?

(We used the answers to this question to compute *cred_supply* and *cred_supply_firms)*

Question 2: Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans or credit lines to enterprises?

A) Cost of funds and balance sheet constraints

a1 – Costs related to your bank's capital position
a2 – Your bank's ability to access market financing (e.g. money or bond market financing, incl. true-sale securitisation)
a3 – Your bank's liquidity position

(We used the answers to this question to compute *inside_firms)*

C) Perception of risk

c1 – Expectations regarding general economic activity
c2 – Industry or firm-specific outlook
c3 – Risk on the collateral demanded

(We used the answers to this question to compute *outside_firms)*

Question 6: Over the past three months (apart from normal seasonal fluctuations) how has the demand for loans or credit lines to enterprises

changed at your bank? Please refer to the financing need of enterprises independent of whether this need will result in a loan or not (We used the answers to this question to compute *cred_dem* and *cred_dem_firms)*

Question 10: Over the past three months, how have your bank's credit standards as applied to the approval of loans to households (for house purchase and consumer credit) changed?

(We used the answers to this question to compute *cred_supply* and *cred_supply_house)*

Question 11: Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans to households for house purchase?

A) Cost of funds and balance sheet constraints

(We used the answers to this question to compute *inside_house)*

C) Perception of risk

c1 – Expectations regarding general economic activity
c2 – Housing market prospects

(We used the answers to this question to compute *outside_house)*

Question 14: Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of consumer credit and other lending to households?

A) Cost of funds and balance sheet constraints

(We used the answers to this question to compute *inside_house)*

C) Perception of risk

c1 – Expectations regarding general economic activity
c2 – Creditworthiness of consumers
c.3 – Risk on the collateral demanded

(We used the answers to this question to compute *outside_house)*

Question 18: Over the past three months (apart from normal seasonal fluctuations) how has the demand for loans to households (for house purchase and consumer credit) changed at your bank? Please refer to the financing need of enterprises independent of whether this need will result in a loan or not

(We used the answers to this question to compute *cred_dem* and *cred_dem_house)*

Non-technical Summary

We investigate the interactions between the real economy and credit markets in Italy, focusing in particular on how the business cycle influences the risks of the banks' loan portfolio (i.e. the real effect), and in turn how the credit market affects the real economy (i.e. the credit supply effect). We find evidence of both effects, with the former conveyed primarily by the creditworthiness of large firms. Moreover, we disentangle credit supply shocks due to factors inside the banking sector (the bank lending channel) from those outside the banking sector (the borrower's balance-sheet channel), and find that both channels have a negative and significant effect on gdp growth.