BANCA D'ITALIA
EUROSISTEMA

Temi di discussione

(Working Papers)

Bank credit, liquidity and firm-level investment: are recessions different?

by Ines Buono and Sara Formai

October 2019

Number 1239

BANCA D'ITALIA
EUROSISTEMA

Temi di discussione

(Working Papers)

Bank credit, liquidity and firm-level investment: are recessions different?

by Ines Buono and Sara Formai

Number 1239 - October 2019

The papers published in the Temi di discussione *series describe preliminary results and are made available to the public to encourage discussion and elicit comments.*

The views expressed in the articles are those of the authors and do not involve the responsibility of the Bank.

ISSN 1594-7939 (print)
ISSN 2281-3950 (online)

Printed by the Printing and Publishing Division of the Bank of Italy

BANK CREDIT, LIQUIDITY AND FIRM-LEVEL INVESTMENT: ARE RECESSIONS DIFFERENT?

by Ines Buono[1] and Sara Formai[2]

Abstract

How do bank credit supply shocks affect firms' investment decisions? We use time-varying data on Italian firms and banks to disentangle shocks to the credit supply using bank mergers and acquisitions as an instrumental variable. We find that credit constraints can hamper the ability of firms to invest. Moreover, while firms normally tend to use liquidity as a substitute for bank credit, they do not do so during recessions, a fact that amplifies the cutback on productive investment following a bank credit supply shock.

JEL Classification: G01, G31, G32.
Keywords: corporate investments, financing constraints, Mergers and Acquisitions.

Contents

1. Introduction 5
2. The data 8
3. Empirical strategy 9
   3.1 The relation between firm investments and bank credit 9
   3.2 The bank-firm relationship level 13
   3.3 The supply credit shock at the firm level and the instrumental variable regression 15
4. Results: investment and bank credit 16
5. Results: expansion versus recession and the role of internal liquidity 18
6. Robustness checks 20
7. Conclusions 22
References 23
Tables and figures 27

[1] Bank of Italy, Rome, Italy
[2] Bank of Italy, Rome, Italy

1 Introduction[1]

The recovery from the global financial crisis has been slow in all the advanced economies. Almost every GDP component has performed sluggishly, especially productive investment: in the advanced countries, it declined strongly between 2008 and 2014, and was still more than 20% below pre-crisis levels in 2015 (IMF 2015). Revitalizing investment has been of primary importance since low investment not only hampers growth in the short-term, but may strongly hurt productivity in the long-term.

In order to design the best policy to stimulate private investments, it is necessary to fully understand the origins of the restraints on investment. Theoretically, different factors may dampen investment. On the one hand, firms may decide to invest less following a fall in expected future demand or an increase in uncertainty in the business environment. On the other hand, though firms may want to invest, they may be prevented from doing so by limited access to credit.

In this paper, we focus on the role of bank credit as a determinant of corporate investment. Focusing on bank credit is particularly appropriate since Italy's underdeveloped stock and corporate bond markets have always made industry reliant on bank credit (seeBonis, Pozzolo and Stacchini 2012 among others).[2] We then investigate how the impact of credit supply shocks on investment choices changes along the business cycle and the importance of internal funds in mitigating this relationship.

Theoretical literature on the effects of limited credit access on corporate investment dates back to the seminal works of Stiglitz and Weiss (1981) and Holmstrom and Tirole (1997). The main finding of these models is that negative shocks to the supply of external financing might hamper corporate investment, especially for firms without sufficient financial slack to fund profitable projects. Empirical quantification of this mechanism, however, has been quite controversial (see Hubbard 1998 for a survey) and has suffered from the endogeneity that characterizes the relationship between credit and any firm outcome variable.

[1]We are grateful to Pietro Catte, Andrea Finicelli, Francesco Manaresi, Giuseppe Parigi, Giacomo Rodano, Enrico Sette and seminar participants at II Banking Research Network Workshop, second BdF-BdI workshop in empirical corporate finance, X Workshop on Institution, Individual Behavior and Economic Outcomes. The opinions expressed in this paper are the authors' own and do not necessarily reflect those of the Bank of Italy.

[2]According to the last Annual Report of the Bank of Italy in 2015 banking loans amounted up to 40% of firms' external fundings and 62% of firms' financial debts.

Other recent studies have focused on the effect at firm level of credit crises on other real variables: Amiti and Weinstein (2011) show that Japanese firms with relationships with less healthy banks at the onset of the 1997 financial crisis experienced a stronger contraction in their exports and domestic sales. Exploiting the 2007-08 financial crisis, Paravisini, Rappoport, Schnabl and Wolfenzon (2015) identify the shock of the credit supply to Peruvian firms, on the basis of their banks pre-crisis exposure to foreign bank loans. Del Prete and Federico (2014) use a similar identification strategy to study the effect of the credit crunch that followed the financial crisis on Italian firms exports.

In this paper we analyze the investment-credit relationship over a long period of time to study whether it changes during recessions compared with non-recessionary periods.[3] For instance, Aghion, Askenazy, Berman, Cette and Eymard (2012) find that firms' credit constraints affect the cyclicality of R&D: R&D investments are counter-cyclical without credit constraints since, when the demand for a firm's goods is low, the opportunity cost of shifting resources from production to R&D is also low, but it becomes more procyclical as firms face tighter credit constraints. More related to our work, Gaiotti (2013) claims that the effect of credit availability on investment is non-linear and materializes only during recessions: using a survey-based measure of financial constraints, the author finds that investments are affected by those constraints only during recessions, while the relationship is absent in non-recessionary periods. Rodano, Serrano-Velarde and Tarantino (2018) find that while during expansionary periods firms with less access to bank credit reduce expenditures in intermediate and labor inputs, during recessions firms react by lowering their investments. Motivated by similar findings (the effect of a credit crunch on investment is stronger, but not exclusive, during recessions), our analysis goes deeper in analyzing the interplay between internal and external funds and uncovers the important role of liquidity. In particular, we find that during recessions the effect of a credit supply shock is bigger because firms do not use liquidity as a buffer.

A main challenge in correctly identifying the effect of credit on investment over a long period of time, both during expansions and recessions, stems from the endogeneity

[3]We used different datasets to obtain annual matched firm-bank data for an average of 15,500 Italian manufacturing firms over the period 1997 to 2012. In this respect our work is closely related to Amiti and Weinstein (2018), who exploit highly disaggregated Japanese data between 1990 and 2010 to develop a new methodology for identifying bank supply shocks and show that their impact on firms investment is indeed quite large.

in the credit-investment relationship. We tackle this issue by using bank mergers and acquisitions (M&As) as an instrumental variable for credit supply shocks, a methodology already used in Buono and Formai (2018b). This choice is motivated by a great deal of banking literature showing how the merged banks tend to reduce (at least in the short term) the supply of credit to existing borrowers (see Beretta and Del Prete 2013, Degryse, Masschelein and Mitchell 2010, Bonaccorsi Di Patti and Gobbi 2007 and Sapienza 2002).

Once we properly control for endogeneity, we find that a 1 percentage point (p.p.) contraction in bank credit supply causes a decline of around 0.6 p.p. in the corporate investment rate. When we split the sample between expansions and recessions, we find that the effect is much stronger during recessions (twice as much, using our preferred specification). We then explore how the relationship between bank credit and investment is influenced by the availability of internal liquidity. We find that internal funding acts as a substitute for external funds only during expansions. During recessions, instead, liquidity does not help to absorb bank credit shocks. A possible interpretation of our result is that, during recessions, when uncertainty is high, firms prefer to hoard liquidity, possibly for precautionary motives, thereby postponing investments. This is consistent with literature that points to uncertainty as an important determinant of investment choices at firm level (see for instance Parigi and Guiso 1999 and Bontempi, Golinelli and Parigi 2007 for firm-level analysis and more recently Bussiere, Ferrara and Milovich 2015 and Buono and Formai 2018a for macro analysis).

Our work is also related to a great deal of literature that empirically explores how firms' financial characteristics affect investments. A seminal work in this area is Fazzari, Hubbard and Petersen (1988), which challenges the hypothesis according to which firms' financial structure is irrelevant for investment decisions. In particular, the authors show that corporate investments are correlated with fluctuations in cash flow only for firms with a high cost disadvantage for external funds. Although this paper has inspired a vast body of literature (see Hubbard 1998 for a survey), the identification of external financial constraints at firm level has been questioned (as pointed out by Kaplan and Zingales 1997). More recently, Duchin, Oguzhan and Sensoy (2010) employ a differences-in-differences approach in which they compare the investments of US firms before and after the onset of the global financial crisis as a function of internal and external financial resources. They find that the decline in investment was greater for

firms with low cash reserves or high net short-term debt levels and for those that are more financially constrained. However, when extended to a macro-panel, Mercatanti, M*a*kinen and Silvestrini (2017) finds no role for cash reserves or for short-term debt in firms' investment choices. Departing from these studies, our identification approach allows us to extend the analysis and study the interaction between credit availability and liquidity in different phases of the cycle.

The rest of the paper is organized as follows: Section 2 describes the data and presents descriptive statistics, Section 3 explains the empirical methodology, Sections 4 and 5 report the main results and robustness checks, and Section 6 concludes.

2 The Data

We use different sources to collect annual data from 1997 to 2012. Firm-level variables come from *Centrale dei Bilanci* (CEBI), a comprehensive database which provides balance sheet data for a sample of about 30,000 medium- and large-sized Italian limited companies. There are both advantages and disadvantages in using this data source. On one hand, data are of high quality as CEBI controls and enriches the data of compulsory balance sheets in order to provide loan consulting to banks.[4] On the other hand, the sample is less representative of smaller firms, those that presumably are more dependent on external funding sources. This implies that our findings may underestimate the true effect of bank credit on investments.

Firm-level variables definitions and summary statistics are reported in tables 1 and 2, respectively. These are based on all observations on manufacturing sectors between 1997 and 2012 that survive data trimming.[5]

Data on bank-firm relationships are taken from the *Italian Credit Register* (CR), a confidential dataset collected by the Bank of Italy for banking supervision purposes. The CR lists all outstanding loans above 75,000 euros held with banks operating in Italy, including branches and subsidiaries of foreign banks, by borrower.[6] The data

[4]For this reason other papers use this same data, see for instance Rodano et al. (2018) and Buono and Formai (2018b) among others.

[5]We excluded the observations below the 2.5th and above the 97.5 th percentile for the dependent variable (the 3-year investment rate) and those below the 1st and above the 99th percentile of the main balance sheet variables (leverage, return on assets, liquidity, cash-flow, fixed assets, productivity and the sales to total asset ratio).

[6]The threshold was reduced to 30,000 euros in 2009. For consistency over the sample period, we

that intermediaries use as a screening and monitoring device for borrowers, available on a monthly basis, is of very high quality.[7] The dataset includes both granted and drawn credit amounts. Being interested in credit supply conditions, we focus on credit granted, as drawn credit is more closely related to demand. Loans are divided into three risk categories (revolving credit lines, term loans, and loans backed by account receivables). Our main independent variable is given by the sum of all the credit categories. Three-year credit growth has a mean of 13.4% in our dataset and, as shown in table 2, it has a very high standard deviation.[8] tables 3 and 4 show the evolution of the dependent and the main independent variable over time. Some clear patterns emerge. Both the 3-year cumulated investment rate and 3-year bank credit growth are quite high at the beginning of the sample, 17.1 and 34.6% respectively. They steadily decline during the first five years of the century and then increase again just before the financial crisis. Afterwards, the average investment rate falls to 10% while bank credit growth becomes nil in the 3-year period ending in 2010 and then negative, around -8%, in the 3-year ending in 2012.

The last data source is the list of bank mergers and acquisitions, available from the Bank of Italy. For each operation, the dataset includes the date, the codes identifying the active banks (both as bidder and acquirer) and the passive banks (the target). For instance, as shown in table 5, in 2000 there were a total of 41 operations: 9 mergers and 32 acquisitions. Each operation involved only one bidder/active bank, while some involved more than one target/passive bank (there were 56 targets in total).

3 Empirical Strategy

3.1 The relation between firm investments and bank credit

We want to analyze the role of bank credit in firms' decision to invest. We assume the following relation:

$$ln(K_{it}) = \alpha_i + \beta ln(Cr_{it}) + \varphi X_{it} + \epsilon_{it} \tag{1}$$

drop all firm-bank relationships with total loans lower than 75,000 euros.

[7]For our analysis we aggregate the data annually. As credit is a stock variable, we downloaded quarterly data and took the average of 4 end-of-quarter observations within a given year.

[8]In next section we will explain why we differentiate our relation over three years.

where K_{it} is the capital stock of the firm, Cr_{it} is the stock of credit granted to the firm, α_i are firm fixed effects that control for all time-invariant characteristics of firm which are correlated with bank credit and enter in the investment equation, and X_{it} represents all determinants of capital other than bank credit.[9] Following the standard Perpetual Inventory Method, we can write

$$K_{it} = (1 - \delta_{it})K_{it-1} + I_{it}$$

where δ_{it} is the firm-time varying depreciation rate and I_{it} is investment. For reasons that will become clear later in this section, we calculate the difference between t and $t-3$. Solving recursively and supposing that the depreciation rate is common for firms in the same sector s:

$$\Delta_3 ln(K_{it}) \approx \frac{K_{it} - K_{it-3}}{K_{it-3}} = InvRate_{it} + \omega_{st}$$

where $InvRate_{it} = \frac{(1-\delta_{st-1})(1-\delta_{st})I_{it-2}+(1-\delta_{st})I_{it-1}+I_{it}}{K_{it-3}}$ is the investment rate between $t-2$ and t and $\omega_{st} = [(1 - \delta_{it-2})(1 - \delta_{it-1})(1 - \delta it) - 1]$ is a sector-time varying variable.[10] The relation (1) thus becomes:

$$InvRate_{it} = \beta Gr\_Cr_{it} + \mu\delta_{it} + \delta_{st} + u_{it} \tag{2}$$

where $Gr\_Cr_{it} = \Delta_3 ln(Cr)_{it}$. Notice that $-\omega_{st}$ is included in the sector-time fixed effects, while firm-fixed effects disappear because of the time-difference. In this context sector-time fixed effects also capture all variations in actual and expected demand for product in each sector, thus may be also intended as a proxy for uncertainty at the sector-time level. Finally $\varphi\Delta_3 ln(X_{it})$ has been replaced by $\gamma\delta_{it}$. The single variable δ_{it} acts as a proxy for all observed and unobserved firm heterogeneity, including elements of X_{it}, that also affect the growth rate of credit demand and must be controlled for.

[9] Among these controls we cannot include the Tobin Q, since we use balance-sheet data and we do not have data on the market value of our firms. Our model is however in line with the so called investment-demand model based on the traditional acceleration principle, which links the demand for capital goods to the level or change in a firm's output or sales.

[10] Following most of the investment literature (see Duchin et al. (2010) and Cingano, Manaresi and Sette (2016)) our main measure of investment is defined as net capital expenditure (the sum of material and immaterial investments less disinvestments) scaled by total firm asset at the beginning of the period.

To estimate this relation it is necessary to overcome the endogeneity problem stemming from the fact that Cr_{it} is an equilibrium variable. It may change, for instance, either because banks provide lower loans or because firms decide to invest less, thus asking for less external credit.

Until recently, very few papers attempted to solve this problem, and they did so using survey-based data in which firms where asked if they were credit constrained. However, in the aftermath of the 2007-2008 crisis and thanks to the availability of firm-bank matched data, some papers have proposed reliable and more sophisticated tools to overcome the endogeneity inbred in the investment-credit relationship. Cingano et al. (2016) use Italian bank-firm matched data to estimate how Italian firms did reduce their investments as a consequence of the collapse of the interbank market after the crisis. They instrument the access to credit using the exposure of firms to banks which were differently hurt by the crisis. Chodorow-Reich (2014) use the dispersion in lender health following the Lehman crisis as a source of exogenous variation in the availability of credit to borrowers and find that credit explains employment variation in U.S. firms.

In this work we use an identification strategy that allows us to identify exogenous supply shocks to bank credit in normal times as well as in crisis periods. Specifically, we instrument bank credit using the M&As involving firm lenders.

This instrument has been recently used in Buono and Formai (2018b) where the role of credit for export and domestic sales is analyzed at the firm level. In what follows we provide a summary of the results in that paper, to convince the reader of the appropriateness of this choice.

The relevance of M&A as an instrument is extensively motivated by the banking literature: a common result in the analysis of the impact of M&As on bank lending is that, in the short run, consolidated banks generally reduce their supply of credit to continuing borrowers (see Beretta and Del Prete 2013 Bonaccorsi Di Patti and Gobbi 2007, Degryse et al. 2010 and Sapienza 2002) and overall to medium and small-sized firms (see Berger, Saunders, Scalise and Udell 1998 and Berger, Demsetz and Strahan 1999). Larger banks differ substantially from small banks in their lending practices. For instance, large organizations could have greater difficulty processing soft information and may have a disadvantage in relationship-based lending, which is particularly important in bank-oriented financial systems like the Italian one (see Angelini, Di Salvo and Ferri 1998 and Sette and Gobbi 2015), but also in more market-oriented systems

(see Petersen and Rajan 1994 and Berger and Udell 1995 for the U.S.). Moreover, bank M&As are generally followed by extensive organizational change, employee turnover, and branch downsizing, which may lead to a loss of the knowledge accumulated within each of the merging banks (see Berger and Udell 2002). New management usually reassesses the riskiness of borrowers and might apply different standards to loan approval. The evidence is also consistent with relatively long transition periods during which difficulties in refocusing lending policies can dominate over longer-term efficiency gains (see Rhoades 1998 and Calomiris and Karceski 2000). Finally, the implementation of diversification strategies can explain the decrease of credit jointly provided by consolidated banks in case of mergers involving banks that were financing the same firm before the deal (see Beretta and Del Prete 2013). In the next section we show that this negative relationship between credit granted and M&As is very robust for the firm-bank couples in our sample and in various subsamples.

The validity of the instrument also relies on the fact that, at least in the short run, firms are not able to react to the shortage of credit from a given bank by increasing loans from other institutions due to the switching costs and other barriers associated with changing lenders. Bonaccorsi Di Patti and Gobbi (2007) provide direct evidence for the case in which the negative supply shock is due to bank M&As. Bofondi, Carpinelli and Sette (2017) show that, during the sovereign debt crisis, Italian firms did not fully compensate for the reduction in credit from domestic banks with an increase in loans from foreign banks that were not directly hit by the crisis. Evidence of the instrument's validity at the firm-level based on our dataset is documented in section 3.3.

The exogeneity of the instrument relies on the idea that M&As between banks are usually very complex financial operations that do not depend on individual clients' characteristics and activities. Buono and Formai (2018b) provide some evidence that a firm's exposure to a bank M&A is not correlated in a systematic way with various other covariates. The disaggregation of the dataset, moreover, allow us to perform an auxiliary analysis, based on Bofondi et al. (2017) and Jiménez, Mian, Peydro and Saurina (2011), in support of the exogeneity of the instrument. Specifically, we consider the regression of bank credit on M&As at the bank-firm level to estimate firm-time fixed effects. These represent those firm-time characteristics that affect the overall amount of credit granted to each firm in each time period and that can also be correlated with investment choice (henceforth $\hat{\delta}_{it}$). We may then add these estimates as a control in

the analysis at the firm level. Our results are not affected by the inclusion of this firm level covariate, providing further support to the exogeneity assumption.

To implement our strategy we proceed in three steps. We identify the shock induced by M&As at the bank-firm level and estimate the firm-time fixed effects as a proxy for the credit demand shock δ_{it} in equation (2). We then aggregate the M&A shock at the firm level and use it as an instrument for Gr_Cr_{it}.

3.2 The bank-firm relationship level

Using data on single credit relationships, we estimate:

$$Gr\_Cr_{ibt} = \alpha + \eta M\&A_{ibt} + \theta_{ib} + \delta_{it} + \upsilon_{ibt} \tag{3}$$

where Gr_Cr_{ibt} is the growth rate of credit between t and t-3 at the firm-bank level.[11] The dummy $M\&A_{ibt}$ is equal to 1 if in the period [t-2,t] bank b has been involved in any merger or acquisition, either as a bidder or a target bank (it is 0 otherwise). In order to control for non-random matching we also include firm-bank dummies θ_{ib}, that also absorb bank fixed effects. The firm-time fixed effects δ_{it}, as already mentioned, capture all time-varying firm-level observed and unobserved heterogeneity that affects the dynamic of credit granted (including firm-level demand, firm balance sheet conditions, and so on).

The time span of three years is the one generally identified by the literature on M&As as the transition period in which the impact of the reorganization is felt. Some studies consider variables referring to M&As taking place in a specific year t, but entering the regression with a lag structure to ensure completion of the post-merger transition period (see Bonaccorsi Di Patti and Gobbi 2007, Degryse et al. 2010 and Sapienza 2002). Others consider one 3-year variable to identify the effect over the whole transition period (see Beretta and Del Prete 2013 and Focarelli, Panetta and Salleo 2002). We chose the latter approach so as to increase the relevance of our instrument and to remain agnostic regarding the relevance of the different lags, which can vary depending on the sample used.

In order to compute Gr_Cr_{ibt} it is necessary to ensure the comparability of the

[11] More specifically Cr_{ibt} is the annual average (based on quarterly data) of outstanding credit granted by bank b to firm i in year t.

credit granted at the beginning and at the end of each three-year period. For instance, suppose that two banks, A and B, both lending to firm i, merge in year t-1 to form a new bank, C. For year $t-3$ CR data would report the credit granted by A and B separately, and for year t that granted by C. Computing a meaningful growth rate Gr_Cr_{ibt} requires considering for both the beginning and the end of the period the same pro-forma bank corresponding to C, constructed by adding up the credit granted by A and B in $t-3$. Following Beretta and Del Prete (2013), for each period in $[t-3, t]$, any bank j existing in $t-3$ is aggregated with the banks that in the three years $t-2, t-1$ and t were involved with j in any $M\&As$ and that, by year t, end up together in the same consolidated bank b. We then pool these pro-forma observations separately, instead of considering a single panel of banks over the period 1997-2012, which would require us to consider for the whole sample the banking ownership structure at the last available date, losing all the information from intermediate M&A operations not involving the consolidated banks as at 2008.[12,13]

Our interest in estimating equation (3) is twofold. First, we show the validity of the instrument: despite a very demanding specification, M&As have a very significant negative effect on the credit granted at the bank-firm level (see table 6). Column 1 shows that a firm's credit grows at a rate that is 4.8 percentage points lower if that firm's bank is involved in an M&A. The effect is stronger for short-term credit (i.e. revolving credit lines, column 2). The effect is also much larger for target banks than for bidder banks (columns 3 and 4), as they experience more organizational and strategic adjustments after complex operations.

Second, we obtain estimates of the fixed effects δ_{it} as a proxy for the demand-side drivers of the credit granted, that will be used in the firm-level analysis. The identification of these fixed effects requires us to restrict the analysis to firms borrowing from more than one bank (see Khwaja and Mian (2008)). Multi-banking is a common practice among Italian firms which mainly rely on bank financing. As table 7 shows, the average number of banks per firm is around 5 and the median value was 4 in 2000. The percentage of firms in our sample that borrow from more than one bank is above 85% and these numbers are quite constant over the years. Moreover, credit is not too concentrated in the main bank: as table 8 shows, the average (and the median) share

[12] See the Methodological Appendix in Buono and Formai (2018b) for an illustration.

[13] In the last section, we implement a robustness check where we pool together only observations for 3-years non-overlapping periods.

of debt that firms owe to the main bank is around 50%.

3.3 The supply credit shock at the firm level and the instrumental variable regression

As analytically shown in Buono and Formai (2018b), taking the weighted average of both the left and right-hand side of equation (3), with weights equal to the share of each bank b in total credit to firm i at the beginning of the period, $w_{ibt-3} = \frac{Cr_{ibt-3}}{Cr_{it-3}}$, the firm-level relationship between the growth of credit granted and bank M&As becomes:

$$Gr\_Cr_{it} = \alpha + \eta M\&A_{it} + \delta_{it} + \bar{v}_{it} \tag{4}$$

where $M\&A_{it}$ is now a firm-level weighted dummy, greater than zero if any of the banks lending to firm i are involved in an M&A in any of the years $t-2$, $t-1$ and t.

This variable represents our instrument (the supply shock at the firm level) and the equation above is the basis for the first stage equation in the IV estimation of the effect of credit supply on investments. Table 9 reports yearly descriptive statistics of this weighted dummy. While in 2000 the average percentage of bank credit coming from banks involved in a M&A operation in the two previous years was 46.3%, this percentage fell to 22.2% by 2007 and increase again up to 51.6% in 2012. This variability, which is useful in our analysis, directly derives from the small number of M&A operations in the central years of our sample, as shown in table 5.

We now have all the ingredients to estimate the effects of a shock to the supply of credit on a firm's investment. Starting with equation (2), we also include further controls for observed firm characteristics that may be correlated with investment choices. In particular, we include alternative funding sources for investments (liquidity and cash flow), measures of firm size (number of employees taken in logs, fixed assets and total sales), proxies for the firm's productivity (value added per employee and ROA) and, finally, measures of financial vulnerability and credit-worthiness (leverage and credit rating, measured with the Z-score).[14] To avoid further endogeneity problems and following Duchin et al. (2010), all controls are taken at the predetermined value in time $t-3$.

[14]This is a standard credit rating measure based on balance sheet information that ranks firms from 1 (highly secure) to 9 (very high risk)

Given the set of additional controls Z_{it-3} and replacing δ_{it} with $\hat{\delta}_{it}$, the estimated relationship between credit and exports is given by:

$$InvRate_{it} = \beta Gr\_Cr_{it} + \mu\hat{\delta}_{it} + \varphi Z_{it-3} + \delta_{st} + u_{it} \tag{5}$$

and the corresponding first stage equation becomes:

$$Gr\_Cr_{it} = \eta M\&A_{it} + \lambda\hat{\delta}_{it} + \phi Z_{it-3} + \delta_{st} + \xi_{it} \tag{6}$$

4 Results: investment and bank credit

Table 10 shows the results of regression (6), pointing to a strong and statistically significant correlation between the M&A weighted dummy and the credit supply: the coefficient of -0.02 in column 1 means that when banks covering, for instance, 50% of a firm's total debt are involved in M&As between $t-2$ and t, the growth rate of the firm's credit supply between $t-3$ and t is, *ceteris paribus*, 1 percentage points lower than that of a firm with no lenders involved in M&As.[15] In column 2 we include $\hat{\delta}_{it}$, obtained from the firm-bank time estimation as explained in section 3.1, to take into account any potential bias deriving by an endogenous matching between banks and firms. The coefficient does not change dramatically, thus giving a further indication on the validity of our instrument. Finally in columns 3 and 4 we include other controls that enter the investment equation and we find a remarkable stable coefficient on our instrument M&As.

Table 11 shows the main results of the investment equation (5). The first column reports the OLS estimate, with a positive but probably biased coefficient of 0.07. Once credit supply is properly instrumented for, the estimated coefficient increases considerably to 0.56 (column 2).[16] This coefficient means that a 1 p.p. increase in bank credit causes a 0.56 p.p. increase in the corporate investment rate. Given the main underling equation (1) and the empirical strategy, the coefficient gives also an estimate of the elas-

[15]To get a quantification of this result, consider the median firm, whose credit granted is equal to 3,286,400 euros. If this firm had all its lenders (100%) involved in M&A operations between $t-2$ and t, it would have a lower increase of credit granted equal to 65,730 euros (=1*0.02*3,286,419) at the end of the three-year period. This is, of course, an upper-bound, since the example assumes that all lenders are involved in M&As.

[16]While the first stage regression of this equation has been already discussed, we report in this table the F-test statistics for the excluded instrument, that is significant and higher than 10.

ticity of the capital stock to the stock of bank-credit. The fact that the OLS estimate is much smaller than the one obtained with instrumental variables indicates the existence of a negative bias, consistent with the idea that firms with higher investment rates may be more profitable and, as a consequence, demand less bank credit either because of higher internal resources or because able to obtain alternative source of financing.[17]

The specification also includes balance-sheet controls that, according to the literature, belongs to the investment equation.[18] Specifically, we consider: firm liquidity (over total asset) which proxies for internal resources that firms may use to finance investments, a measure of collateral (fixed over total assets), a measure of firm financial solidity (Z score), a measure of firm efficiency (sales over total assets), firm's cash flow, a measure of firm size (employment, taken in logs), firm's productivity (value added per worker), a measure of leverage and a measure of firm profitability (ROA). We find that firms with higher internal liquid resources, higher cash flows and higher collateral at the beginning of the period tend to invest more; firms with higher ROA, instead, tend to invest less. The effect of bank credit on firm's propensity to invest is much higher than that of internal liquidity. Considering a mean value for the dependent variable (see table 2), a reduction of bank credit of 1 p.p. causes a decrease of the (cumulative) investment rate from 13% to 12.4%, while the same reduction on liquidity implies a decrease from 13% to 12.9%.

The third column reports the result of the reduced form, namely the regression of investment rate directly on the instrument. As expected, the coefficient is negative, thus the higher is the percentage of credit coming form banks involved in M&A, the lower is the investment rate in the years following the operation.

All over the analysis we use 1997-2012 as our main sample. However, one may worry that the recent crises, given the magnitude of its effect, may drive all our results. As a robustness check, we thus replicate the main regression eliminating the three-year period ending in 2008. We find very similar coefficients (column 4) and, as expected, a stronger first stage.

[17] Also Cingano et al. (2016) find a downward bias in the investment equation (from 0.08 in the OLS to 0.3 in the IV specification). A downward bias has been detected by the trade literature on the effects of credit on export in Buono and Formai (2018b) (from 0.2 in the OLS to 0.6 in the IV specification), Paravisini et al. (2015) (from 0.025 in the OLS specification to 0.195 in the IV specification), and of credit on employment Chodorow-Reich (2014) (from 1.2 in the OLS to 2.1-3.2 depending on the instrument in the IV specification).

[18] In order to avoid further endogeneity problems all the controls are measured at $t-3$.

5 Results: expansion versus recession and the role of internal liquidity

In this section we deepen our analysis along two lines: first we show that the elasticity of investments to bank credit is counter-cyclical, second we show that this pattern is related from the different role of liquidity as a substitute of bank credit along the cycle.

Gaiotti (2013) analyzes how the investment-credit relation changes during the cycle and finds that investments are elastic to trade credit only during recession times. He argues that this result may explain the mixed findings of previous works in the literature on the response of investment to credit shocks. A plausible explanation for the different response over the cycle, which is not investigated in that paper, is that during non-recession periods firms are more likely to find alternative sources to finance their investments, thus the bank credit constraint bites only during recession times.

In what follows we provide evidence of the causal relation between investment and bank credit and of the role of liquidity as substitute for the latter, distinguishing between recessions and expansions. This is possible because our identification strategy does not rely on a systemic crisis to identify shocks on the supply of bank credit but, instead, on an instrument that works both during recessions and during non-recession years. To perform the analysis, we define a 3-year period as a recession if at least two years have two consecutive quarters of negative growth. With this definition the period 2001-2003, and all the 3-year periods going from 2006-2008 to 2010-2012 are considered recessions (see table 12). In the next section we will show robustness analysis using a different definition of recession periods.

Table 13 shows our main analysis splitting the sample into expansions and recessions. The elasticity of investment to bank credit is four times higher during recessions than during expansions. Notice however that the coefficient in column 2 is less precise, and this may be due to the lower an less significant M&A coefficient in the in first stage regression. A weaker instrument in recession periods may be due to the fact that during downturns aggregate shocks in the credit supply may prevail over the idiosyncratic shocks that follow the banks M&A, and which are at the base of our identification strategy. In fact, as we remove the 3-year period ending in 2008 (column 3), the first stage coefficient is highly significant and the F-stat of the test for excluded variable get

closer to the rule of thumb of 10. The estimated elasticity decrease to 0.664, still twice as much as that for expansions.

In general, weak instruments may bias the results in the first stage increasing the standard errors and providing less precise estimates in the main regression, this should not necessarily cast doubt on the validity of our results (see Angrist and Pischke 2009). Nevertheless, in what follows we base our analysis on the OLS estimation of the reduced form specification of the dependent variable directly as a function of the instruments and all the exogeneous regressors. The reduced form does not involve the first-stage regression and is therefore also correct if the instruments are weak (see Chernozhukov and Hansen 2008 for motivation and generalizations).

Next, we analyze the role of internal funds in explaining the asymmetric response of investment to credit supply shock along the cycle. As suggested in seminal papers like Fazzari et al. 1988 and Kaplan and Zingales 1997, and as shown in Duchin et al. 2010, the sensitivity of the relation between external financial constraints and firms' investment decisions strongly depends on the availability of internal liquidity. Those papers, however, did not explore the relation between credit and investment in a causal sense, nor they consider the way internal and external funds interact during expansions and recessions. Our hypothesis is that the stronger effect of bank credit supply shocks on investment during recessions relies on the different role of internal funds, which may not always substitute for bank credit. We augment the reduced form specification with the interaction term between M&A and firm's liquidity, measured at $t-3$ as cash and cash equivalents over assets:

$$InvRate_{it} = \alpha + \eta M\&A_{it} + \rho M\&A_{it} * LIQ_{it-3} + \mu\hat{\delta}_{it} + \varphi Z_{it-3} + \delta_{st} + u_{it} \qquad (7)$$

The results are reported in table 14.[19] All the usual controls are included, but for the sake of space, in what follows, we report only the coefficients of the main variables. The first 3 columns report the estimates for the baseline specification without the interaction term between M&A and liquidity. Results in column 1 are based on the full sample and are equivalent to those of column 3 in table 11 already discussed above: the stronger the credit supply shock as captured by the exposure to banks involved in M&A, the lower is the investment rate in the years following that event. In columns 2 and 3 we

[19]The results obtained in this section are unchanged when the continuous variable LIQ_{it-3} is replaced by a dummy equal to one for firms with liquidity above the median of the sample.

replicate the analysis considering expansions and recessions separately: analogously to IV estimations, the negative effect on investment is stronger during recessions (twice as much as during expansions).

Finally we add the interaction term to the specification: the parameter of $M\&A_{it} * LIQ_{it-3}$ is not statistically different from zero when equation (7) is estimated on the full sample (column 3). In other words, on average firms are not differently affected by M&A according to the availability of internal liquidity. In columns 5 and 6 we again split the sample between expansions and recessions: in the first case the interaction term becomes significant and positive and the coefficient for $M\&A_{it}$ increases with respect to column (2). This suggest that during expansions internal financial resources act as a buffer against external credit shocks: the effect of exposure to M&A operations on firms' capital accumulation is smaller for firms with higher internal liquidity. The estimated coefficients imply that for a firm with no liquidity at time $t-3$ the effect of a supply shock is almost 30% stronger with respect to a firm with the same exposure to merging banks but with a liquidity equal to 7% of total assets (the mean in the sample, see table 2). On the other hand, in recession the interaction term is not statistically different from zero, suggesting that liquidity does not act as a buffer against supply shocks.

This evidence carries important policy implications. When banks tighten credit to firms, these cut investments. However, under normal economic conditions, firms tend to use liquidity to offset the reduced availability of credit. In other words, in normal times liquidity has the key function to substitute for bank credit, if needed. However, during crisis, liquidity does not act as an alternative to bank credit in order to finance investments, but it plays other roles. For instance, during recessions, high uncertainty may push firms' to hold liquidity for precautionary motives (see Parigi and Guiso 1999, Bontempi et al. 2007 and more recently Bussiere et al. 2015 and Buono and Formai 2018a for the effect of uncertainty on investments).

6 Robustness checks

As a first robustness check, we use a different criteria to identify recession periods. We follow Gaiotti (2013) and take the periods from peak to trough reported in the

ISAE-ISCO[20] and define as recession a 3-years period with the majority of months included between peak and trough. With this criteria, also the 3-year periods ending in 2002 and 2004 are considered of recessions.[21] Results with this alternative measure are reported in table 15 and, besides the interaction term in column (4) loosing significance, are very close to what found above.

Second, we consider the effect of other sources of finance that can attenuate the dependence on bank credit, other than internal liquidity. Using balance sheet data, we construct an indicator which is equal to 1 if the share of external fundings over total debt is lower than the median and zero otherwise. In other words, an indicator equal to zero identifies firms that have more access to alternative forms of debt and so are more able to substitute credit when their banks are involved in M&As operations. Table 16 reports results of reduced form analysis for recession and expansion periods separately: while during expansions the effect of the instrument on investment is relevant only for firms with high dependence on bank credit (only the interaction term is significant), during recessions the reduction of investment is widespread to all firms independently from their possibility to access alternative forms of fundings. The results, robust to both measures of recessions/expansions, tell us, once again, that a decrease in the supply of bank credit affects investment mostly during recessions because firms do not substitute it with other funding means.

In the analysis so far we used a sample composed by 3-years rolling periods. As explained in the methodological section, this approach allows to exploit as much as possible the variability of our data, in particular of the M&A episodes, and there is no reason to believe that it introduces any systematic bias to the results. Nevertheless, to reassure the reader that our findings are not driven by this methodological choice, as a final check we replicate the main analysis using a non-rolling sample, namely using observations for the non-overlapping periods ending in 2000, 2002, 2004, 2006, 2008, 2010,and 2012. Results in table 17 confirm previous analysis, with bigger effect in recession (column 3) and liquidity used as a buffer only during expansions (column 4).

Finally we replicate our analysis omitting our generated regressor $\hat{\delta}_{it}$ that captures the demand unobservable characteristics that affect the credit granted. Results, reported in table 18, are basically unchanged, providing a reassurance on the exogeneity

[20] See ISAE, 2009, p.54

[21] For all the other periods, this measure coincides with the main one reported in table 12.

of the shock that M&As induced on the supply of credit.

7 Conclusions

In this paper we analyze the relationship between bank credit and investment at the firm level. We use bank M&As to isolate the exogenous shock to the credit supply and find that investment contracts when credit is reduced. We also find that the effect is much higher during recessions because firms are unable to substitute bank credit with other financial means, including internal liquidity, like they can during expansions. We interpret this as a reaction to uncertainty, as firms hold liquidity and other resources for precautionary motives. In other words, the consequences of the "bank-centralism" of Italian firms become particularly severe during recessions, when the role of internal liquidity as a buffer fails, magnifying the drop of investment in response to the shock to the supply of credit.

References

Aghion, Philippe, Philippe Askenazy, Nicolas Berman, Gilbert Cette, and Laurent Eymard, "Credit constraints and the cyclicality of R&D investment: evidence from France," *Journal of the European Economic Association*, 2012, *10(5)*, 10011024.

Amiti, Mary and David E. Weinstein, "Exports and Financial Shocks," *The Quarterly Journal of Economics*, 2011, *126* (4), 1841–1877.

__ **and** __ , "How Much Do Idiosyncratic Bank Shocks Affect Investment? Evidence from Matched Bank-Firm Loan Data," *Journal of Political Economy*, 2018, *126* (2), 525–587.

Angelini, Paolo, Roberto Di Salvo, and Giovanni Ferri, "Availability and cost of credit for small businesses: Customer relationships and credit cooperatives," *Journal of Banking and Finance*, 1998, *22(6-8)*, 925–954.

Angrist, Joshua D. and Jorn-Steffen Pischke, "Mostly Harmless Econometrics," *Princeton University Press*, 2009.

Beretta, Enrico and Silvia Del Prete, "Banking consolidation and bank-firm credit relationships: the role of geographical features and relationship characteristics," *Bank of Italy Working Paper*, 2013, *901.*

Berger, Allen N. and Gregory F. Udell, "Relationship lending and lines of credit in small firm finance," *The Journal of Business*, 1995, *68(3)*, 351–381.

Berger, Allen N. and Gregory F. Udell, "Small business credit availability and relationship lending: The importance of bank organisational structure," *The Economic Journal*, 2002, *112* (477), F32–F53.

Berger, Allen N., Anthony Saunders, Joseph M. Scalise, and Gregory F. Udell, "The effects of bank mergers and acquisitions on small business lending," *Journal of financial Economics*, 1998, *50* (2), 187–229.

__ **, Rebecca S. Demsetz, and Philip E. Strahan**, "The consolidation of the financial services industry: Causes, consequences, and implications for the future," *Journal of Banking and Finance*, 1999, *23* (2), 135–194.

Bofondi, Marcello, Luisa Carpinelli, and Enrico Sette, "Credit Supply During a Sovereign Debt Crisis," *Journal of the European Economic Association*, 08 2017, *16* (3), 696–729.

Bonaccorsi Di Patti, Emilia and Giorgio Gobbi, "Winners or losers? The effects of banking consolidation on corporate borrowers," *The Journal of Finance*, 2007, *62* (2), 669–695.

Bonis, Riccardo De, Alberto Pozzolo, and Massimiliano Stacchini, "The Italian banking system: Facts and interpretations," *Universita del Molise, working paper*, 2012, *068.*

Bontempi, Maria Elena, Roberto Golinelli, and Giuseppe Parigi, "Why demand uncertainty curbs investment: Evidence from a panel of Italian manufacturing firms," *Bank of Italy Working Paper*, 2007, *621.*

Buono, Ines and Sara Formai, *Explaining Weak Investment Growth After the Great Recession: A Macro-Panel Analysis*, Ferrara, Laurent, Hernando, Ignacio, Marconi, Daniela (Eds.), 2018, *06.*

__ and __ , "The heterogeneous response of domestic sales and exports to bank credit shocks," *Journal of International Economics*, 2018, *113*, 55 – 73.

Bussiere, Matthieu, Laurent Ferrara, and Juliana Milovich, "Explaining the recent slump in investment: the role of expected demand and uncertainty," *Bank de France Document de Travail*, 2015, *571.*

Calomiris, Charles W. and Jason Karceski, "Is the bank merger wave of the 1990s efficient? Lessons from nine case studies," in "Mergers and productivity," University of Chicago Press, 2000, pp. 93–178.

Chernozhukov, Victor and Christian Hansen, "The reduced form: A simple approach to inference with weak instruments," *Economics Letters*, 2008, *100*, 68–7.

Chodorow-Reich, Gabriel, "The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis," *The Quarterly Journal of Economics*, 2014, *129*, 1–59.

Cingano, Federico, Francesco Manaresi, and Enrico Sette, "Does Credit Crunch Investment Down? New Evidence on the Real Effects of the Bank-Lending Channel," *The Review of Financial Studies*, 06 2016, *29* (10), 2737–2773.

Degryse, Hans, Nancy Masschelein, and Janet Mitchell, "Staying, dropping, or switching: the impacts of bank mergers on small firms," *Review of Financial Studies*, 2010, p. hhp126.

Del Prete, Silvia and Stefano Federico, "Trade and finance: is there more than just 'trade finance'? Evidence from matched bank-firm data," *Bank of Italy Working Paper*, 2014, *948.*

Duchin, Ran, Ozbas Oguzhan, and Berl A. Sensoy, "Costly external finance, corporate investment, and the subprime mrtgage credit crisis," *Journal of Finance Economics*, 2010, *97*, 418–435.

Fazzari, Steven M., R. Glenn Hubbard, and Bruce C. Petersen, "Financing constraints and corporate investment," *Brookings papers on economic activity*, 1988, *1988* (1), 141–206.

Focarelli, Dario, Fabio Panetta, and Carmelo Salleo, "Why do banks merge?," *Journal of Money, Credit, and Banking*, 2002, *34* (4), 1047–1066.

Gaiotti, Eugenio, "Credit availability and investment: Lessons from the "great recession"," *European Economic Review*, 2013, *59* (4), 212–227.

Holmstrom, Bengt and Jean Tirole, "Financial Intermediation, Loanable Funds, and the Real Sector," *The Quarterly Journal of Economics*, 1997, *112*, 663–691.

Hubbard, R. Glenn, "Capital-Market Imperfections and," *journal of Economic Literature*, 1998, *36*, 193–225.

IMF, "Private investment: what's the holdup?," *WEO*, 2015, *April*, 111–143.

Jiménez, Gabriel, Atif R. Mian, Jose-Luis Peydro, and Jesus Saurina, "Local versus aggregate lending channels: the effects of securitization on corporate credit supply in Spain," *Banco de España Working Paper*, 2011, *1124*.

Kaplan, Steven N. and Luigi Zingales, "Do investment-cash flow sensitivities provide useful measures of financing constraints?," *The Quarterly Journal of Economics*, 1997, pp. 169–215.

Khwaja, Asim Ijaz and Atif Mian, "Tracing the impact of bank liquidity shocks: evidence from an emerging market," *American Economic Review*, 2008, *98*, 1413–1442.

Mercatanti, Andrea, Taneli Mäkinen, and Andrea Silvestrini, "Investment decisions by European firms and financing constraints," *Bank of Italy Working Paper*, 2017, *1148*.

Paravisini, Daniel, Veronica Rappoport, Philipp Schnabl, and Daniel Wolfenzon, "Dissecting the effect of credit supply on trade: evidence from matched credit-export data," *The Review of Economic Studies*, 2015, *82*, 333–359.

Parigi, Giuseppe and Luigi Guiso, "Investment and Demand Uncertainty," *The Quarterly Journal of Economics*, 1999, *114*, 185–227.

Petersen, Mitchell A. and Raghuram G. Rajan, "The benefits of lending relationships: Evidence from small business data," *The Journal of Finance*, 1994, *49* (1), 3–37.

Rhoades, Stephen A, "The efficiency effects of bank mergers: An overview of case studies of nine mergers," *Journal of Banking & Finance*, 1998, *22* (3), 273–291.

Rodano, Giacomo, Nicolas Serrano-Velarde, and Emanuele Tarantino, "Lending Standards over the Credit Cycle," *The Review of Financial Studies*, 04 2018, *31* (8), 2943–2982.

Sapienza, Paola, "The effects of banking mergers on loan contracts," *The Journal of Finance*, 2002, *57* (1), 329–367.

Sette, Enrico and Giorgio Gobbi, "Relationship lending during a financial crisis," *Journal of the European Economic Association*, 2015, *13* (3), 453–481.

Stiglitz, Joseph E. and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, 1981, *71*, 393–410.

Tables and Figures

Table 1: Variable Description - Firm Data

Variable	Description	Label
Liquidity	Liquidity/Total Assets	LIQ
Fixed Assets	Fixed Assets/Total Assets	$FIXED$
Z score	1 (safe) to 9 (risky)	$RATING$
Sales	Sales/Total Asset	$SALES$
Cash Flow	Cash Flow/Total Assets	$CASH$
Employment	Average Employment over the year (log)	$EMPL$
Productivity	Value Added/Employment	$PROD$
Leverage	Total Assets/Capital	LEV
ROA	Net profit/Total Assets	ROA

Table 2: Summary Statistics - Firms' Data

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
$InvRate_{it}$	0.13	0.14	-1.6	1.1	250352
Gr_Cr_{it}	0.13	0.52	-2.9	3.4	250352
LIQ	0.07	0.10	0	0.98	241917
FIXED	0.5	0.3	0	20.2	193654
RATING	4.5	1.8	1	9	242163
SALES	1.2	0.5	0	87.447	250214
CASH (%)	7.3	7.2	-358.1	485.3	250179
EMPL (log	3.9	0.9	0	8.0	179326
EMPL (unit)	86.2	113.5	0	1060	180299
PROD	61.4	51.9	-822.5	8407	179324
LEV (%)	8.2	92.1	-12622.5	14928.1	250316
ROA (%)	6.7	8.3	-312.2	465.8	250126

Note: data refer to the period 1997-2012 and for the sample of all firms, winsorizing dependent variable at 5% and independent variables at 2%. Label of the variables are listed in Table 1. **Sources:** CEBI, Centrale dei Bilanci and Credit Register, Bank of Italy.

Table 3: Summary Statistics of $InvRate_{it}$ by rolling 3-year period

Variable	Mean	Std. Dev.
1998-2000	0.171	0.157
1999-2001	0.165	0.154
2000-2002	0.167	0.164
2001-2003	0.143	0.147
2002-2004	0.135	0.137
2003-2005	0.116	0.119
2004-2006	0.117	0.118
2005-2007	0.118	0.119
2006-2008	0.131	0.153
2007-2009	0.127	0.148
2008-2010	0.121	0.137
2009-2011	0.100	0.102
2010-2012	0.100	0.100

Source: Authors' calculations on CEBI, Centrale dei Bilanci .

Table 4: Summary Statistics of Gr_Cr_{it} by rolling 3-year period

Variable	Mean	Std. Dev.
1998-2000	0.346	0.533
1999-2001	0.265	0.509
2000-2002	0.228	0.505
2001-2003	0.194	0.511
2002-2004	0.162	0.506
2003-2005	0.174	0.506
2004-2006	0.187	0.509
2005-2007	0.220	0.525
2006-2008	0.195	0.512
2007-2009	0.110	0.501
2008-2010	0.006	0.492
2009-2011	-0.044	0.484
2010-2012	-0.083	0.492

Source: Authors' calculations on Credit Register, Bank of Italy.

Table 5: Mergers and Acquisitions

	N. Mergers	N. Acquisitions	N. Bidders	N. Targets
1997	5	18	23	24
1998	3	27	30	34
1999	6	42	48	59
2000	9	32	41	56
2001	6	23	29	36
2002	3	33	36	40
2003	6	24	30	35
2004	0	16	16	17
2005	0	6	6	7
2006	1	11	12	13
2007	1	8	9	10
2008	4	13	17	19
2009	1	13	14	15
2010	1	18	19	24
2011	0	21	21	23
2012	1	26	27	32

Source: Albo Operazioni Bancarie, Bank of Italy.

Table 6: M&As and Credit Granted - firm-bank level

Credit M&As	Total All	Short All	Total Target	Total Bidder
$M\&A_{ibt}$	-0.048***	-0.066***	-0.108***	-0.027***
	(0.001)	(0.002)	(0.003)	(0.001)
N	2.354.026	1.634.140	2.354.026	2.354.026

Note: Results of regressions (3). Robust standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 7: Number of Banks by Firm

	2000	2006	2011
Average	5.2	4.8	4.3
Max	90	66	61
Min	1	1	1
Median	4.0	4.5	4.0
Standard Deviation	3.9	3.6	3.2
Number of firms	43048	54184	57045
Share with more than 1 bank	88%	86%	84%

Source: CEBI, Centrale dei Bilanci and Credit Register, Bank of Italy.

Table 8: Credit Share of the Main Bank

	2000	2006	2011
Average	0.5	0.5	0.6
Max	1	1	1
Min	0.1	0.1	0.1
Median	0.4	0.5	0.5
Standard Deviation	0.3	0.3	0.3

Source: Credit Register, Bank of Italy.

Table 9: Summary Statistics: weighted M&A dummy

Year	**Mean**	**Std. Dev.**	**Observations**
2000	0.463	0.240	10956
2001	0.405	0.237	10479
2002	0.519	0.242	10174
2003	0.442	0.244	10455
2004	0.418	0.238	10531
2005	0.206	0.202	11288
2006	0.263	0.221	11687
2007	0.222	0.199	12275
2008	0.379	0.242	12890
2009	0.349	0.258	15016
2010	0.307	0.257	15568
2011	0.365	0.284	16293
2012	0.516	0.312	15968
Total	0.371	0.268	163580

Source: Authors' calculations on Albo Operazioni Bancarie and Credit Register, Bank of Italy.

Table 10: Credit supply on M&A weighted dummy, First Stage

	Dependent Variable Gr_Cr_{it}, FS			
	(1)	(2)	(3)	(4)
MeA_{it}	-0.022***	-0.032***	-0.033***	-0.025***
	(0.008)	(0.007)	(0.007)	(0.007)
$\hat{\delta}_{it}$		0.805***	0.802***	0.794***
		(0.007)	(0.007)	(0.007)
LIQ_{it-3}			-0.204***	-0.215***
			(0.021)	(0.021)
$FIXED_{it-3}$			-0.113***	-0.102***
			(0.008)	(0.008)
$RATING_{it-3}$			0.002**	0.017***
			(0.001)	(0.001)
$SALES_{it-3}$			0.069***	0.047***
			(0.004)	(0.004)
$CASH_{it-3}$				0.005***
				(0.000)
$EMPL_{it-3}$				-0.026***
				(0.002)
$PROD_{it-3}$				-0.000***
				(0.000)
LEV_{it-3}				-0.000
				(0.000)
ROA_{it-3}				0.003***
				(0.000)
Observations	116568	116568	116568	116568

Note: Results based on regression 6. All regressions include sector-time fixed effects. Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table 11: Investment on (instrumented) credit supply: main results

	Dependent Variable $InvRate_{it}$			
	(1)	(2)	(3)	(4)
	OLS	IV	RF	IV: no 2006-2008
Gr_Cr_{it}	0.076***	0.562***		0.424***
	(0.002)	(0.161)		(0.103)
$\hat{\delta}_{it}$	-0.008***	-0.393***	0.052***	-0.282***
	(0.002)	(0.128)	(0.002)	(0.081)
LIQ_{it-3}	0.021***	0.125***	0.004	0.096***
	(0.006)	(0.037)	(0.006)	(0.025)
$FIXED_{it-3}$	0.069***	0.119***	0.062***	0.105***
	(0.005)	(0.018)	(0.004)	(0.013)
$RATING_{it-3}$	0.007***	-0.002	0.008***	0.001
	(0.000)	(0.003)	(0.000)	(0.002)
$SALES_{it-3}$	0.014***	-0.009	0.017***	-0.003
	(0.001)	(0.008)	(0.001)	(0.005)
$CASH_{it-3}$	0.006***	0.003***	0.006***	0.004***
	(0.000)	(0.001)	(0.000)	(0.001)
$EMPL_{it-3}$	-0.006***	0.006	-0.008***	0.003
	(0.001)	(0.004)	(0.001)	(0.003)
$PROD_{it-3}$	-0.000***	-0.000	-0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
LEV_{it-3}	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ROA_{it-3}	-0.001***	-0.003***	-0.001***	-0.002***
	(0.000)	(0.001)	(0.000)	(0.000)
MeA_{it}			-0.014***	
			(0.002)	
F test (excl. instrument)		12.58***		19.29***
Observations	116568	116568	116568	107459

Note: Results based on regression 5. All regressions include sector-time fixed effects. Standard errors in parentheses. In the second-to-last row we report the F test of the correspondent first-stage regression when IV methodology is applied (columns 2 and 4). * p<0.10, ** p<0.05, *** p<0.01.

Table 12: Measures of recession

	Expansions and Recessions
1998-2000	0
1999-2001	0
2000-2002	0
2001-2003	1
2002-2004	0
2003-2005	0
2004-2006	0
2005-2007	0
2006-2008	1
2007-2009	1
2008-2010	1
2009-2011	1
2010-2012	1

Source: Authors' calculations. A 3-year period is considered of recession if it contains at least two years with two consecutive quarters of negative growth.

Table 13: Investment on (instrumented) credit supply: expansions versus recessions

Dependent Variable $InvRate_{it}$			
	(1)	(2)	(3)
	Expansion	Recession	Recession (no 2006-2008)
	IV and FS	IV and FS	IV and FS
Gr_Cr_{it}	0.327***	1.209*	0.664***
	(0.119)	(0.721)	(0.243)
LIQ_{it-3}	0.064***	0.314*	0.185***
	(0.023)	(0.187)	(0.069)
$\hat{\delta}_{it}$	-0.210**	-0.874	-0.446**
	(0.098)	(0.548)	(0.179)
$FIXED_{it-3}$	0.119***	0.148**	0.097***
	(0.016)	(0.061)	(0.022)
$RATING_{it-3}$	0.002	-0.008	-0.000
	(0.003)	(0.009)	(0.003)
$SALES_{it-3}$	0.001	-0.034	-0.013
	(0.006)	(0.031)	(0.011)
$CASH_{it-3}$	0.004***	0.001	0.003**
	(0.001)	(0.002)	(0.001)
$EMPL_{it-3}$	0.002	0.017	0.006
	(0.004)	(0.015)	(0.005)
$PROD_{it-3}$	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
LEV_{it-3}	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
ROA_{it-3}	-0.002***	-0.005**	-0.003***
	(0.000)	(0.003)	(0.001)
Fist Stage. Dep var: Gr_Cr_{it}			
MeA_{it}	-0.031***	-0.016*	-0.027***
	(0.010)	(0.010)	(0.010)
F test (excl. instrument)	10.73***	2.69*	7.35***
Observations	62279	54289	45180

Note: Results based on regression 5. All regressions include sector-time fixed effects. Standard errors in parentheses. In the last rows we report the $M\&A_{it}$ coefficient of the first stage regression and the correspondent F test. * p<0.10, ** p<0.05, *** p<0.01.

Table 14: Investment on M&A weighted dummy, Reduced Form Analysis

	Dependent Variable $InvRate_{it}$					
	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample	Expansion	Recession	Full Sample	Expansion	Recession
MeA_{it}	-0.014***	-0.010***	-0.019***	-0.016***	-0.014***	-0.019***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
$MeA_{it} * LIQ_{it-3}$				0.022	0.052**	-0.003
				(0.017)	(0.025)	(0.021)
LIQ_{it-3}	0.004	0.006	0.005	-0.004	-0.013	0.006
	(0.006)	(0.008)	(0.008)	(0.009)	(0.012)	(0.012)
$\hat{\delta}_{it}$	0.052***	0.059***	0.046***	0.052***	0.059***	0.046***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	116568	62279	54289	116568	62279	54289

Note: Results based on regression 7. All regressions include sector-time fixed effects. Other controls are included but coefficients not reported. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 15: Investment on M&A weighted dummy, Reduced Form Analysis with alternative measure of expansions and recessions

	Dependent Variable $InvRate_{it}$			
	(1)	(2)	(3)	(4)
	Expansion 2	Recession 2	Expansion 2	Recession 2
MeA_{it}	-0.012***	-0.016***	-0.015***	-0.016***
	(0.003)	(0.003)	(0.004)	(0.003)
$MeA_{it} * LIQ_{it-3}$			0.036	0.013
			(0.028)	(0.020)
LIQ_{it-3}	-0.001	0.007	-0.012	0.002
	(0.008)	(0.007)	(0.012)	(0.011)
$\hat{\delta}_{it}$	0.059***	0.049***	0.059***	0.049***
	(0.003)	(0.002)	(0.003)	(0.002)
Observations	44951	71617	44951	71617

Note: Results based on regression 7. All regressions include sector-time fixed effects. Other controls are included but coefficients not reported. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 16: Investment on M&A weighted dummy and its interaction with a measure of bank-debt dependence, Reduced Form Analysis

	Dependent Variable $InvRate_{it}$			
	(1)	(2)	(3)	(4)
	Expansion 1	Expansion 2	Recession 1	Recession 2
MeA_{it}	-0.003	-0.003	-0.017***	-0.013***
	(0.004)	(0.005)	(0.004)	(0.004)
$MeA_{it} * Db_{it-3}$	-0.013**	-0.017***	-0.008	-0.007
	(0.005)	(0.006)	(0.005)	(0.005)
Db_{it-3}	0.024***	0.024***	0.023***	0.023***
	(0.002)	(0.003)	(0.003)	(0.003)
LIQ_{it-3}	0.027***	0.021**	0.036***	0.035***
	(0.009)	(0.010)	(0.010)	(0.009)
$\hat{\delta}_{it}$	0.059***	0.060***	0.048***	0.050***
	(0.003)	(0.003)	(0.003)	(0.002)
Observations	56074	40356	48596	64314

Note: Results based on regression 7. All regressions include sector-time fixed effects. Columns 1 and 3 use the main definition of expansion/recession; columns 2 and 4 use the alternative definition as explained in the text. Other controls are included but coefficients not reported. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 17: Investment on M&A weighted dummy, Reduced Form Analysis, No rolling sample

	Dependent Variable $InvRate_{it}$				
	(1)	(2)	(3)	(4)	(5)
	Full sample	Expansion	Recession	Expansion	Recession
MeA_{it}	-0.014***	-0.010***	-0.022***	-0.014***	-0.023***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
$MeA_{it} * LIQ_{it-3}$				0.053*	0.009
				(0.030)	(0.024)
LIQ_{it-3}	0.005	0.013	0.004	-0.009	0.000
	(0.007)	(0.009)	(0.010)	(0.015)	(0.014)
$\hat{\delta}_{it}$	0.055***	0.063***	0.048***	0.063***	0.048***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	62558	35708	26850	35708	26850

Note: Results based on regression 7. All regressions include sector-time fixed effects. Other controls are included but coefficients not reported. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 18: Investment on M&A weighted dummy, Reduced Form Analysis without the generated regressor $\hat{\delta}$

	Dependent Variable $InvRate_{it}$				
	(1)	(2)	(3)	(4)	(5)
	Full sample	Expansion	Recession	Expansion	Recession
MeA_{it}	-0.013***	-0.010***	-0.018***	-0.014***	-0.017***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)
$MeA_{it} * LIQ_{it-3}$				0.051**	-0.004
				(0.025)	(0.021)
LIQ_{it-3}	0.001	0.000	0.004	-0.018	0.006
	(0.006)	(0.008)	(0.008)	(0.012)	(0.012)
Observations	116568	62279	54289	62279	54289

Note: Results based on regression 7. All regressions include sector-time fixed effects. Other controls are included but coefficients not reported. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

RECENTLY PUBLISHED "TEMI" (*)

N. 1213 – *A regression discontinuity design for categorical ordered running variables with an application to central bank purchases of corporate bonds*, by Fan Li, Andrea Mercatanti, Taneli Mäkinen and Andrea Silvestrini (March 2019).

N. 1214 – *Anything new in town? The local effects of urban regeneration policies in Italy*, by Giuseppe Albanese, Emanuele Ciani and Guido de Blasio (April 2019).

N. 1215 – *Risk premium in the era of shale oil*, by Fabrizio Ferriani, Filippo Natoli, Giovanni Veronese and Federica Zeni (April 2019).

N. 1216 – *Safety traps, liquidity and information-sensitive assets*, by Michele Loberto (April 2019).

N. 1217 – *Does trust among banks matter for bilateral trade? Evidence from shocks in the interbank market*, by Silvia Del Prete and Stefano Federico (April 2019).

N. 1218 – *Monetary policy, firms' inflation expectations and prices: causal evidence from firm-level data*, by Marco Bottone and Alfonso Rosolia (April 2019).

N. 1219 – *Inflation expectations and firms' decisions: new causal evidence*, by Olivier Coibion, Yuriy Gorodnichenko and Tiziano Ropele (April 2019).

N. 1220 – *Credit risk-taking and maturity mismatch: the role of the yield curve*, by Giuseppe Ferrero, Andrea Nobili and Gabriele Sene (April 2019).

N. 1221 – *Big-city life (dis)satisfaction? The effect of living in urban areas on subjective well-being*, by David Loschiavo (June 2019).

N. 1222 – *Urban agglomerations and firm access to credit*, by Amanda Carmignani, Guido de Blasio, Cristina Demma and Alessio D'Ignazio (June 2019).

N. 1223 – *The international transmission of US tax shocks: a proxy-SVAR approach*, by Luca Metelli and Filippo Natoli (June 2019).

N. 1224 – *Forecasting inflation in the euro area: countries matter!*, by Angela Capolongo and Claudia Pacella (June 2019).

N. 1225 – *Domestic and global determinants of inflation: evidence from expectile regression*, by Fabio Busetti, Michele Caivano and Davide Delle Monache (June 2019).

N. 1226 – *Relative price dynamics in the Euro area: where do we stand?*, by Pietro Cova and Lisa Rodano (June 2019).

N. 1227 – *Optimally solving banks' legacy problems*, by Anatoli Segura and Javier Suarez (June 2019).

N. 1228 – *Il mercato degli affitti nelle città italiane: un'analisi basata sugli annunci online*, di Michele Loberto (Luglio 2019).

N. 1229 – *Using credit variables to date business cycle and to estimate the probabilities of recession in real time*, by Valentina Aprigliano and Danilo Liberati (July 2019).

N. 1230 – *Disinflationary shocks and inflation target uncertainty*, by Stefano Neri and Tiziano Ropele (July 2019).

N. 1231 – *Exchange rate dynamics and unconventional monetary policies: it's all in the shadows*, by Andrea De Polis and Mario Pietrunti (July 2019).

N. 1232 – *Risky bank guarantees*, by Taneli Mäkinen, Lucio Sarno and Gabriele Zinna (July 2019).

(*) Requests for copies should be sent to:
Banca d'Italia – Servizio Studi di struttura economica e finanziaria – Divisione Biblioteca e Archivio storico – Via Nazionale, 91 – 00184 Rome – (fax 0039 06 47922059). They are available on the Internet www.bancaditalia.it.

2017

AABERGE, R., F. BOURGUIGNON, A. BRANDOLINI, F. FERREIRA, J. GORNICK, J. HILLS, M. JÄNTTI, S. JENKINS, J. MICKLEWRIGHT, E. MARLIER, B. NOLAN, T. PIKETTY, W. RADERMACHER, T. SMEEDING, N. STERN, J. STIGLITZ, H. SUTHERLAND, *Tony Atkinson and his legacy,* Review of Income and Wealth, v. 63, 3, pp. 411-444, **WP 1138 (September 2017).**

ACCETTURO A., M. BUGAMELLI and A. LAMORGESE, *Law enforcement and political participation: Italy 1861-65,* Journal of Economic Behavior & Organization, v. 140, pp. 224-245, **WP 1124 (July 2017).**

ADAMOPOULOU A. and G.M. TANZI, *Academic dropout and the great recession,* Journal of Human Capital, V. 11, 1, pp. 35–71, **WP 970 (October 2014).**

ALBERTAZZI U., M. BOTTERO and G. SENE, *Information externalities in the credit market and the spell of credit rationing,* Journal of Financial Intermediation, v. 30, pp. 61–70, **WP 980 (November 2014).**

ALESSANDRI P. and H. MUMTAZ, *Financial indicators and density forecasts for US output and inflation,* Review of Economic Dynamics, v. 24, pp. 66-78, **WP 977 (November 2014).**

BARBIERI G., C. ROSSETTI and P. SESTITO, *Teacher motivation and student learning,* Politica economica/Journal of Economic Policy, v. 33, 1, pp.59-72, **WP 761 (June 2010).**

BENTIVOGLI C. and M. LITTERIO, *Foreign ownership and performance: evidence from a panel of Italian firms,* International Journal of the Economics of Business, v. 24, 3, pp. 251-273, **WP 1085 (October 2016).**

BRONZINI R. and A. D'IGNAZIO, *Bank internationalisation and firm exports: evidence from matched firm-bank data,* Review of International Economics, v. 25, 3, pp. 476-499 **WP 1055 (March 2016).**

BRUCHE M. and A. SEGURA, *Debt maturity and the liquidity of secondary debt markets,* Journal of Financial Economics, v. 124, 3, pp. 599-613, **WP 1049 (January 2016).**

BURLON L., *Public expenditure distribution, voting, and growth,* Journal of Public Economic Theory,, v. 19, 4, pp. 789–810, **WP 961 (April 2014).**

BURLON L., A. GERALI, A. NOTARPIETRO and M. PISANI, *Macroeconomic effectiveness of non-standard monetary policy and early exit. a model-based evaluation,* International Finance, v. 20, 2, pp.155-173, **WP 1074 (July 2016).**

BUSETTI F., *Quantile aggregation of density forecasts,* Oxford Bulletin of Economics and Statistics, v. 79, 4, pp. 495-512, **WP 979 (November 2014).**

CESARONI T. and S. IEZZI, *The predictive content of business survey indicators: evidence from SIGE,* Journal of Business Cycle Research, v.13, 1, pp 75–104, **WP 1031 (October 2015).**

CONTI P., D. MARELLA and A. NERI, *Statistical matching and uncertainty analysis in combining household income and expenditure data,* Statistical Methods & Applications, v. 26, 3, pp 485–505, **WP 1018 (July 2015).**

D'AMURI F., *Monitoring and disincentives in containing paid sick leave,* Labour Economics, v. 49, pp. 74-83, **WP 787 (January 2011).**

D'AMURI F. and J. MARCUCCI, *The predictive power of google searches in forecasting unemployment,* International Journal of Forecasting, v. 33, 4, pp. 801-816, **WP 891 (November 2012).**

DE BLASIO G. and S. POY, *The impact of local minimum wages on employment: evidence from Italy in the 1950s,* Journal of Regional Science, v. 57, 1, pp. 48-74, **WP 953 (March 2014).**

DEL GIOVANE P., A. NOBILI and F. M. SIGNORETTI, *Assessing the sources of credit supply tightening: was the sovereign debt crisis different from Lehman?,* International Journal of Central Banking, v. 13, 2, pp. 197-234, **WP 942 (November 2013).**

DEL PRETE S., M. PAGNINI, P. ROSSI and V. VACCA, *Lending organization and credit supply during the 2008–2009 crisis,* Economic Notes, v. 46, 2, pp. 207–236, **WP 1108 (April 2017).**

DELLE MONACHE D. and I. PETRELLA, *Adaptive models and heavy tails with an application to inflation forecasting,* International Journal of Forecasting, v. 33, 2, pp. 482-501, **WP 1052 (March 2016).**

FEDERICO S. and E. TOSTI, *Exporters and importers of services: firm-level evidence on Italy,* The World Economy, v. 40, 10, pp. 2078-2096, **WP 877 (September 2012).**

GIACOMELLI S. and C. MENON, *Does weak contract enforcement affect firm size? Evidence from the neighbour's court,* Journal of Economic Geography, v. 17, 6, pp. 1251-1282, **WP 898 (January 2013).**

LOBERTO M. and C. PERRICONE, *Does trend inflation make a difference?,* Economic Modelling, v. 61, pp. 351–375, **WP 1033 (October 2015).**

MANCINI A.L., C. MONFARDINI and S. PASQUA, *Is a good example the best sermon? Children's imitation of parental reading,* Review of Economics of the Household, v. 15, 3, pp 965–993, **WP No. 958 (April 2014).**

MEEKS R., B. NELSON and P. ALESSANDRI, *Shadow banks and macroeconomic instability,* Journal of Money, Credit and Banking, v. 49, 7, pp. 1483–1516, **WP 939 (November 2013).**

MICUCCI G. and P. ROSSI, *Debt restructuring and the role of banks' organizational structure and lending technologies,* Journal of Financial Services Research, v. 51, 3, pp 339–361, **WP 763 (June 2010).**

MOCETTI S., M. PAGNINI and E. SETTE, *Information technology and banking organization,* Journal of Journal of Financial Services Research, v. 51, pp. 313-338, **WP 752 (March 2010).**

MOCETTI S. and E. VIVIANO, *Looking behind mortgage delinquencies,* Journal of Banking & Finance, v. 75, pp. 53-63, **WP 999 (January 2015).**

NOBILI A. and F. ZOLLINO, *A structural model for the housing and credit market in Italy,* Journal of Housing Economics, v. 36, pp. 73-87, **WP 887 (October 2012).**

PALAZZO F., *Search costs and the severity of adverse selection,* Research in Economics, v. 71, 1, pp. 171-197, **WP 1073 (July 2016).**

PATACCHINI E. and E. RAINONE, *Social ties and the demand for financial services,* Journal of Financial Services Research, v. 52, 1–2, pp 35–88, **WP 1115 (June 2017).**

PATACCHINI E., E. RAINONE and Y. ZENOU, *Heterogeneous peer effects in education,* Journal of Economic Behavior & Organization, v. 134, pp. 190–227, **WP 1048 (January 2016).**

SBRANA G., A. SILVESTRINI and F. VENDITTI, *Short-term inflation forecasting: the M.E.T.A. approach,* International Journal of Forecasting, v. 33, 4, pp. 1065-1081, **WP 1016 (June 2015).**

SEGURA A. and J. SUAREZ, *How excessive is banks' maturity transformation?,* Review of Financial Studies, v. 30, 10, pp. 3538–3580, **WP 1065 (April 2016).**

VACCA V., *An unexpected crisis? Looking at pricing effectiveness of heterogeneous banks,* Economic Notes, v. 46, 2, pp. 171–206, **WP 814 (July 2011).**

VERGARA CAFFARELI F., *One-way flow networks with decreasing returns to linking,* Dynamic Games and Applications, v. 7, 2, pp. 323-345, **WP 734 (November 2009).**

ZAGHINI A., *A Tale of fragmentation: corporate funding in the euro-area bond market,* International Review of Financial Analysis, v. 49, pp. 59-68, **WP 1104 (February 2017).**

2018

ACCETTURO A., V. DI GIACINTO, G. MICUCCI and M. PAGNINI, *Geography, productivity and trade: does selection explain why some locations are more productive than others?,* Journal of Regional Science, v. 58, 5, pp. 949-979, **WP 910 (April 2013).**

ADAMOPOULOU A. and E. KAYA, *Young adults living with their parents and the influence of peers,* Oxford Bulletin of Economics and Statistics,v. 80, pp. 689-713, **WP 1038 (November 2015).**

ANDINI M., E. CIANI, G. DE BLASIO, A. D'IGNAZIO and V. SILVESTRINI, *Targeting with machine learning: an application to a tax rebate program in Italy,* Journal of Economic Behavior & Organization, v. 156, pp. 86-102, **WP 1158 (December 2017).**

BARONE G., G. DE BLASIO and S. MOCETTI, *The real effects of credit crunch in the great recession: evidence from Italian provinces,* Regional Science and Urban Economics, v. 70, pp. 352-59, **WP 1057 (March 2016).**

BELOTTI F. and G. ILARDI *Consistent inference in fixed-effects stochastic frontier models,* Journal of Econometrics, v. 202, 2, pp. 161-177, **WP 1147 (October 2017).**

BERTON F., S. MOCETTI, A. PRESBITERO and M. RICHIARDI, *Banks, firms, and jobs,* Review of Financial Studies, v.31, 6, pp. 2113-2156, **WP 1097 (February 2017).**

BOFONDI M., L. CARPINELLI and E. SETTE, *Credit supply during a sovereign debt crisis,* Journal of the European Economic Association, v.16, 3, pp. 696-729, **WP 909 (April 2013).**

BOKAN N., A. GERALI, S. GOMES, P. JACQUINOT and M. PISANI, *EAGLE-FLI: a macroeconomic model of banking and financial interdependence in the euro area,* Economic Modelling, v. 69, C, pp. 249-280, **WP 1064 (April 2016).**

BRILLI Y. and M. TONELLO, *Does increasing compulsory education reduce or displace adolescent crime? New evidence from administrative and victimization data,* CESifo Economic Studies, v. 64, 1, pp. 15–4, **WP 1008 (April 2015).**

BUONO I. and S. FORMAI *The heterogeneous response of domestic sales and exports to bank credit shocks,* Journal of International Economics, v. 113, pp. 55-73, **WP 1066 (March 2018).**

BURLON L., A. GERALI, A. NOTARPIETRO and M. PISANI, *Non-standard monetary policy, asset prices and macroprudential policy in a monetary union,* Journal of International Money and Finance, v. 88, pp. 25-53, **WP 1089 (October 2016).**

CARTA F. and M. DE PHLIPPIS, *You've Come a long way, baby. Husbands' commuting time and family labour supply,* Regional Science and Urban Economics, v. 69, pp. 25-37, **WP 1003 (March 2015).**

CARTA F. and L. RIZZICA, *Early kindergarten, maternal labor supply and children's outcomes: evidence from Italy,* Journal of Public Economics, v. 158, pp. 79-102, **WP 1030 (October 2015).**

CASIRAGHI M., E. GAIOTTI, L. RODANO and A. SECCHI, *A "Reverse Robin Hood"? The distributional implications of non-standard monetary policy for Italian households,* Journal of International Money and Finance, v. 85, pp. 215-235, **WP 1077 (July 2016).**

CECCHETTI S., F. NATOLI and L. SIGALOTTI, *Tail co-movement in inflation expectations as an indicator of anchoring,* International Journal of Central Banking, v. 14, 1, pp. 35-71, **WP 1025 (July 2015).**

CIANI E. and C. DEIANA, *No Free lunch, buddy: housing transfers and informal care later in life,* Review of Economics of the Household, v.16, 4, pp. 971-1001, **WP 1117 (June 2017).**

CIPRIANI M., A. GUARINO, G. GUAZZAROTTI, F. TAGLIATI and S. FISHER, *Informational contagion in the laboratory,* Review of Finance, v. 22, 3, pp. 877-904, **WP 1063 (April 2016).**

DE BLASIO G, S. DE MITRI, S. D'IGNAZIO, P. FINALDI RUSSO and L. STOPPANI, *Public guarantees to SME borrowing. A RDD evaluation,* Journal of Banking & Finance, v. 96, pp. 73-86, **WP 1111 (April 2017).**

GERALI A., A. LOCARNO, A. NOTARPIETRO and M. PISANI, *The sovereign crisis and Italy's potential output,* Journal of Policy Modeling, v. 40, 2, pp. 418-433, **WP 1010 (June 2015).**

LIBERATI D., *An estimated DSGE model with search and matching frictions in the credit market,* International Journal of Monetary Economics and Finance (IJMEF), v. 11, 6, pp. 567-617, **WP 986 (November 2014).**

LINARELLO A., *Direct and indirect effects of trade liberalization: evidence from Chile,* Journal of Development Economics, v. 134, pp. 160-175, **WP 994 (December 2014).**

NUCCI F. and M. RIGGI, *Labor force participation, wage rigidities, and inflation,* Journal of Macroeconomics, v. 55, 3 pp. 274-292, **WP 1054 (March 2016).**

RIGON M. and F. ZANETTI, *Optimal monetary policy and fiscal policy interaction in a non_ricardian economy,* International Journal of Central Banking, v. 14 3, pp. 389-436, **WP 1155 (December 2017).**

SEGURA A., *Why did sponsor banks rescue their SIVs?,* Review of Finance, v. 22, 2, pp. 661-697, **WP 1100 (February 2017).**

2019

ALBANESE G., M. CIOFFI and P. TOMMASINO, *Legislators' behaviour and electoral rules: evidence from an Italian reform,* European Journal of Political Economy, v. 59, pp. 423-444, **WP 1135 (September 2017).**

ARNAUDO D., G. MICUCCI, M. RIGON and P. ROSSI, *Should I stay or should I go? Firms' mobility across banks in the aftermath of the financial crisis,* Italian Economic Journal / Rivista italiana degli economisti, v. 5, 1, pp. 17-37, **WP 1086 (October 2016).**

BASSO G., F. D'AMURI and G. PERI, *Immigrants, labor market dynamics and adjustment to shocks in the euro area,* IMF Economic Review, v. 67, 3, pp. 528-572, **WP 1195 (November 2018).**

BUSETTI F. and M. CAIVANO, *Low frequency drivers of the real interest rate: empirical evidence for advanced economies,* International Finance, v. 22, 2, pp. 171-185, **WP 1132 (September 2017).**

CAPPELLETTI G., G. GUAZZAROTTI and P. TOMMASINO, *Tax deferral and mutual fund inflows: evidence from a quasi-natural experiment,* Fiscal Studies, v. 40, 2, pp. 211-237, **WP 938 (November 2013).**

CARDANI R., A. PACCAGNINI and S. VILLA, *Forecasting with instabilities: an application to DSGE models with financial frictions,* Journal of Macroeconomics, v. 61, **WP 1234 (September 2019).**

CIANI E., F. DAVID and G. DE BLASIO, *Local responses to labor demand shocks: a re-assessment of the case of Italy,* Regional Science and Urban Economics, v. 75, pp. 1-21, **WP 1112 (April 2017).**

CIANI E. and P. FISHER, *Dif-in-dif estimators of multiplicative treatment effects,* Journal of Econometric Methods, v. 8. 1, pp. 1-10, **WP 985 (November 2014).**

CHIADES P., L. GRECO, V. MENGOTTO, L. MORETTI and P. VALBONESI, *Fiscal consolidation by intergovernmental transfers cuts? The unpleasant effect on expenditure arrears,* Economic Modelling, v. 77, pp. 266-275, **WP 985 (July 2016).**

COLETTA M., R. DE BONIS and S. PIERMATTEI, *Household debt in OECD countries: the role of supply-side and demand-side factors,* Social Indicators Research, v. 143, 3, pp. 1185–1217, **WP 989 (November 2014).**

COVA P., P. PAGANO and M. PISANI, *Domestic and international effects of the Eurosystem Expanded Asset Purchase Programme,* IMF Economic Review, v. 67, 2, pp. 315-348, **WP 1036 (October 2015).**

GIORDANO C., M. MARINUCCI and A. SILVESTRINI, *The macro determinants of firms' and households' investment: evidence from Italy,* Economic Modelling, v. 78, pp. 118-133, **WP 1167 (March 2018).**

GOMELLINI M., D. PELLEGRINO and F. GIFFONI, *Human capital and urban growth in Italy,1981-2001,* Review of Urban & Regional Development Studies, v. 31, 2, pp. 77-101, **WP 1127 (July 2017).**

MAGRI S, *Are lenders using risk-based pricing in the Italian consumer loan market? The effect of the 2008 crisis,* Journal of Credit Risk, v. 15, 1, pp. 27-65, **WP 1164 (January 2018).**

MIGLIETTA A, C. PICILLO and M. PIETRUNTI, *The impact of margin policies on the Italian repo market,* The North American Journal of Economics and Finance, v. 50, **WP 1028 (October 2015).**

MONTEFORTE L. and V. RAPONI, *Short-term forecasts of economic activity: are fortnightly factors useful?,* Journal of Forecasting, v. 38, 3, pp. 207-221, **WP 1177 (June 2018).**

MERCATANTI A., T. MAKINEN and A. SILVESTRINI, *The role of financial factors for european corporate investment,* Journal of International Money and Finance, v. 96, pp. 246-258, **WP 1148 (October 2017).**

NERI S. and A. NOTARPIETRO, *Collateral constraints, the zero lower bound, and the debt–deflation mechanism,* Economics Letters, v. 174, pp. 144-148, **WP 1040 (November 2015).**

RIGGI M., *Capital destruction, jobless recoveries, and the discipline device role of unemployment,* Macroeconomic Dynamics, v. 23, 2, pp. 590-624, **WP 871 (July 2012).**

FORTHCOMING

ALBANESE G., G. DE BLASIO and P. SESTITO, *Trust, risk and time preferences: evidence from survey data,* International Review of Economics, **WP 911 (April 2013).**

APRIGLIANO V., G. ARDIZZI and L. MONTEFORTE, *Using the payment system data to forecast the economic activity,* International Journal of Central Banking, **WP 1098 (February 2017).**

ARDUINI T., E. PATACCHINI and E. RAINONE, *Treatment effects with heterogeneous externalities,* Journal of Business & Economic Statistics, **WP 974 (October 2014).**

BRONZINI R., G. CARAMELLINO and S. MAGRI, *Venture capitalists at work: a Diff-in-Diff approach at late-stages of the screening process,* Journal of Business Venturing, **WP 1131 (September 2017).**

BELOTTI F. and G. ILARDI, *Consistent inference in fixed-effects stochastic frontier models,* Journal of Econometrics, **WP 1147 (October 2017).**

CIANI E. and G. DE BLASIO, *European structural funds during the crisis: evidence from Southern Italy,* IZA Journal of Labor Policy, **WP 1029 (October 2015).**

COIBION O., Y. GORODNICHENKO and T. ROPELE, *Inflation expectations and firms' decisions: new causal evidence,* Quarterly Journal of Economics, **WP 1219 (April 2019).**

CORSELLO F. and V. NISPI LANDI, *Labor market and financial shocks: a time-varying analysis,* Journal of Money, Credit and Banking, **WP 1179 (June 2018).**

COVA P., P. PAGANO, A. NOTARPIETRO and M. PISANI, *Secular stagnation, R&D, public investment and monetary policy: a global-model perspective,* Macroeconomic Dynamics, **WP 1156 (December 2017).**

D'AMURI F., *Monitoring and disincentives in containing paid sick leave,* Labour Economics, **WP 787 (January 2011).**

D'IGNAZIO A. and C. MENON, *The causal effect of credit Guarantees for SMEs: evidence from Italy,* Scandinavian Journal of Economics, **WP 900 (February 2013).**

ERCOLANI V. and J. VALLE E AZEVEDO, *How can the government spending multiplier be small at the zero lower bound?,* Macroeconomic Dynamics, **WP 1174 (April 2018).**

FEDERICO S. and E. TOSTI, *Exporters and importers of services: firm-level evidence on Italy,* The World Economy, **WP 877 (September 2012).**

FERRERO G., M. GROSS and S. NERI, *On secular stagnation and low interest rates: demography matters,* International Finance, **WP 1137 (September 2017).**

GERALI A. and S. NERI, *Natural rates across the Atlantic,* Journal of Macroeconomics, **WP 1140 (September 2017).**

GIACOMELLI S. and C. MENON, *Does weak contract enforcement affect firm size? Evidence from the neighbour's court,* Journal of Economic Geography, **WP 898 (January 2013).**

LIBERATI D. and M. LOBERTO, *Taxation and housing markets with search frictions,* Journal of Housing Economics, **WP 1105 (March 2017).**

LOSCHIAVO D., *Household debt and income inequality: evidence from italian survey data,* Review of Income and Wealth, **WP 1095 (January 2017).**

NATOLI F. and L. SIGALOTTI, *Tail co-movement in inflation expectations as an indicator of anchoring,* International Journal of Central Banking, **WP 1025 (July 2015).**

PANCRAZI R. and M. PIETRUNTI, *Natural expectations and home equity extraction,* Journal of Housing Economics, **WP 984 (November 2014).**

PEREDA FERNANDEZ S., *Teachers and cheaters. Just an anagram?,* Journal of Human Capital, **WP 1047 (January 2016).**

RAINONE E., *The network nature of otc interest rates,* Journal of Financial Markets, **WP 1022 (July 2015).**

RIZZICA L., *Raising aspirations and higher education. evidence from the UK's widening participation policy,* Journal of Labor Economics, **WP 1188 (September 2018).**

SEGURA A., *Why did sponsor banks rescue their SIVs?,* Review of Finance, **WP 1100 (February 2017).**