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Are Co-operative Banks Suffering from Capital Fever? Evidence over the Lending Crisis

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ABSTRACT

The decline in bank loans observed during the recent economic crisis in Italy has been attributed by a number of commentators to nothing more than the usual decline in the loan demand that occurs in a recession. This paper finds evidence that a *capital crunch* occurred in the co-operative banking segment in Italy in 2013, shedding some light on the presence of significant supply-side factors on lending retrenchment. Co-operative banks succeeded for years in supporting business and households despite the economic downturn, playing a crucial role in the economy in smoothing the effects of the crisis. Nevertheless, the persistent economic depression in Italy seems to have eventually weakened their capitalization and pushed them to cut-back lending in order to restore safer capital-to-asset positions. This paper, by discussing the recent difficulties of the banking system to finance businesses and households, contributes to the ongoing debates on the opportunity of evolving the traditional co-operative banks' business model and on the necessity of introducing instruments able to disintermediate the established banking channel. Finally, the paper introduces the concept of *Capital fever* and proposes a simple index to measure such a phenomenon on the basis of the regression coefficients of the book-based capital-to-asset ratio on lending.

Keywords: Co-operative banks, Lending, Credit crunch, Capital crunch, Capital fever
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1. Introduction

The financial crisis blasted in 2007 in the US produced worldwide an intense and largely unexpected shock, the effects of which are still not completely absorbed or even fully understood. More than six years after the outbreak of the crisis on the real economy, few western countries have recovered pre-crisis standard of GDP and employment, while others are still struggling to adapt their economies to the changed macroeconomic conditions.

In Italy, GDP went down by 1.2% in 2008 and by 5.5% in 2009. After a partial recovery in 2010 and 2011 (+1.7% and +0.4%), the economy turned again into recession, with a fall of the GDP in 2012 and 2013 of -2.4% and -1.9% respectively[2].

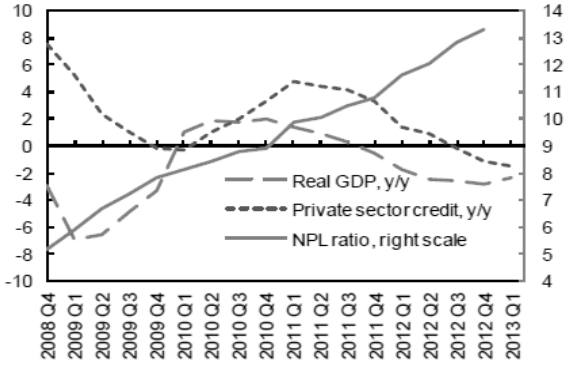
With the aim to shed some light on the banking sector in Italy during this period, some preliminary observations may be stated. First and foremost, the international context played a decisive role in shaping the internal market. Especially from 2009 to 2012, fears of collapsing of major European banks and repetitive speculative attacks on the debt positions of the South European countries produced an unprecedented pressure on the money market. As a consequence, the cost of liquidity peaked up severely, harming the solvency of many banks, both in Italy and in the rest of Europe. Only with the deployment by the European Central Bank of the Ltro (Long term refinancing operations) and the pledge of its President Mario Draghi "*to do whatever it takes to preserve the Euro"*, more stable funding conditions were established and maintained.

Secondly, recession hit businesses and households in Italy more severely than in other countries, leading many to consider the recession a structural adjustment of the economy. The impact on the banking system has been twofold. On one hand, the prolonged downturn has produced a significant and generalized worsening of borrowers' credit standing, which has pushed up non-performing loans and forced banks to impair their credits. On the other hand, the demand of new credit has felt down due to a review of the investment plans.

As a consequence of the mentioned elements, several Italian banks have incurred in operational losses or, in the best cases, in reduced profitability. This has created the conditions for an assessment of their capital adequacy and, starting from 2012, has induced a first run of recapitalizations, involving primarily big institutions.

In this scenario, here briefly described in its essential elements, the levels of new credit issued by Italian banks to the economy have critically reduced. It has turned to negative from the second part of 2012.

Figure 1: GDP, credit growth and non-performing loans in Italy (in percent)



Source: International Monetary Fund (2013)

[2] Source: Eurostat.

Many observers have described this situation as a new *credit crunch*. In their influential work, Bernanke and Lown (1991) defined the *credit crunch* as "*a significant leftward shift in the supply curve for bank loans, holding constant both the safe real interest rate and the quality of potential borrowers*". In other words, in a situation of *credit crunch* banks may refuse to supply credit at the same conditions they use to in previous periods. Many authors identify one of the causes of a *credit crunch* in the effects of unexpected levels of non-performing loans on the capital structure of the banks (through asset impairments and economic losses). In this sense, they imply causality between the *credit crunch* and the so called *capital crunch*. Whatever the cause, the main drawback of a *credit crunch* lays in the fact that it can hamper the launch of new investments by firms and can impact the consumption of households, leading to a further worsening of the economic cycle.

The aim of this paper is to analyze whether and in what measure the observed drop in bank lending occurred in Italy in the period 2009-2013 has been caused by a shortfall in banks capitalization, hence assessing the hypothesis of the presence of a *capital crunch*.

To this extent, a particular attention has to be given to the analysis of co-operative banks. With total assets peaking € 136.0 billion and 1.1 million members at the beginning of 2014[3], these banks assume in Italy an essential role in supplying credit, in particular to small and medium enterprises (SME).

Italy's SME sector is the largest in the EU by number of firms (3.8 million firms by including enterprises with less than 10 employees) and it counts for 80.3% in terms of employment and 68.3% in terms of value added[4]. Hence, the lending behavior of co-operative banks has relevant systemic connotations.

The rest of the document is organized as follows. Section 2 gives an overview of the *credit crunch* phenomenon. Section 3 describes the sources of data and the sample analyzed. Section 4 goes into details about the methodology used to test the *capital crunch* hypothesis. Section 5 contains the empirical results obtained and Section 6 states the research conclusions.

2. *Credit crunch* and *capital crunch*

2.1 Disentanglement of supply-side effects in lending retrenchment

The President of the Federal Reserve of Boston Richard F. Syron (1991) was the first to observe the presence of supply-side effects on credit slowdowns, while analyzing the marked deceleration in bank lending in the region of New England during the 1990-1991 recessions. He gave a first explanation of *credit crunch*, describing it as a situation in which credit availability is unusually restrictive, after factoring in the stage of the business cycle. He noticed how the severe credit restrictions were not caused as in past credit crisis by losses in bank deposits due to higher rates of return available from outside the banking sector (disintermediation[5]), but instead by losses in bank capital. High levels of non-performing assets, much of them being real estate loans, were the main cause of sensitive impairments and subsequent capital shrinkages. In such a situation, Syron observed that the banks had reacted by tightening their credit standards, probably kept too lax during the previous real estate booming phase.

[3] Source: Credito Cooperativo, data as at 30/03/2014.
[4] Source: European Commission (2012), *"Small Business Act for Europe, Fact Sheet 2012 – Italy"*.
[5] See Wojnilower (1980).

Syron's observations gave birth to a flourishing literature, aimed at analyzing the causes of the *credit crunch* and its consequences on the economy. The seminal work of Bernanke and Lown (1991) was the first structured attempt to analyze this phenomenon. The authors used state-level data for the US to observe the relation between bank capital and bank lending. Through a cross-sectional regression of loan growth on bank capital, they found out a causal link between low capital-asset ratios and low lending growth during the years 1990-1991. Similarly, by using bank-level data for a panel of banks in New Jersey, they verified that poorly capitalized banks had experienced substantially higher levels of lending retrenchment than highly capitalized banks, in most individual lending categories as well as in overall, confirming in this extent the presence of a significant *capital crunch*.

In terms of modeling, several variations of the following standard OLS regression scheme have been adopted in order to assess the variation of bank lending due to capital-driven factors (e.g. Berger and Hudell, 1994, Peek and Rosengren, 1995a):

$$(\Delta L/L)_{i,t0-t1} = \alpha + \beta_1 (K/A)_{i,t0} + \beta_2 D_{t0-t1} + \varepsilon_{i,t} \qquad (1)$$

In the equation, the dependent variable $(\Delta L/L)_{i,t0-t1}$ represents the level of credit growth or retrenchment for the sample unit analyzed (either a state, a region or a single bank) in one particular period, $(K/A)_{i,t0}$ is a measure of capital-to-asset ratio at the beginning of the period and D_{t0-t1} represents a vector of demand-driven variables. Many works have used a lagged measure of the capital-to-asset ratio in order to avoid simultaneity of the lending growth and capital ratio and limit the endogeneity problem.

No unanimous consensus exists in literature as far as it concerns the different methods to control for demand-side effects while analyzing a *credit crunch*. The factual observation that most of the times shifts in lending demand and supply occur at the same time and with different magnitude on volumes and rates, has forced researchers to introduce limitations and adjustments to raw time series and samples. A first way used to limit these effects is to restrict the sample to banks operating in the same area and/or to group banks into demand-homogeneous clusters (e.g. Bernanke and Lown, 1991, Peek and Rosengren, 1995b). In this way, it may be assumed that all the sample units in the same cluster face the same uniform demand of credit. Other authors preferred to approximate the demand of credit with the general economic conditions. In this sense, they included in the regression model a number of key macroeconomic variables, such as employment rate, GDP growth, inflation etc. (e.g. Kashyap and Stein, 2000, Ashcraft, 2003). A few researchers used instrumental variables calculated with respect to benchmark periods, in which it may be assumed there were not credit limitations (e.g. Berger and Udell, 1994, Watanabe, 2007). Finally and more recently, the use of survey-based analysis seems to have gained a certain level of consensus in appraising the demand of bank lending. In particular in Europe, the availability of the Eurosystem's bank lending survey (BLS) has allowed researchers to introduce new variables backed by a qualitative assessment of the demand and supply of credit as perceived by leading banks and financial institutions (e.g. Hempell and Sorensen, 2010, Del Giovane, Eramo and Nobili, 2011). In any case, none of the methods mentioned assures a complete disentanglement between the supply-side and demand-side effects on credit developments.

Once the presence of supply-side effects had gathered consensus as one significant component of the lending developments, further studies have tried to analyze the sensitiveness of the response of banks' assets and

liabilities components to a shock in capital. Hancock, Laing and Wilcox (1995) used quarterly data for individual banks to estimate bank-level dynamic responses, demonstrating that it took securities and capital instruments only one year to adjust to capital shocks, while liabilities and most loan categories took two to three years to complete their adjustments.

On the differences between large and small banks, Hancock, Laing and Wilcox (1998), using data by state for the period 1989-1992 in the US, verified that in response to declines in their own bank capital, small banks shrank their loan portfolios considerably more than large banks did. Furthermore, they found that the volume of loans made under specific governmental guarantee scheme (the Small Business Administration loan guarantee program) shrank less in response to declines in bank capital than the volume of loans not made under the same loan guarantee program.

2.2 Capital targets and capital shortfalls

In the analysis of the causes and the implications of a shortfall in bank capital, regulation and management preferences for specific capital targets play an essential role. As far as it concerns regulation, the introduction of risk-based capital-to-asset ratios in the early nineties definitively linked the equity side to the assets sides of the banks' balance sheets. Under a regulatory point of view, undercapitalized banks are the ones which present a capital-to-asset ratio lower than a fixed threshold (as a general rule, under the Basel II Accord, regulatory capital must be equal or higher the 8.0% of the risk-weighted assets). In such a framework, when the capital-to-asset ratio falls below the binding minimum requirement, two basic options are available for the bank in order to restore compliancy: issuing new equity (increase the numerator of the ratio) or shifting assets from more risky to less risky classes (decrease the denominator of the ratio). Because of asymmetric information, bank management can find issuing new equity excessively costly, as it involves a confrontation with the shareholders as well as signaling on the market a state of inadequacy that may be perceived negatively[6]. Undercapitalized banks, in order to quickly adjust their ratios, may prefer cutting back credit and investing in less risky assets classes. To explicit the concept, under the Basel II framework loans to real estate have in principle a 100.0% weight[7], against a 0.0% weight for highly rated government bonds. Shifting from real estate lending to government bonds will be then an effective way to push back the capital-to-asset ratio above the regulatory constraint. If this reasoning holds for a sufficiently high number of banks in the same region, the "regulatory" shortfall in capital can lead to a supply-driven cutback in lending, in other words to a *credit crunch*.

With this assumption in mind, Haubrich and Wachtel (1993) analyzed the shift in the portfolio structure of U.S. commercial banks which took place since 1989 and observed that the changes in portfolio composition were strongly related to the introduction of risk-based capital requirements (the Basel I provision in the US). In particular, they verified that banks with the largest increases in government securities holdings tended to be those with the lowest capital-asset ratios when the new capital requirements were introduced. In the same extent, Berger and Udell (1994) attempted to determine the causes of the reallocation of U.S. commercial bank credit from loans to securities in the early 1990s, with particular emphasis on the risk-based capital regulations recently introduced. They tested the hypothesis that the increase in the shift from loans to securities in the early nineties was due to capital constraints. They compared the speed of shifting in previous years, which they used as control

[6] For example, Stein (1998) concludes that banks issuing new equity may be perceived under-performing by the investors.
[7] This may not be the case for banks that adopt the Internal Ratings-Based (IRB) approach to evaluate their credit positions. By using the IRB approach, the weight to assign to each loan varies depending on the borrower's credit standing.

periods, and also factored in a dummy variable to indicate the hypothesized *credit crunch* period (1990-1992). They found confirmation that banks restrained credit or increased the cost of lending as a result of regulatory pressure to reduce risk. More recently, Montgomery (2005) found for a panel of Japanese banks that regression coefficients on the book-based capital-to-asset ratios were significant for explaining lending developments during the post-Basel I years (1988–99) and not significant during the pre-Basel I years (1982–87) for all international, domestic, and "switcher" banks[8], in this way confirming the impact of regulation on bank portfolio composition.

Peek and Rosengren (1995a) proposed a behavioral model aimed at analyzing the role of banks' capital constraints on banks management decisions, observing that such constraints could potentially come from regulatory pressures, market pressures or just management preferences. The authors worked with single-level bank data, using variation in deposits instead of loans as dependent variable. The authors verified the existence of a significant *capital crunch* in New England in the period 1990-1991 and concluded that bank behavior was altered by losses in capital, with poorly capitalized banks contracting more than their better-capitalized competitors. They were then able to argument that regulatory constraints had played a major role as one key cause of a *credit crunch*. Similar conclusions were reached by Hancock and Wilcox (1992), who focused their research on management preferences for specific target capital-to-asset ratios.

2.3 The role of the supply-side factors in the recent lending crisis in Europe and in Italy

A number of works have so far attempted to analyze the effects of the financial crisis started in mid-2007 on the lending behavior of the European banks. Nevertheless, homogeneous, continent-wise findings on this matter do not seem to have emerged so far. This is mainly due to the short time span on hand and most of all to the sensitive differences that can be observed amongst the European countries in terms of structural response to the crisis. This notwithstanding, Hempell and Sorensen (2010) tried to assess the impact of supply constraints on bank lending, by focusing on the Eurozone. These authors applied a cross-country panel-econometric approach using a confidential data set on results from the Eurosystem's bank lending survey (BLS), which allows them to partially disentangle supply and demand effects. They were able to provide evidence that factors related to banks' balance sheet positions had a significant influence on the development of loans to firms and households in the euro area with regard to the 2007-2009 period. In particular, their findings suggested that strains on banks' liquidity positions and the difficulties to access the wholesale funding were two main causes of lending alteration. In this context, they observed that the adjustment that took place primarily occurred via prices rather than outright quantity restrictions.

Most of the authors narrowed the scope of research to the effects of the financial crisis in a single European country. As far as it concerns Italy, Del Giovane, Eramo and Nobili (2011) assessed the role of both supply and demand factors in lending to businesses developments during the years 2007–2009. They concluded that the effect of supply factors on the growth of lending was the strongest after Lehman collapsed. In particular, they calculated that about one fourth of the total supply effect could be attributed to costs related to the banks' balance sheet position (including capital constraints), while the rest was most probably due to their perception of credit risk. Caivano, Rodano, and Siviero (2010) attempted to link the international economic environment to the specificities of the Italian market by studying the transmission of the financial crisis on the Italian domestic

[8] "Switcher" banks are, under the Japanese regulatory scheme, banks that renounced to their privilege to conduct international business in order to loosen the minimum risk-based capital requirements.

economy in the period 2008-2010. They found that the largest part of the economic shock was due to the international contest, while a less important role, even if not negligible, was played by the worsening of lending conditions for businesses and the fall in the confidence levels of consumers throughout the recession. Gaiotti (2011) studied the periods of economic recession in Italy starting from the early nineties, founding that the elasticity of a firm's investment to the availability of bank credit were significant in periods of economic contraction, but not in other periods. In particular during the last global crisis, he observed that the impact of credit constraints on investments in Italy was significant in the manufacturing sector.

Existing literature leaves the period starting from 2012 broadly unexplored as far as it concerns the analysis of the role of supply factors in credit developments. This is primarily due to the limited availability of data regarding the latest years of the crisis. Therefore, by focusing on the entire period 2009-2013, the present paper adds significantly to literature by providing for the first time evidences on the *capital crunch* hypothesis in Italy all along the crisis period. In addition, the paper has the merit to focus the analysis on co-operative banks.

3. Data

3.1 Sources of data and sampling procedure

The main database used to collect the data for the analysis is *Bankscope*, by Bureau Van Dijk. This database contains financial information for a wide number of banks worldwide. It is compiled predominantly from the balance sheet and income statement as well as notes from the audited annual reports. At the end of 2013, *Bankscope* covered 605 active Italian banks and other financial institutions, hence comprising almost the entire financial market.

In order to have conclusive results on the topic under discussion, the analysis of the Italian market has been restricted to three types of banks, which carry out the lending activity as their core business: commercial banks, savings banks and co-operative banks. This has meant the exclusion of all the other type of financial institutions available in the dataset (investment banks, private banking and asset management institutions, government financial institutions, etc.). Banks have been analyzed, as much as possible, at a single level. In this light, consolidated values for baking groups have been taken into account only when more granular information was not available. Furthermore, banks with total assets value lower than 800 million have been excluded. This limitation has been adopted to avoid the presence in the sample of a majority of micro-banks representing a very limited portion of the market. Finally, banks with only partial time series available have been excluded in order to assure the coherence and the comparability of the regression results over the reference period. The following table summarizes the sampling procedure results by indicating the final composition of the sample by bank type.

Table 1: Composition of the sample by bank type

Commercial banks	37
Savings banks	24
Co-operative banks	77
Total	**138**

The final sample is strongly illustrative of the Italian loans market, as it includes banks representing about 83.0% of the total assets managed by commercial, savings and co-operative banks[9].

3.2 Preliminary evidence

The following table gives a broad overview of the banks included in the sample by providing some key descriptive statistics. Specific values for co-operative banks and for commercial and savings bank altogether (other banks) are also given.

Table 2: Selected descriptive statistics of the banks in the sample

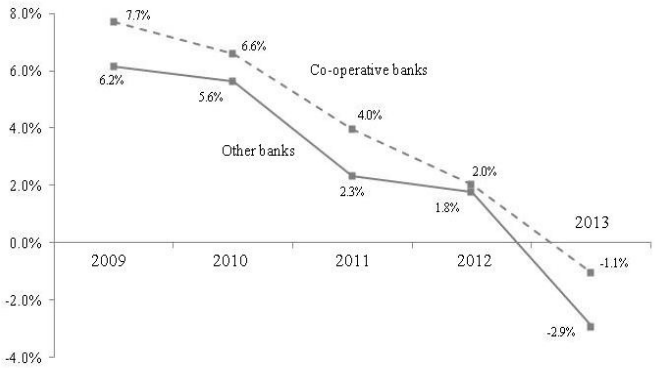
	All banks	Co-operative banks	Other banks
Total assets (average)	€ 15.08 bln	€ 7.47 bln	€ 24.70 bln
K/A ratio (average)	8.69%	8.95%	8.35%
FEE/OI ratio (average)	0.30	0.26	0.35

Notes: For total assets and K/A ratio values as at 31/12/2013. For FEE/OI ratio values related to FY 2013.

The analysis of the descriptive statistics confirms the widespread understanding of the market. Co-operative banks suffer a smaller size than the rest of the banks and are more capitalized (at the end of FY2013, the book-based capital-to-asset ratio, *K/A*, was on average 0.6% higher for co-operative banks than for other banks). The relevant difference in the incidence of the fees on the overall operating income (*FEE/OI* ratio) is also worth mentioning: co-operative banks rely less than other banks on their intermediation activity, basically meaning they are less diversified.

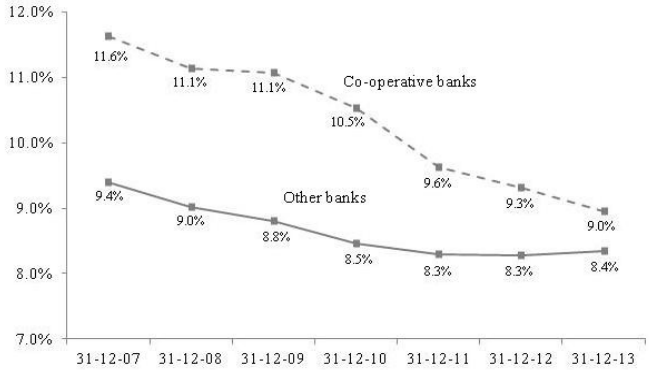
The following figures show the development of the gross loans (Figure 2) and the evolution of *K/A* ratio (Figure 3) during the crisis. Different lines indicate co-operative banks (dotted) and other banks (plain).

Figure 2: Gross loans increase (decrease) over time



Notes: author's elaboration on sample data set. Average values calculated on the basis of the sample analyzed, outliers excluded.

Figure 3: Evolution of the K/A ratio over time



Notes: author's elaboration on sample data set. Average values calculated on the basis of the sample analyzed, outliers excluded.

[9] Author's estimate on Bankscope data as at 31/12/2013.

Some valuable indications can be drawn from the observation of the charts above. First of all, co-operative banks have shrunk lending less than the market. To this extent, Figure 2 shows how the co-operative banks' line lays permanently above the other banks' one. This highlights the capacity of co-operative banks to support Italian businesses and households all along the crisis, confirming in this way the countercyclical function that has been observed by many authors (e.g. Di Colli and Girardi, 2012, Zago and Dogili, 2014).

Further indications arise from the analysis of Figure 3. Even if still better capitalized then other banks at the end of FY2013, co-operative banks have experienced over time a higher reduction in their relative capitalization. In particular, the average *K/A* ratio for co-operative banks passed from 11.6% at the end of FY2007 to 9.0% at the end of FY2013 (-2.6%). In the same period, other banks' average *K/A* ratio mildly worsened from 9.4% to 8.4% (-1.0%). Furthermore, savings and commercial banks appear to have succeeded in stabilizing their relative capitalization, at least from FY2011 (for these banks, the average *K/A* ratio at the end of FY2010 was 8.5%, in line with the value at the end of the FY2013). On the contrary, co-operative banks have kept reducing their capitalization over time *vis-à-vis* their assets.

4. Methodology

The methodology used in the paper consists in a bottom-up approach, where the effects of capital (and other control factors) on lending is estimated by using data at single bank level. The OLS regression model is in the form:

$$\left(\frac{\Delta L}{L}\right)_{i,t0-t1} = \alpha_0 + \beta_1 \left(\frac{K}{A}\right)_{i,t0} + \beta_2 \left(\frac{\Delta K}{K}\right)_{i,31/12/08-t0} + \beta_3 \left(\frac{\Delta GNS}{GNS}\right)_{i,t0-t1} + \beta_4 \left(\frac{\Delta DVT}{DVT}\right)_{i,t0-t1} + \beta_5 \left(\frac{\Delta LBN}{LBN}\right)_{i,t0-t1} + \beta_6 \log(A)_{i,t0} + \beta_7 \left(\frac{FEE}{OI}\right)_{i,t\text{-}1-t0} + \beta_8 RGDP_{t0-t1} + \varepsilon_{i,t} \quad (2)$$

The dependent variable *ΔL/L* is a measure of incremental loans, mortgages and other financing instruments to non-financial institutions issued by the bank *i* in the year of reference. To this extent, *L* represents the gross loans outstanding.

Two variables are used to verify the *capital crunch* hypothesis. The first one, *K/A*, is the book-based capital-to-asset ratio used in several papers (e.g. Bernanke and Lown, 1991, Berger and Hudell, 1994, Watanabe, 2007). It is calculated at the beginning of the year of the observation of the loans variation. The second one, *ΔK/K,* is the variation in equity calculated as the difference between the value at 31-dec-2008 and the value at the beginning of the period under analysis. This variable is used to assess the response in terms of loans to the capital losses that a bank may have experienced from the beginning of the economic crisis.

A set of behavioral variables is also included in order to try to detect the opportunistic conduct of the banks in terms of substitution of loans with other financial instruments available in the market. *ΔGNS/GNS, ΔDVT/DVT* and *ΔLNB/LNB* are three variables that aim at measuring the percentage variation in the levels of government securities, derivatives and loans to banks held by the bank *i* in the period of reference.

Log(A) is a first control variable used to account for the borrowers concentration problem that several small banks may have (Peek and Rosengren,1995a). Because of regulatory provisions, banks cannot lend above a certain percentage of their portfolio to a single borrower. In such a framework, small banks may find difficult to lend to big firms as the amount demanded would be relatively too high. Hence, in a situation of economic downturn in which small businesses may suffer the most (as anectodical observation seems to claim in Italy), small banks may shrink their loans more than bigger banks do in response to the deteriorated balance sheet conditions of the borrowers (that is, small businesses). *A* represents here the bank's total assets. *FEE/OI* is a second control variable aiming at assessing the impact on lending of the diversification characteristics of the bank (Peek and Rosengren, 1995a). The variable consists in the portion of fee income over the sum of total interest and fee income. The underlying consideration is that bank less exposed to the credit business and hence more diversified (with higher FEE/OI ratio), may be more insulated in the case of significant shock in the demand of credit in the market. *RGDP* represents the change in the relevant gross domestic product in the region of activity of the bank in year of reference. Such a control variable is used to factor in the impact of the economic conditions in the development of the lending activity. To this extent, each bank has been categorized as national level bank or as regional bank. For national level banks *RGDP* is simply the overall Italian GDP growth rate, while for regional banks it assumes the value of the GDP growth rate registered in the region of prevalent activity.

Including demand control variables such as *Log(A)*, *FEE/OI* and *RGDP* should ease the potential bias of the regression coefficients for the *K/A* and *ΔK/K* ratios due to endogeneity. In fact, these variables may predict lending development only as a consequence of demand-side effects. In particular, a prolonged recession can impact on both the quantity of credit demanded (hence impacting on the dependent variable) and the capitalization of the banks, via an increase of non-performing loans. The use of lagged values of *ΔK/K* also contributed to limit this problem.

The regression is run separately for the five years of reference of the analysis (from 2009 to 2013). This allows the observation of the evolution of the significance and the magnitude of the regression coefficients over time. The regression analysis is conducted on the overall sample and separately on co-operative banks and other banks.

Table 3 reports the correlations between the variables as far as it concerns FY2013 for the entire sample analyzed.

Table 3: Correlation matrix

	ΔL/L	K/A	ΔK/K	ΔGNS/GNS	ΔDVT/DVT	ΔLNB/LBN	Log(A)	FEE/OI	RGDP
ΔL/L	1.0000								
K/A	0.0820	1.0000							
ΔK/K	0.1500	0.0026	1.0000						
ΔGNS/GNS	0.0274	0.0451	-0.0249	1.0000					
ΔDVT/DVT	0.0087	-0.0146	0.0685	-0.0420	1.0000				
ΔLNB/LBN	-0.0876	0.0846	0.0822	0.6214	-0.0719	1.0000			
Log(A)	0.0254	-0.1372	-0.1616	-0.1719	-0.0750	-0.1432	1.0000		
FEE/OI	-0.0979	-0.2234	-0.1415	0.0116	-0.0008	0.0804	0.3873	1.0000	
RGDP	0.1346	0.0864	-0.0168	0.0246	0.0903	0.0610	-0.0443	-0.0402	1.0000

Notes: Correlations calculated on the basis of FY2013 values and for the entire sample.

5. Results and discussion

5.1 Co-operative banks and credit crunch

Empirical investigation on the *credit crunch* has been hampered by the difficulty to separate demand-side and supply-side effects in periods of credit retrenchment. This notwithstanding, consolidated literature offers several methods to ease this problem. In the case of this study, the focus on a single country pledges a certain level of homogeneity in terms of demand of credit that banks under investigation face over time. Nevertheless, this is not sufficient to advocate that all the banks are subject to identical demand shocks. For this reason, relevance of results has been sought by including control variables taking into account the development of economic activity in the region where the bank mainly operates (*RGDP*), the borrowers concentration problem (*log(A)*) and the diversification characteristics of the bank (*FEE/OI*).

On these basis, the model formalized by the relation (2) investigates supply-side effects on credit lending developments through a measure of capitalization (*K/A*) and of change in equity from the beginning of the crisis (*ΔK/K*) as well as through a set of variables aiming at capturing potential substitution effects in terms of investment options available for the banks (*ΔGNS/GNS*, *ΔDVT/DVT*, *ΔLNB/LNB*).

Tables 4 to 8 report the regression results for the FYs 2013, 2012, 2011, 2010 and 2009 respectively, for the entire sample (all banks), for co-operative banks only and for other banks.

Table 4: Regression results for the equation (2) for the FY 2013

	FY 2013		
	All banks	Co-operative banks	Other banks
K/A	0.2107	0.8538**	-0.2162
	(0.87)	(2.62)	(-0.60)
ΔK/K	0.0618**	0.1023**	0.0249
	(2.07)	(2.40)	(0.59)
ΔGNS/GNS	0.0085	0.0086	0.0073
	(1.56)	(0.69)	(1.16)
ΔDVT/DVT	-0.0043	-0.0376	0.0108
	(-0.18)	(-1.06)	(0.32)
ΔLNB/LBN	-0.0097*	-0.0085	-0.0102
	(-1.85)	(-0.98)	(-1.56)
Log(A)	0.0123	0.0578***	-0.0091
	(1.06)	(3.36)	(-0.55)
FEE/OI	-0.0498	-0.1963*	0.0711
	(-0.78)	(-1.73)	(0.78)
RGDP	2.2188*	2.4033	1.4048
	(1.67)	(1.22)	(0.76)
Constant term	-0.0378	-0.2302***	0.0274
	(-0.70)	(-2.88)	(0.33)
N	*138*	*77*	*61*
R^2	*0.085*	*0.272*	*0.086*

Notes: the dependent variable is the annual percentage change in gross loans outstanding to non-financial corporations for each bank in 2013.
*** shows significance at 1%, ** 5% and * 10% respectively. *t*-statistics are in parentheses.

Table 5: Regression results for the equation (2) for the FY 2012

	FY 2012		
	All banks	Co-operative banks	Other banks
K/A	0.4762	0.7176	0.1286
	(1.33)	(1.32)	(0.28)
ΔK/K	0.352	0.0532	0.0549
	(0.61)	(0.49)	(0.83)
ΔGNS/GNS	0.0133*	0.0090	0.0173
	(1.77)	(0.83)	(1.57)
ΔDVT/DVT	-0.0091	-0.0164	-0.0055
	(-0.79)	(-1.03)	(-0.34)
ΔLNB/LBN	-0.0054	-0.0012	0.0060
	(-0.57)	(-0.07)	(-0.56)
Log(A)	0.0277	0.1023***	-0.0066
	(1.63)	(3.48)	(-0.29)
FEE/OI	-0.0276	-0.5059**	-0.0388
	(-0.69)	(-2.17)	(-1.03)
RGDP	-0.2301	3.9793	-3.8947*
	(-0.13)	(1.59)	(-1.75)
Constant term	-0.1223	-0.1658	-0.0574
	(-1.44)	(-1.29)	(-0.50)
N	*138*	*77*	*61*
R^2	*0.200*	*0.222*	*0.152*

Notes: the dependent variable is the annual percentage change in gross loans outstanding to non-financial corporations for each bank in 2012.
*** shows significance at 1%, ** 5% and * 10% respectively. *t*-statistics are in parentheses.

Table 6: Regression results for the equation (2) for the FY 2011

	FY 2011		
	All banks	Co-operative banks	Other banks
K/A	0.2832	0.6010	-0.1463
	(0.19)	(0.22)	(-0.45)
ΔK/K	0.2066	0.5608	-0.0722
	(0.59)	(0.83)	(-1.10)
ΔGNS/GNS	-0.0001	-0.0012	-0.0007
	(-0.07)	(-0.69)	(-0.99)
ΔDVT/DVT	0.0204	0.0435	0.0011
	(0.55)	(0.80)	(0.10)
ΔLNB/LBN	0.0027	-0.0229	-0.0022
	(0.26)	(-0.42)	(-1.41)
Log(A)	0.1886***	0.5340***	-0.0162
	(2.70)	(4.04)	(-1.14)
FEE/OI	-1.2583***	-4.1070***	0.0028
	(-2.87)	(-3.99)	(0.04)
RGDP	-3.4099	-2.8920	-0.2998
	(-0.52)	(-0.25)	(-0.23)
Constant term	-0.2481	-0.7371	0.1046
	(-0.75)	(-1.18)	(1.52)
N	*138*	*77*	*61*
R^2	*0.115*	*0.337*	*0.094*

Notes: the dependent variable is the annual percentage change in gross loans outstanding to non-financial corporations for each bank in 2011.
*** shows significance at 1%, ** 5% and * 10% respectively. *t*-statistics are in parentheses.

Table 7: Regression results for the equation (2) for the FY 2010[10]

	FY 2010		
	All banks	Co-operative banks	Other banks
K/A	-0.0682	-0.1909	0.0414
	(-0.23)	(-0.36)	(0.13)
ΔK/K	0.0048	0.0052	-0.0504
	(0.06)	(0.03)	(-0.74)
ΔGNS/GNS	0.0001	0.0000	0.0023***
	(0.45)	(0.26)	(3.56)
ΔDVT/DVT	-0.0037	-0.0039	-0.0019
	(-0.84)	(-0.55)	(-0.48)
ΔLNB/LBN	0.0046	0.0067	0.0024
	(0.36)	(0.31)	(0.20)
Log(A)	-0.0251*	-0.0235	-0.0166
	(-1.74)	(-0.87)	(-1.22)
FEE/OI	0.0493	0.2134	-0.0399
	(0.55)	(0.89)	(-0.55)
RGDP	0.0654	-0.4633	0.2532
	(-0.12)	(-0.49)	(0.48)
Constant term	0.1504**	0.1409	0.1179**
	(2.26)	(1.15)	(1.93)
N	*135*	*76*	*59*
R^2	*0.032*	*0.035*	*0.251*

Notes: the dependent variable is the annual percentage change in gross loans outstanding to non-financial corporations for each bank in 2010.
*** shows significance at 1%, ** 5% and * 10% respectively. *t*-statistics are in parentheses.

Table 8: Regression results for the equation (2) for the FY 2009[11]

	FY 2009		
	All banks	Co-operative banks	Other banks
K/A	0.2811	-0.0320	0.8161**
	(1.47)	(-0.08)	(2.00)
ΔK/K	-	-	-
ΔGNS/GNS	-0.0010	-0.0022	-0.0001
	(-0.52)	(-0.51)	(-0.27)
ΔDVT/DVT	0.0071	0.0089	0.0035
	(1.03)	(1.04)	(0.27)
ΔLNB/LBN	0.0001	-0.0025	0.0077
	(0.12)	(-0.25)	(0.39)
Log(A)	-0.0065	-0.0035	-0.0110
	(-0.47)	(-0.14)	(-0.58)
FEE/OI	0.0120	-0.0181	0.0087
	(0.14)	(-0.08)	(0.09)
RGDP	0.3914	0.6958	0.1525
	(0.92)	(1.18)	(0.23)
Constant term	0.0724	0.1325	0.0387
	(1.13)	(1.25)	(0.44)
N	*134*	*75*	*59*
R^2	*0.048*	*0.040*	*0.093*

Notes: the dependent variable is the annual percentage change in gross loans outstanding to non-financial corporations for each bank in 2009.
*** shows significance at 1%, ** 5% and * 10% respectively. *t*-statistics are in parentheses.

[10] 3 outlier observations have been dropped out from the sample in order to avoid alteration of the regression results.
[11] 4 outlier observations have been dropped out from the sample in order to avoid alteration of the regression results.

The results for the full specification provide substantial support to the hypothesis that a *capital crunch* occurred in Italy in 2013. Though, this effect was uneven and can be only partially generalized to the entire market. On one hand, the coefficient of capital-to-asset ratio is positive and significant at 95 percent confident level only for co-operative banks, while it is not significant for the entire sample and for other banks. On the other hand, the coefficient of the change in capital since the beginning of the crisis is positive and significant at 95 percent confidence level for the entire sample and for co-operative banks, while it remains not significant for other banks. These results suggest that the *capital crunch* hypothesis may be verified for co-operative banks, while the same effect for the rest of the market has been mild or absent. That is, co-operative banks might have been forced to shrink loans in FY 2013 in order to adjust their capital-to-asset ratios.

The analysis of the results of the regression for the FYs from 2012 to 2009 does not provide strong evidences of supply-side effects on the lending developments in these years. In fact, neither the regression coefficient of capital-to-asset ratio nor of the change in capital since the beginning of the recession are significant. The only exception is given by the coefficient of the *K/A* variable for other banks in FY2009, which is significant at 95 percent confidence level. Nevertheless, a low coefficient of determination (R^2 = 0.093) suggests caution and evidences the risk of overweighting the relevance of this result.

Overall, the results obtained may confirm the adjustment effect of a *capital crunch* whenever it occurs. Banks tend to operate in an unconstrained manner when they stand close to their target capitalization but they start revising their asset composition when they derail excessively from the target. To this extent, the regression results for the *K/A* variable seem to fit well with the developments summarized in the Figure 3 and previously described. In particular for co-operative banks, it might have been the case that continuous reduction in the relative capitalization over the crisis has eventually produced a *capital crunch* in FY2013. For other banks, the absence of a *capital crunch* is largely coherent with a more stable capital-to-asset ratio all along the period 2009-2013.

One can argue why co-operative banks may have suffered a *capital crunch* in FY 2013 even though they had, on average, a better capitalization than other banks. Two possible explanations may be given. First, co-operative banks' target capitalization may be structurally higher than it is for commercial and savings banks. Hence, pressure on assets (and lending) might arise at a higher level of *K/A* than for other banks. Second, it might be the case that the co-operative banks have suffered for a capital shock, that is a substantial and unexpected loss in capital. Overall, both possibilities seem coherent and in line with the full appreciation of the *K/A* ratio over time already discussed.

Some interesting findings arise by analyzing the regression results of the independent variables intended to control for differences in demand. In fact, both the *log(A)* and the *FEE/OI* ratio have estimated coefficients that are consistently significant for co-operative banks in the FYs 2011, 2012 and 2013. The same variables are not significant for other banks. These results suggest an incidence of specific demand-side factors on the lending developments of co-operative banks in those years.

Firstly, co-operative banks may have been touched by the borrowers' concentration problem. Serving prevalently small businesses and households, these banks are largely excluded from the market of the big firms. In the case of an asymmetric impact of the crisis on big and small firms, as it has most probably been the case in Italy, co-operative banks' lending activity might have been strongly influenced by the deteriorated balance sheet positions of their target clients, that is small firms. At the same time, they could have been in the impossibility to access the more stable market of the big firms because of the excessively high size of the demanded loans.

Overall, this may explain the significance of the *log(A)* variable for co-operative banks. An alternative explanation to the borrowers' concentration problem to clarify the significance of the *log(A)* variable may be drawn from a closer analysis of the property structure of co-operative banks and its implication in terms of target clientele. Members of co-operative banks are prevalently small economic agents operating in a particular area. This has a clear incidence on the bank size. Furthermore, mutuality and focus in serving members often create a captive market formed prevalently by small businesses and households. Hence, in a period in which small businesses suffer the most, it might be that the *log(A)* variable has captured the effects of the property structure and the focus towards members more than the borrower's concentration problem. This interpretation is alternative to the one present in the relevant literature.

Secondly, the lending activity of co-operative banks may have been influenced by low diversification. In fact, the regression coefficients of *FEE/OI* are significant from FY2011 to FY2013. In this light, the higher relevance of the lending business might have exposed co-operative banks more than commercial and savings banks to a shock in lending demand. A low *FEE/OI* ratio might again be explained by the presence of a base of clients largely formed by small economic agents, demanding principally traditional banking services.

Finally, conclusive results have not arisen from the behavioral variables included to detect substitution effects from lending to other assets classes (*ΔGNG/GNS*, *ΔDVT/DVT*, *ΔLNB/LNB*). In particular, no evidences emerged to support the claim of many observers reproving banks to lay down lending in favor of financial activities.

5.2 Robustness checks

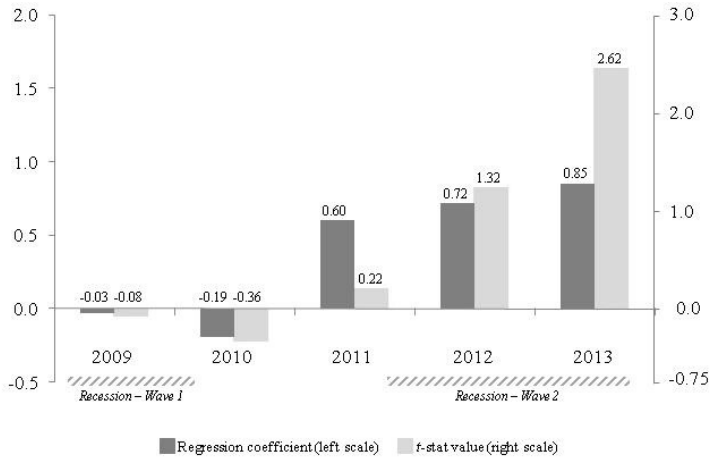
A first verification has been performed in order to clear doubts on the effects of the bank size. As co-operative banks are predominantly small banks, one can argue that the research findings may be somehow linked to size more than to bank type. For this reason, an OLS regression has been run for FY2013 for the half of the sample including the banks with the lowest total assets. This cluster included 50 co-operative banks, 10 commercial banks and 9 savings banks. Table 10 in the Annex shows the details of the regression results. No decisive causality between capital and lending has emerged. Hence, the *capital crunch* effect captured for co-operative banks cannot be fully and directly dependent to their size.

A second check has been carried out with the aim of verifying the mid-term impact on co-operative banks lending of the independent variables used in the analysis. To this extent, a Pooled OLS regression and a Fixed Effect regression have been run. The *nT* observations have concerned the entire period 2009-2013. Table 11 in the Annex reports the regression results. Also in this case, no causality between capital and lending has been verified, confirming in this way the only momentary relation between capital and lending which characterizes the *capital crunch* phenomenon. That is, banks usually act in a capital-unconstrained way. Furthermore, it is interesting to observe how both Pooled OLS and Fixed Effect regressions confirmed the mid-term significance of some of the variables intending to control for demand specific features. In fact, both *log(A)* and *FEE/OI* variables have regression coefficients which are significant at 99 percent confidence level.

5.3 Capital fever

A more generalized approach to the observation of the *capital crunch* problem may be proposed by focusing the analysis on co-operative banks only. To this extent, Figure 4 plots the values of the regression coefficients of the book-based capital-to-asset ratio and their *t*-statistics over the period analyzed.

Figure 4: Year-by-year coefficient of the book-based capital-to-asset ratio (K/A) and related *t*-statistics for co-operative banks



As previously debated, the regression coefficient on the *K/A* ratio is significant for the FYs 2013. Nevertheless, the *t*-statistics evolution over time may arise some interest. Low values of this parameter are registered in FY 2009 and 2010, in correspondence of the first wave of recession in Italy and a partial recovery. From FY2011 to 2013 the *t*-statistics value progressed constantly all along the second wave of recession (milder but longer) that hit the country[12]. The regression coefficient follows a similar path to the one described for the *t*-statistics.

An interpretation of these developments can go under the name of *capital fever*. This phenomenon can be defined as *the condition of the market in which the likelihood of a systemic-wise alteration of the lending capacity of the banks due to a generalized shortfall in banks' capitalization is not negligible*.

By having in mind this definition, a situation like the one exposed in Figure 4 can be interpreted as follows. Intense macroeconomic downturns may hit banks via an increase in their non-performing loans and more in general via a reduced or negative profitability[13]. These factors may cause operational losses and pull away the banks from their target capitalization (which depends on their risk appetite or even on the regulatory requirements). A generalized capital shortfall may initially push the market in a situation of *capital fever*, that is condition in which the likelihood of a systemic-wise alteration of the lending capacity of the banks is not negligible. In the case the capital shortfalls worsen and become widespread, banks may systematically react by reviewing their asset composition and cutting back loans, as it is quicker and less costly than rising new capital.

In such a framework, high *capital fever* produces (is equal to) a situation of *capital crunch* as described in the consolidated literature. Nevertheless, the introduction of the notion of *capital fever* may add to the widespread understanding of the problem as its use conveys the idea of analyzing over time the risk that a *capital crunch* occurs.

The regression coefficients of the capital-to-asset ratio on lending capture both the *capital fever* and *capital crunch* phenomenon. In fact, they are used to assess whether the capitalization level of the banks affect their

[12] In Italy, GDP fell by 5.5% in 2009, grew by 1.7% in 2010 and by 0.4% in 2011. Then, it went down by 2.4% in 2012 and by 1.9% in 2013. Source: Eurostat.

[13] A reduction in the profitability of the banks may arise as a consequence of several factors. In particular in 2011, Italian banks experienced a significant increase in the cost of funding and difficulties to obtain liquidity.

capacity to offer credit to business and households. In this sense, the intensification over time of the significance of the regression coefficient may indicate a situation of *capital fever* and the increase of the risk of having a *capital crunch* in the market.

Here is presented a simple index, the Capital Fever Test (CFT). This index, by using the *t*-stat of the regression coefficient of *K/A* ratio on lending with a representative sample of the market and with a fixed set of explanatory variables over time, aims at measuring the level of *capital fever* in a given year.

$$\text{Capital Fever Test}_{t,0.99} = \frac{min\ (|t\text{stat}_{K/A,t}|, 2.576)}{2.576} \quad (3)$$

$$\text{Capital Fever Test}_{t,0.95} = \frac{min\ (|t\text{stat}_{K/A,t}|, 1.960)}{1.960} \quad (4)$$

$$\text{Capital Fever Test}_{t,0.90} = \frac{min\ (|t\text{stat}_{K/A,t}|, 1.645)}{1.645} \quad (5)$$

The three versions of the index are built in consideration of confidence levels of 99.0%, 95.0% and 90.0% respectively and an infinitive number of degrees of freedom. The test value ranges from 0.0 to 1.0. A value equal to 1.0 identifies the presence in the market of a *capital crunch*, hence a situation in which the capability of banks to lend is harmed. A value lower than 1.0 signals the distance from a situation of *capital crunch*.

Table 9 summarizes the results of the Capital Fever Test for co-operative and other banks in the FYs 2009-2013 on the basis of the regression model used and of the research results obtained.

Table 9: Capital Fever Test (CFT)

	Co-operative banks				Other banks		
	$CFT_{0.90}$	$CFT_{0.95}$	$CFT_{0.99}$		$CFT_{0.90}$	$CFT_{0.95}$	$CFT_{0.99}$
2013	*1.00*	*1.00*	*1.00*	2013	0.36	0.31	0.23
2012	0.80	0.67	0.51	2012	0.17	0.14	0.11
2011	0.13	0.11	0.09	2011	0.27	0.23	0.17
2010	0.22	0.18	0.14	2010	0.08	0.07	0.05
2009	0.05	0.04	0.03	2009	*1.00*	*1.00*	0.78

The most important practical application of the CFT would be its use in monitoring the *capital crunch* risk over time. CFT values close to 1.0 should persuade authorities to put in place mitigating actions. For these reasons, a version of the CFT based on more granular data (e.g. quarterly data) would improve its effectiveness. Nevertheless, further investigation is needed to verify the consistency and the efficacy of the proposed index.

5.4 Policy implications

Some policy indications may be drawn from the present paper. Primarily, a careful evaluation of the capitalization of co-operative banks seems to be necessary. To this extent, uncertainty about the macroeconomic

scenario in Italy for the years to come[14] makes it difficult to expect that a renewed profitability will boost existing capital levels without taking any initiative. Two actions can then be envisaged to avoid capital shortfalls to harm the lending capacity of co-operative banks in the next few years.

On one hand, co-operative banks should evaluate the possibility to evolve their operative model, even maintaining their solid mutualistic and territorial aptitude. In particular, both revenues and costs structures might be toughened. An increase in revenues might be primarily sought through an increase in the fee income, via a more diversified offering. A reduction in costs might be achieved in particular through an assessment of the efficiency of the distribution networks.

On the other hand, the most leveraged co-operative banks should be encouraged to recapitalize. Nevertheless, this may be difficult as it involves the contribution of the members. Then, in some specific cases, targeted government-driven capital infusions might work better in covering existing capital shortfalls.

Furthermore, policy makers should act on their side in order to provide in the short term valuable and easy-to-access alternatives to the bank lending, especially for medium and small firms. To this extent, two actions recently put in place by the Italian government seem to go in the right direction: the possibility for firms to discount the credits held towards the public administrations and the introduction of the so called "mini-bond" system. This second action in particular, launched at the beginning of 2014, merits to be strengthened and rolled-out. In fact, the system aims at permitting to small and medium enterprises to access directly the debt market, disintermediating the traditional banking channel. In the first two months of the initiative, 26 medium firms have issued bonds for totally € 1 billion and 20 of these firms have had access to the bond market for the first time[15,16].

This notwithstanding, the "mini-bond" initiative risks to leave aside smaller businesses. In fact, small companies may found the system excessively costly due to the lack of internal expertise to deal with the required procedures and to a usually fragile risk profile to be assessed by the market. In order to reach these crucial economic agents, a scheme of guarantees, especially directed to small innovative firms and/or covering investment in R&D might be a more effective solution[17].

6. Conclusions

The observed decline in bank loans over the recent economic crisis in Italy has been attributed by a number of commentators to nothing more than the normal decline in loan demand that occurs in a recession. This paper finds evidences that a *capital crunch* occurred in Italy in 2013, shedding some light on the presence of significant supply-side factors on lending developments.

[14] Italian GDP declined in both the first and the second trimester of 2014 (-0.1% and -0.2%, t/t). Source: Istat.

[15] The amount of the bond issued by each firm varies from a minimum of € 5,000,000.00 to a maximum of € 200,000,000.00. Source: Ministero dell'Economia e delle Finanze, Press Release n° 203, 28/08/2014.

[16] As a matter of fact, the early success of the "mini-bond" system is a further validation of the *credit crunch* hypothesis. In effect, it has permitted firms to substitute banking funding with direct market capitals, realizing a first level of disintermediation and hence signaling the presence of specific supply-side factors in bank lending retrenchments (see Wojnilower, 1980 and Syron, 1990).

[17] Finally, it is worth mentioning the plan of the European Central Bank to go live in September 2014 with the deployment of the Tltro (Targeted long-term refinancing operations). This plan, aiming at providing cheap funds to banks at the condition they use them to lend to businesses and households (with the exclusion of housing mortgages) may further ease the credit restriction in the Italian market. Nevertheless, it is addressed prominently to big financial institutions, with the risk to leave aside smaller banks, including co-operative banks. As of today (September 2014), conclusive remarks on the effects of this action are not possible.

More in details, the findings suggest that a *capital crunch* invested co-operative banks in 2013, while the effect on the rest of the market (intended as commercial and savings banks) has been mild or even absent. As a consequence of a *capital crunch*, co-operative banks have been induced to cut-back lending in order to mitigate the effects of deteriorated capital-to-asset positions.

Co-operative banks succeeded for years in supporting business and households despite the economic downturn, in this sense playing a crucial role in the economy in smoothing the effects of the crisis. Nevertheless, in the mid-term, the persistent economic depression in Italy seems to have eventually weakened their capitalization. This may have finally forced co-operative banks to review their credit policies. In the words used in this paper, co-operative banks may have started suffering from *capital fever*. This finding is also supported by the descriptive observation of the book-based capital-to-asset ratio over time. In fact, from the beginning of the crisis, co-operative banks capitalization has worsened on average by 2.6%, well above the shrinkage experienced by the rest of the market (-1.0 %).

The results of the research also revealed some interesting features of the lending developments of co-operative banks due to specific characteristics of their demand. The significance of the regression coefficients of the control variables *log(A)* and *FEE/OI* for the period 2011-2013 suggests that the borrowers concentration problem and low diversification may have fashioned the capacity of co-operative banks to lend during the crisis. An alternative interpretation of the significance of the abovementioned variables may be drawn by taking into account the property structure and the base of clients that characterize co-operative banks: focus on serving members may have led to the difficulty to extend lending towards alternative valuable options in a period of sensitive worsening of the balance sheet positions of existing clients.

References

Ashcraft, A. (2003), *"New Evidence on the Lending Channel"*, Journal of Money, Credit and Banking, Vol. 38(3), pp. 751-776.

Banca d'Italia (2011), *"The Macroeconomic Impact of Basel III on the Italian Economy"*.

Banca d'Italia (2012), *"Rapporto sulla Stabilità Finanziaria"*.

Basel Committee on Banking Supervision (1988), *"International Convergence of Capital Measurement and Capital Standards."*

Basel Committee on Banking Supervision (2004), *"International Convergence of Capital Measurement and Capital Standards. A Revised Framework."*

Basel Committee on Banking Supervision (2010), *"Assessing the Macroeconomic Impact of the Transition to Stronger Capital and Liquidity Requirements - Interim Report"*.

Basel Committee on Banking Supervision *(2013)*, *"Basel III - The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools"*.

Benink, H., Danielsson, J. and Jónsson, A. (2008), *"On the Role of Regulatory Banking Capital"*, Financial Markets, Institutions & Instruments, Volume 17, Issue 1, pages 85–96, February 2008.

Berger, A.N. and Udell, G. (1994), *"Did Risk-Based Capital Allocate Bank Credit and Cause a 'Credit Crunch' in the United States?"*, Journal of Money, Credit and Banking, 26, 585–628.

Berger A.N. and De Young R. (1997), *"Problem Loans and Cost Efficiency in Commercial Banks"*, Journal of Banking & Finance 21 (1997) pp 849-870.

Bernanke, B. and Lown, C.S. (1991) *"The Credit Crunch"*, Brookings Papers on Economic Activity, Vol. 1991, No. 2 (1991), pp. 205-247.

Brinkmann, E.J. and Horvitz, P.M. (1995), *"Risk-Based Capital Standards and the Credit Crunch"*, Journal of Money, Credit and Banking , Vol. 27, No 3 (Aug., 1995), pp. 848-863.

Caivano, M. Rodano, L. and Siviero, S. (2010), *"The Transmission of the Global Financial Crisis to the Italian Economy. A counterfactual Analysis, 2008–2010"*, Occasional Papers No. 64, Bank of Italy.

Del Giovane, P., Eramo, G. and Nobili, A. (2011), *"Disentangling Demand and Supply in Credit Developments: A Survey-based Analysis for Italy"*, Journal of Banking & Finance 35 (2011) 2719–2732.

Di Colli, S. and Girardi, A. (2012), "*Restrizione Creditizia durante la Crisi del 2008-2009 e il Ruolo Anticiclico delle Banche di Credito Cooperativo*", Quaderni di Ricerca del Credito Cooperativo, N.3.

European Commission (2012), *"Small Business Act for Europe, Fact Sheet 2012 – Italy"*.

European Investment Bank (2013), *"CESEE Bank Lending Survey - H2-2013"*, EIB.

Gaiotti, E. (2011), *"Credit Availability and Investment in Italy: Lessons from the Great Recession"*. Working Papers No. 793, Bank of Italy.

Hempell, H.S. and Sorensen, K.C. (2010), *"The Impact of Supply Constraints on Bank Lending in the Euro Area – Crisis Induced Crunching?"*, Working Paper Series No. 1262, European Central Bank.

Hancock, D. and Wilcox, J.A. (1992), *"The Effects on Bank Assets of Business Conditions and Capital Shortfalls"*, Credit Markets in Transition, Proceedings of the 28th Annual Conference on Bank Structure and Competition, pp. 502-20. Chicago: Federal Reserve Bank of Chicago, 1992.

Hancock, D. Laing, A.J. and Wilcox, J.A. (1995) *"Bank Capital Shocks: Dynamic Effects on Securities, Loans, and Capital"*, Journal of Banking & Finance - 19 (1995) pp. 661-677.

Hancock, D. Laing, A.J. and Wilcox, J.A. (1998) *"The Credit Crunch and the Availability of Credit to Small Businesses"*, Journal of Banking & Finance 22 (1998) 983-1014.

Haubrich, J.G. and Wachtel, P. (1993), *"Capital Requirements and Shifts in Commercial Bank Portfolios"*, Economic Review, 1993, issue Q III, pages 2-15.

International Monetary Fund (2013), *"Financial System Stability Assessment - Italy"*, September 2013.

Kashyap, A.N. and Stein, J. (2000), *"What Do a Million Observations on Banks Say about the Transmission of Monetary Policy?"*, American Economic Review, Vol. 90, No 3, June, pp. 407-428.

Montgomery, H. (2005), *"The Effect of the Basel Accord on Bank Portfolios in Japan"*, Journal of the Japanese and International Economies, 19:1, 24–36.

Panetta, F. and Signoretti, F.M. (2010), *"Credit Demand and Supply in Italy During the Financial Crisis"*, Occasional Papers No. 63, Bank of Italy.

Peek, J. and Rosengren, E.S. (1995a), *"The Capital Crunch: Neither a Borrower nor a Lender Be"*, Journal of Money, Credit and Banking, Vol. 27, No. 3 (Aug., 1995), pp. 625-638.

Peek, J. and Rosengren, E.S. (1995b), *"Bank Regulation and Credit Crunch"*, Journal of Banking & Finance - 19 (1995) pp. 679-692.

Peek, J. and Rosengren, E.S. (1995c), *"Bank Lending and the Transmission of Monetary Policy"*, in Is Bank Lending Important for the Transmission of Monetary Policy? Edited by Joe Peek and Eric S. Rosengren, Federal Reserve Bank of Boston.

Saurina, J. and Trucharte, C. (2007), *"An Assessment of Basel II Procyclicality in Mortgage Portfolios"*, Journal of Financial Services Research, October 2007, Volume 32, Issue 1-2, pp 81-101.

Stein, J.C. (1998), *"An Adverse Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy"*, RAND Journal of Economics, 29, 466-486.

Syron, R.F. (1991), *"Are We Experiencing a Credit Crunch?",* New England Economic Review (Federal Reserve Bank of Boston), July/August: 3-10.

Watanabe, W. (2007), *"Prudential Regulation and the Credit Crunch: Evidence from Japan"*, Journal of Money, Credit and Banking, Volume 39, Issue 2-3, pages 639–665, March–April 2007.

Wojnilower, A.M. (1980), *"The Central Role of Credit Crunches in Recent Financial History"*, Brookings Papers on Economic Activity (No. 2 1980), 277-326.

Woo, D. (2003), *"In Search for Capital Crunch: Supply Factors Behind the Credit Slowdown in Japan",* Journal of Money, Credit and Banking, 35:6, 1019–38.

Zago, A. and Dogili, P. (2014), "*Financial Crisis, Business Model and Technical Efficiency of Italian Banche di Credito Cooperativo*", Quaderni di Ricerca del Credito Cooperativo, N.4.

Annexes

Table 10: Regression results for the equation (2) for the FY 2013 for small banks and comparison with co-operative banks

	FY 2013	
	Small banks[18]	Co-operative banks
K/A	0.3577	0.8538**
	(0.90)	(2.62)
ΔK/K	0.0902	0.1023**
	(1.54)	(2.40)
ΔGNS/GNS	0.0073	0.0086
	(1.05)	(0.69)
ΔDVT/DVT	0.0171	-0.0376
	(0.51)	(-1.06)
ΔLNB/LBN	-0.0097	-0.0085
	(-1.29)	(-0.98)
Log(A)	0.0316	0.0578***
	(0.55)	(3.36)
FEE/OI	0.0157	-0.1963*
	(0.10)	(-1.73)
RGDP	1.6849	2.4033
	(0.84)	(1.22)
Constant term	-0.1340	-0.2302***
	(-0.71)	(-2.88)
N	*69*	*77*
R^2	*0.0842*	*0.272*

Notes: the dependent variable is the annual percentage change in gross loans outstanding to non-financial corporations for each bank in 2013. *** shows significance at 1%, ** 5% and * 10% respectively. *t*-statistics are in parentheses.

[18] The small banks cluster includes 50 co-operative banks, 10 commercial banks and 9 savings banks.

Table 11: Pooled OLS and Fixed Effect regressions for co-operative banks for the period 2009-2013[19]

	Co-operative banks	
	Pooled OLS_FYs 2009-2013	Fixed Effect_FYs 2009-2013
K/A	0.5064	0.2561
	(0.86)	(0.43)
ΔK/K	0.0781	0.1588
	(0.66)	(1.25)
ΔGNS/GNS	-0.0000	0.0000
	(-0.01)	(0.04)
ΔDVT/DVT	0.0218*	0.0122
	(1.79)	(0.97)
ΔLNB/LBN	-0.0057	-0.0082
	(-0.38)	(-0.55)
Log(A)	0.1592***	0.2055***
	(4.98)	(5.12)
FEE/OI	-1.0322***	-1.1333***
	(-4.29)	(-4.52)
RGDP	0.4069	0.1823
	(0.82)	(0.13)
dummy 2013	-	-0.0946
		(-1.19)
dummy 2012	-	-0.0004
		(-0.01)
dummy 2011	-	0.0589
		(0.56)
dummy 2010	-	-0.0197
		(-0.42)
Constant term	-0.2926**	-0.2516*
	(-2.28)	(-1.66)
N	*382*	*382*
R^2	*0.0982*	*0.1200*

Notes: the dependent variable is the annual percentage change in gross loans outstanding to non-financial corporations for each bank.
*** shows significance at 1%, ** 5% and * 10% respectively. *t*-statistics are in parentheses.

[19] As far as it concerns FY 2010, 1 outlier observation has been dropped out from the sample in order to avoid alteration of the regression results. As far as it concerns FY 2009, 2 outlier observations have been dropped out from the sample in order to avoid alteration of the regression results.