DO HOUSEHOLDS REACT TO CREDIT SUPPLY SHOCKS? EVIDENCE FROM ITALY

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Abstract

We document the effects of a negative credit supply shock on Italian households decisions. Results show that tighter credit supply conditions caused by a bank's higher exposure to the interbank market at the onset of the Great Financial Crisis (GFC) are associated with subsequent lower liabilities and lower real assets (including stock of durables) of the bank's customers, while financial holdings and their composition are largely unaffected. These effects are at least in part due to changes at the extensive margins, suggesting that tighter credit supply might in part reverberate on credit access of already indebted households who in turn have limited access to home ownership or durables. Against these sizeable and heterogeneous effects on the household's balance sheet, we do not find evidence that households subsequently modify their consumption expenditure or labour supply differentially depending on their bank's interbank exposure. While the results are based on comparisons of the decisions of customers of banks differently exposed to the interbank market before the GFC, they suggest that lending shortages caused by tighter funding conditions might be unlikely to have major direct effects on household demand and labour supply (and thus income) and be likely limited to the housing market.

JEL Classification: D12, D14, E21, E32, G01, G21.

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1 Introduction

We document the extent to which the bank lending channel produces real effects on Italian households. Following the global financial crisis of 2007-2008, considerable attention has been devoted to understanding the role of financial institutions in transmitting shocks from financial markets to the real economy. While, however, most research has focused on the real consequences for non-financial firms, only a handful of papers have examined how the crisis affected household borrowing (Puri et al., 2011; Gropp et al., 2014; Ramcharan et al., 2016; Jensen and Johannesen, 2017; Chava et al., 2023), and, to our knowledge, only Jensen and Johannesen (2017) have gone further by documenting for Danish households also the effects on consumption. We contribute to this limited body of research by examining how borrowing, consumption expenditure, real and financial assets, and labor supply of Italian households respond to a negative credit supply shock.

We use the global financial crisis, the consequent dry-up of the interbank market, and Italy as a laboratory for our analysis. Following a relevant literature, we measure each bank's exposure to the impending financial crisis by the share of interbank funding in total liabilities in the period preceding the shock. The crisis originated in the U.S. mortgage-backed securities market, to which banks in Italy had no direct exposure. Nevertheless, the crisis spread globally through short-term funding markets (Brunnermeier, 2009; Shin, 2009; Gorton and Metrick, 2012). Interbank markets experienced a severe liquidity drought beginning in August 2007, which intensified after the Lehman Brothers default in September 2008, due to the loss of mutual trust among banks and the general deterioration in the quality of collateral used in secured transactions. The freeze in the interbank market was largely unexpected and unrelated to Italian banks' fundamentals, thus representing a plausibly exogenous shock to their balance-sheet structures. The magnitude of the impact varied across banks depending on their funding composition. This ensures that our estimates are not biased by banks adjusting their lending behavior in anticipation of the shock. A similar empirical approach has been adopted by studies examining the bank lending channel for firms. For example, Cingano et al. (2016), for Italy, and Iyer et al. (2013), for Portugal, show that banks more reliant on interbank borrowing prior to the crisis subsequently tightened credit to firms (measured by credit quantities) more than less exposed banks. Those with greater dependence on interbank funding experienced a sharper liquidity shock when the interbank market dried up in 2007-2008. It is then an empirical question whether a similar

mechanism operated in the case of household lending.

Our empirical analysis proceeds in two steps. First, we perform a bank-province level analysis using granular proprietary supervisory data that all banks operating in Italy are required to report to the Supervisory Authority. This approach enables us to analyze the lending decisions of the entire banking sector (bank-by-bank) for virtually all household debt (province-by-province of residence) in the country (as Italy is a bank-based economy and household debt is almost entirely provided by banks). Furthermore, the high level of disaggregation allows us to saturate the estimates with an extensive set of interacted fixed effects - at both the province and loan-type levels - thereby isolating the supply-driven component of credit dynamics. Our results show that banks more reliant on interbank funding prior to the crisis - and thus more exposed to the subsequent financial dysfunctions - effectively reduced lending to households to a significantly greater extent, mirroring existing evidence on lending to non-financial corporations.[1]

Second, we conduct a bank-province-household level analysis by constructing a unique dataset that combines information from the Bank of Italy's Survey of Household Income and Wealth (SHIW) with the same supervisory data used in the first analysis, matching the two sources through the identity of each household's primary bank as reported in the SHIW. Compared to our first step, this analysis no longer covers the entire population of banks and households in Italy, but rather a representative survey sample, and mainly it enables us to relate each household's outcomes to the pre-crisis interbank funding reliance of its primary bank, and to account for an extensive set of controls and fixed effects at the bank, province, and household level. The second step of our analysis confirms that by 2008 the debt-to-income ratio was lower than in 2006 for households whose primary bank was more exposed to the interbank market. Then, it shows that the real-estate-assets-to-income and durables-to-income ratios of those households were also lower, whereas their financial-assets-to-income ratio, consumption expenditure, and labor supply exhibited no statistically significant differences.

The remainder of the paper is organized as follows. Section 2 reviews the related literature and summarizes the contribution of our analysis. Section 3 presents the empirical framework and discusses the main identification issues, while Section 4 describes the data sources. Section 5 reports the results. Section 6 concludes.

[1] Italy was affected by the 2007-2008 global financial crisis and, subsequently, by the 2011-2012 euro-area sovereign debt crisis. To avoid confounding effects, we restrict our analysis to 2007-2010.

2 Related literature

Our work relates to and complements three strands of research.

First, many studies have analyzed the effect of liquidity shocks on credit supply, yet without examining the consequences of bank-level shocks on the real economy. For instance, Khwaja and Mian (2008) and Schnabl (2012) estimated the impact of liquidity shocks on Pakistani and Peruvian banks, respectively. Iyer et al. (2013) showed that Portuguese banks that relied more heavily on interbank borrowing prior to the 2007 crisis tightened their credit supply more than banks that depended less on interbank funding. Several other studies investigated the contraction of interbank market lending during 2007 (Ivashina and Scharfstein, 2010; Bonaccorsi di Patti and Sette, 2012; Iyer et al., 2013; Kapan and Minoiu, 2013).

Second, a large body of research has linked the 2007-2008 financial crisis to real effects on firms through the credit supply channel. Some studies used aggregate data (Peek and Rosengren, 2000), others relied on samples of publicly listed firms (Gan, 2007a; Gan, 2007b; Almeida et al., 2012; Amiti and Weinstein, 2018; Campello et al., 2010; Chava et al., 2023; Duchin et al., 2010), while many studies employed micro-level data (Chodorow-Reich, 2013; Cingano et al., 2016; Bentolila et al., 2017; Balduzzi et al., 2018).

Third, by contrast, the literature linking the global financial crisis to household outcomes through the credit supply channel remains limited. In this strand, a few studies have focused solely on credit dynamics, showing that banks with high exposure to the 2007-2008 financial crisis reduced their lending to households more decisively in its aftermath, but they did not examine the consequences of bank credit restrictions for household decisions. Puri et al. (2011) used a unique dataset of German savings banks covering the period 2006-2008, which included information on retail loan applications and loans granted. They investigated whether banks affected at the onset of the financial crisis reduced consumer lending more than non-affected banks.[2] Moreover, they distinguished between demand and supply effects by using information on application rates to capture demand, and rejection rates to capture supply. While they found no significant differences in demand, they provided evidence of a supply-side effect on credit following the onset of the financial crisis, as reflected in the

[2]They classified as affected those savings banks that owned Landesbanken, which were in turn impacted by the financial crisis due to their large exposures to the U.S. subprime market.

higher rejection rates of affected savings banks. This effect was stronger for mortgages than for consumer loans. Ramcharan et al. (2016) combined data on institutional characteristics of the U.S. credit union industry with microeconomic data from the housing and automobile markets, showing that the ABS-related balance sheet losses incurred by the financial sector after the global financial crisis were associated with a substantial contraction in the supply of consumer credit, including both mortgage and automobile loans. Chava et al. (2023) used micro-level data on credit limits and balances for the near-universe of U.S. consumer credit cards and demonstrated that the drying-up of the short-term wholesale funding market for banks persistently reduced consumers' access to credit card borrowing.

An even smaller number of studies have investigated also the real effects on households, and have produced mixed results. Gropp et al. (2014) combined bank and household survey data from Canada, and identified exposed banks as those that had exposures to the U.S. money market, which they assumed as exogenous to household behaviour. They showed that the financial crisis caused a sizeable but temporary reduction in the non-mortgage credit supply of distressed banks to households, and that this short-run contraction had only a negligible effect on household consumption. Jensen and Johannesen (2017) extended the analysis by investigating both lending dynamics and consumption effects in Denmark over the period 2003-2011 using a comprehensive dataset containing all bank accounts in Danish financial institutions, along with detailed information on individual account holders and banks. They documented that banks exposed to the financial crisis reduced their lending relative to non-exposed banks. This contraction led to a significant decline in borrowing and spending by affected customers. The effects were persistent, as borrowing remained lower throughout the post-crisis years and foregone spending during the crisis was not subsequently recovered.

We contribute to this literature by extending the analysis to Italy, one of the largest economies in the euro area, and by broadening the investigation to a wider range of household phenomena and potentially affected variables.

3 Empirical approach and identification issues

We proceed in two steps. First, we perform a bank-province level analysis to examine the effects of the funding shock on the lending activity of all banks in Italy toward all indebted households. Second, we conduct a bank-province-household level analysis to assess, using highly granular though

sample-based data, how banks' exposure to the funding shock influences their customers' borrowing behavior, portfolio composition, consumption patterns, and labor market decisions.

Bank-province level analysis

We estimate regressions with the following functional form:

$$v_{tblp} = \alpha + \beta IBX_b + \delta_{pl} + \gamma B_b + \varepsilon_{tblp} \tag{3.1}$$

where v_{tblp} is the percentage variation in loans to households over different time spans, between 2006 and time $t = \{2007, 2008, 2009, 2010\}$, for bank b, loan type l (total, mortgages and other loans), in province p; IBX_b is the bank exposure to the interbank market as of 2006, δ_{pl} is an interacted fixed effect (FE) between province and loan type dummies, capturing local developments for each loan type between 2006 and t; B_b is a matrix of bank characteristics as of 2006 and their developments over the previous three years (backward up to 2003), including bank category, size, capital, liquidity, funding sources (deposits, bonds, central bank refinancing), bad loans, and holdings of securities. This comprehensive set of bank-province level controls, measured prior to the interbank market freeze, accounts for the possibility that the share of interbank funding may be associated with other determinants of the outcomes of interest. We also estimate separate regressions by loan type to examine how exposure to the interbank market affects each category separately. In this case, the interacted FE δ_{pl} is replaced by a province FE.

Bank-province-household level analysis

For a representative panel of households, we are able to match the identity of each household with that of the primary bank. This feature allows us to estimate the following equation:

$$Y_{h,b,2008} = \beta IBX_{b,2006} + \gamma H_{h,2006} + \lambda B_{b,2006} + \phi_{h,p} + \varepsilon_{h,b} \tag{3.2}$$

where $Y_{h,b,2008}$ represents, alternatively, one of the following outcomes of interest in 2008 for household h, customer of bank b: the debt-to-income ratio, the assets-to-income ratio (total, real, financial, liquid), the consumption-to-income ratio, as well as measures of labor supply and labor income.

$IBX_{b,2006}$ is defined as in the bank-province level analysis, that is, the exposure of bank b (the household's primary bank) to the interbank market in 2006; $H_{h,2006}$ is a matrix of household demographic, economic and financial characteristics as of 2006; $B_{b,2006}$ denotes the same set of bank characteristics used in the bank-province level analysis, measured in 2006 and in the preceding years (also in this case, backward up to 2003), and referred to the household's primary bank; $\phi_{h,p}$ is a fixed effect for the province of residence of household h.

This analysis relies on comparisons of outcomes of households who were customers of banks differently exposed to the interbank market. The key identification challenge is therefore that banks' exposure to the financial crisis may conceivably correlate with the credit demand of their customers. The typical example in this perspective is to imagine that banks more exposed to the interbank market were also characterized by pre-crisis lending policies, such as low credit standards and lax monitoring of borrowers, that could cause selection into exposed banks by customers who borrowed beyond their means before the crisis and thus demanded less credit after the crisis. In this example, simply comparing the credit outcomes of customers in exposed and non-exposed banks would conflate demand and supply factors, and therefore not correctly identify the credit supply channel. We address the issue both on conceptual and empirical grounds.

On conceptual grounds, we note that Italy did not experience a real estate bubble (Cingano et al., 2016; Nobili and Zollino, 2017) implying that, on the one hand, Italian banks did not suffer from losses on mortgages and, on the other, that Italian households were neither hit by adverse wealth and collateral effects nor suffered from demand shocks driven by house price developments. This favours our identification strategy. While the decline in housing prices and household net worth would have reduced the demand for credit leading to an observationally similar reduction in bank lending and economic activity, the absence of a household-side demand allows us to investigate whether liquidity and losses in banking sector affect household decisions. We also note that the literature on the credit supply channel on non-financial firms has shown that there is no correlation between bank exposure to the crisis and firms' credit demand (e.g., Bonaccorsi di Patti and Sette, 2012; Cingano et al., 2016). It is then unlikely that such correlation exists with the credit demand of households, who are individually much smaller customers. Finally, we note that for a purely demand side shock to explain our results, it should be that households were affected by the crisis with different intensities and that such intensities

were correlated with their banks' exposures to the interbank market in 2006.

On empirical grounds, we implement a number of strategies to address potential confounding effects. First, our bank-province-level analysis follows the conventional Khwaja-Mian empirical design as it compares the lending behavior of banks across households residing in different provinces. In line with this framework broadly used in bank-firm analyses, we control for local demand shocks by including province fixed effects (or even interacted province $\times$ loan type fixed effects, in the estimations of total loans).[3] Results therefore reflect the correlation of interbank exposure and lending to households borrowing in the same local market, thus exposed to similar shocks. Second, our bank-province-household level analysis rests on comparisons of lending to specific households in a given province by banks differently exposed to the interbank market. We can show (not reported) that the pre-crisis observable characteristics of households customers of more and less exposed banks are virtually identical. Seemingly, the two types of banks served the observationally same household segments on the eve of the crisis, making it plausible that they were exposed to the same demand shocks.

Third, our bank-province-household level analysis accounts for a very large set of individual household and bank characteristics as well as for province dummies that absorb all local demand effects. On the household side, beyond the conventional demographics, we control for a rich range of household economic and financial characteristics. On the bank side, we include all controls used in the bank-province level analysis (bank category, size, liquidity, capital level, volumes of loans, burden of bad loans, holdings of securities). This rich control set should plausibly absorb household- and province-specific credit demand shocks.[4] Furthermore, these controls address the concern that it is other bank characteristics or policies rather than interbank exposure that affect households behaviours. For example, our contemporaneous and lagged controls on bank size and bank category

[3] Provinces are Italian administrative units of intermediate level (between smaller municipalities and larger regions). They are considered an ideal set to take into account demand differences as they are quite heterogeneous in terms of economic and financial structure and development as well as in terms of household and banking characteristics. Furthermore, the province-level is considered the relevant credit market level for households (e.g, Gobbi and Lotti, 2004).

[4] Specifically, the baseline model includes sociodemographic controls (sex, age, education, household size, unemployment, professional status, sector of activity) and the main household economic features as of 2008 (liabilities, income, wealth, and consumption expenditure) as well as bank size (log of total assets), bank category (*significant*, *less significant*, medium-size, foreign, cooperative), bank liquidity (share of cash, loans from the Eurosystem), bank health and soundness (the share of capital, and the share of bad loans to total assets), funding sources (deposits, bonds, central bank refinancing), the prevalent business model (the share of total loans to firms, the share of total loans to households, the portfolio holdings).

account for the possibility that larger banks have reduced credit more because of the greater regulatory costs imposed in the aftermath of the GFC (Jiménez et al., 2012, Carpinelli and Crosignani, 2021). In this sense, our broad set of household-level and bank-level controls strengthens the implicit assumption that, conditional on these observables, variation in IBX across households and banks is as good as random.

Finally, it is worth emphasizing that our empirical bank-province-household approach focuses on outcomes at the individual level. In conventional Khwaja-Mian frameworks, one cannot rule out the possibility that credit supply shocks are offset by customers switching from exposed to non-exposed banks, as they implicitly rely on the assumption of symmetric credit demand by an individual across multiple lenders (Khwaja and Mian, 2008; Schnabl, 2012; Jiménez et al., 2012). In contrast, our individual-level analysis enables us to capture the full effect of differential credit supply shocks on bank customers, including adjustments through alternative sources of credit. This feature is crucial - and shared with Jensen and Johannesen (2017) - since our objective is to investigate the consequences of credit supply shocks on real economic outcomes.

4 Data

We draw on two sources of data: the Bank of Italy Supervisory banking statistics (SBS), and the Bank of Italy Survey of Household Income and Wealth (SHIW).

Supervisory banking statistics

The SBS provide a rich source of information on banks operating in Italy. They include data on banks' categories, size, funding sources, loans, holdings of securities, liquidity, capital, and profitability. In particular, loans are disaggregated by economic sector and geographical area (provinces). These details allow us to: (i) track loans to households at the bank-province level, distinguishing between different types of loans (mortgages and other loans); (ii) construct a measure of exposure to the funding shock generated by the sudden freeze of the interbank market during the global financial crisis of 2007-2008; and (iii) obtain a comprehensive set of bank-level controls, which reduce the likelihood that confounding factors drive the relationship between a bank's exposure to the interbank

market and changes in its lending to households.

The Survey of Household Income and Wealth

The SHIW is a long-running survey on households' demographic, economic, and financial characteristics, conducted by the Bank of Italy since the mid-1960s. Among other aspects, the SHIW collects information on households' liabilities, consumption, labor status, and portfolios of real estate and financial assets.

Notably, the SHIW also records the identity of the primary bank of each respondent household. This feature allows us to match each household with its reference bank and, therefore, to relate each household's borrowing behavior and the range of its real and financial decisions to the characteristics of the reference bank (beginning with the specific exposure to the interbank market and to the funding shock of 2007-2008).

The SHIW is conducted every two years, and approximately half of the previous sample is reinterviewed in the subsequent wave. We exploit this panel dimension to assess the effects of banks' exposure to the 2007-2008 interbank freeze by studying how key components of household financial and economic decisions evolved between 2006 and 2008.

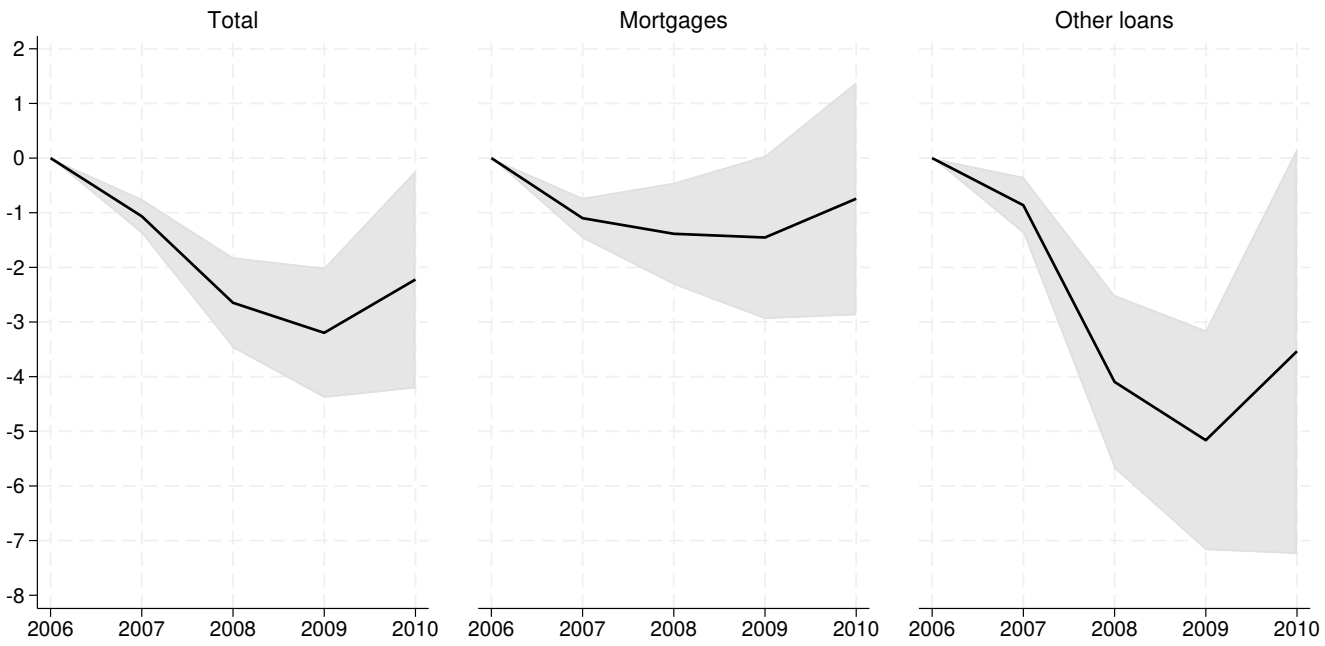
5 Empirical Results

We start with the bank-province level analysis by describing whether and to what extent bank credit to households changes in the aftermath of the interbank market freeze depending on their pre-shock exposure. We then move on to the bank-province-household level analysis and describe how the main households' economic and financial characteristics react to the interbank market freeze depending on the pre-shock exposure of their primary bank to the interbank market.

Bank-province level evidence

Figure 1 reports the results of the bank-province level estimation of equation 3.1. The graphs visually illustrate the cumulative effect of bank exposure to the interbank market in 2006 on subsequent

Figure 1 *– Bank loans and exposure to the interbank market*



lending to households (β in equation 3.1), for each loan type.[5]

Pre-crisis bank's exposure to the interbank market has a statistically significant and negative effect already in 2007 on all loan types. A one-percentage-point increase in exposure leads to a 1.1 percent lower growth of total household loans, with a broadly similar magnitude for mortgages and other loans. The drop doubles over the subsequent year, becoming stronger for loans other than mortgages (-4.1 and -1,4 per cent). Over the subsequent two years, lending at exposed banks remain weaker, mostly driven by loans other than mortgages; the response of mortgages is still negative but weakly significant.

Overall, this evidence confirm that - just like for firms - also lending to households suffered from the credit supply shock caused by the interbank freeze. The effects appear to be long-lasting and, importantly for our subsequent analysis, already visible and significant in 2008.

[5]The results on all other control variables and the fixed effects are not reported for simplicity. They are available from the authors.

Bank-province-household level evidence

As discussed above, the SHIW is run every second year and roughly half the sample is re-interviewed. Hence, we can study household behaviour in the aftermath of the shock focusing on panel respondents interviewed both in 2006 and 2008. Before moving on with the empirical application, we restrict the sample as follows. First, to minimize potential age related selection effects, we focus on households whose head was between 25 and 75 years old in 2006, interviewed also in 2008. Second, to avoid outliers influencing the estimation results, we drop households whose gross wealth, liabilities and monetary income change between 2006 and 2008 was unusual, i.e. in the top or bottom percentile of the empirical distribution. We then drop the few observations that report negative monetary income in at least one period. Finally, we retain households whose main bank in 2006 is known. This leaves us with 2004 observations. Table (1) shows descriptives of these households and how they change with the various selection criteria. With respect to the population surveyed in 2006, households in the final sample are slightly better off in economic terms: on average they have higher income, financial assets and real estate and similar debt levels, although a larger share is in debt; are less likely to be liquidity constrained and a larger share of them owns real estate. The differences are largely determined by the last, necessary, selection criterion, that is reporting a valid bank identity to be matched with the bank's characteristics and exposure to the interbank market. Most of the lost observations are households that report as their main bank *Poste italiane*, the former Italian public post service that over the years has expanded its business perimeter and now also provides some financial services (e.g., overnight and saving deposits, payments, debt cards, etc.) but it cannot grant loans. It is not legally a bank and therefore it cannot access the interbank market. We thus have to drop these households from the sample since a measure of indirect exposure to the credit shock cannot be defined.

We use this sample and our preferred specification of equation (3.2) to estimate the effect of the primary bank's exposure to the interbank market on a number of household economic and financial decisions available in the SHIW. Table 2 reports the results. Each row refers to a specific dependent variable and shows the estimated coefficient for the bank's exposure, and the corresponding standard error and p-value.[6]

Consistently with the previous bank-province level evidence, we find that households whose main

[6] Also in this case, the results on all other household-side and bank-side control variables and the fixed effects are not reported, and are available form the authors.

Table 1 *– Sample selection criteria and households' characteristics in 2006*

	Interviewed in 2006	Interviewed in 2008	Drop tail % changes	Income>0	Bank id
N. households	6496	3657	3471	3471	2004
Head's age	52.2	53.0	53.2	53.2	52.5
Female head (%)	27.3	26.3	26.0	26.0	24.5
Size	2.7	2.7	2.7	2.7	2.8
Monetary income (ths euro)	27.7	28.1	27.8	27.8	30.6
Financial assets (ths euro)	27.2	28.7	27.9	27.9	33.9
Real estate (ths euro)	211.2	219.2	210.4	210.4	237.2
Liabilities (ths euro)	7.4	7.4	6.4	6.4	7.4
Has debt (%)	22.4	23.5	23.2	23.2	26.0
Has real estate (%)	72.4	74.9	74.7	74.7	77.9
Hand-to-mouth (%)	32.1	31.1	30.7	30.7	24.9

Table 2 *– The effects of bank exposure to credit supply shock on households*

		β	SE	Pval
1.	Liabilities	-0.085	0.037	0.020
2.	1+ debts	-0.023	0.025	0.363
3.	2+ debts	-0.031	0.010	0.002
4.	Real estate	-0.627	0.306	0.040
5.	1+ houses	-0.031	0.016	0.050
6.	2+ houses	-0.019	0.017	0.265
7.	Durables (stock)	-0.089	0.036	0.012
8.	Financial assets	-0.003	0.055	0.959
9.	Deposits	-0.013	0.043	0.752
10.	Monetary income	0.001	0.019	0.956
12.	N. income earners	0.024	0.032	0.442
13.	2+ earners	-0.005	0.020	0.813
14.	N. labour income earners	0.009	0.032	0.781
15.	1+ lab. income earners	-0.010	0.010	0.313
16.	2+ lab. income earners	0.004	0.020	0.862
17.	Consumption expenditure	0.009	0.020	0.661
18.	durables purchases	-1.062	0.779	0.172

Each row reports results of OLS estimates of equation (3.2) for the specific (row) dependent variable. Robust standard errors. Sample include 2004 households. See appendix for detailed description of set of control variables.

Rows 1, 4, 7, 8, 9: ratios to household monetary income; rows 10, 17, 18: logs; rows 2, 3, 5, 613, 15, 16 are indicator variables; rows 12, 14: "number of".

bank was more reliant on interbank funding in 2006 display a lower value of their liabilities (as a ratio to monetary income) by 2008. Note that this must not necessarily be the case, as households are in principle free to shop for credit at other banks (this is captured by the approach at individual level). We take this evidence as suggestive that households display limited mobility across banks even in the local market. Similarly, these households record a lower value of their real estate and stock of durables (to monetary income), while financial assets are largely unchanged. These effects are at least in part due to changes at the extensive margins: we find that clients of banks more exposed to the shock are less likely to hold 2 or more debts and, at the same time, less likely to own one house, while the likelihood of owning at least 2 is unchanged. This suggests that tighter credit supply might in part reverberate on credit access of already indebted households who in turn have limited access to home ownership or durables.

Economic theory suggests that a credit shortage, especially if perceived as temporary, might be to some extent offset by tapping cash-on-hand, by increasing labour supply, by compressing consumption expenditure. We find none of these channels at work. Overall changes in financial assets as well as in deposits are (as a ratio to monetary income) not statistically different for households referring to banks with different exposures to the credit shock; monetary income and consumption expenditure are also largely unaffected. Similarly, a broad set of gauges of household labour supply at different margins does not reveal any systematic difference between households more and less exposed to the shock through their banks. Importantly, despite the limited sample size and the rich set of controls, the effects on these variables are generally quite precisely estimated and their point values are actually rather close to zero suggesting that the lack of evidence of a response of households does not reflect low informative power of the data.

We explore two dimensions along which the effects could be potentially heterogeneous across households.

In Table 3 we interact the bank's exposure to the credit shock with a dummy for hand-to-mouth households. As before, the table reports for each dependent variable the estimated coefficient on the main variable and on the interaction. Hand-to-mouth households are those with a 2006 deposit-to-consumption ratio in the lowest quartile of the distribution. In practice, their liquidity amounts on average to about 6% of their consumption expenditure against an average of 60% and a median of

Table 3 *– The effects of bank exposure to credit supply shock on households: Hand-to-mouth*

					Hand-to-Mouth		
		β	SE	Pval	β	SE	Pval
1.	Liabilities	-0.085	0.037	0.020	-0.000	0.004	0.982
2.	1+ debts	-0.022	0.025	0.387	0.004	0.003	0.129
3.	2+ debts	-0.032	0.010	0.002	-0.001	0.002	0.328
4.	Real estate	-0.624	0.308	0.043	0.025	0.038	0.503
5.	1+ houses	-0.032	0.016	0.042	-0.004	0.002	0.026
6.	2+ houses	-0.019	0.017	0.274	0.002	0.002	0.177
7.	Durables (stock)	-0.089	0.035	0.012	0.002	0.004	0.585
8.	Financial assets	-0.002	0.055	0.964	0.003	0.005	0.626
9.	Deposits	-0.013	0.042	0.755	0.003	0.004	0.367
10.	Monetary income	0.001	0.019	0.966	-0.001	0.002	0.726
12.	N. income earners	0.025	0.032	0.433	0.003	0.004	0.432
13.	2+ earners	-0.005	0.020	0.812	-0.000	0.002	0.927
14.	N. labour income earners	0.009	0.032	0.784	-0.000	0.004	0.906
15.	1+ lab. income earners	-0.010	0.010	0.317	0.001	0.001	0.713
16.	2+ lab. income earners	0.003	0.020	0.870	-0.001	0.002	0.709
17.	Consumption expenditure	0.010	0.020	0.629	0.004	0.002	0.108
18.	durables purchases	-1.037	0.779	0.183	0.217	0.096	0.023

Each row reports results of OLS estimates of equation (3.2) for the specific (row) dependent variable. Robust standard errors.
Hand-to-mouth households are those with a ratio of deposits to consumption expenditure in the first quartile of the 2006 distribution.
Sample include 2004 households. See appendix for detailed description of set of control variables.
Rows 1, 4, 7, 8, 9: ratios to household monetary income; rows 10, 17, 18: logs; rows 2, 3, 5, 613, 15, 16 are indicator variables; rows 12, 14: "number of".

30% in the whole sample. For these households, a credit shortage might result more harmful due to the tight liquidity constraint and thus induce a response along the available margins. Yet, we do not find evidence that their response is significantly different besides a marginally lower likelihood of owning a house. Once again, despite the limited sample size, the estimated interaction effects are associated to quite low standard errors.

In Table 4 we explore whether households who were not indebted in 2006 respond differently to the bank's exposure. These households represent about three quarters of our final sample. Not being already in debt, they might attract, all else equal, a larger share of the loans extended by banks hit by the credit supply shock. However, we find that households that were not indebted in 2006 respond largely in the same way as from those who had debt. In particular, they display the same lower stock

Table 4 *– The effects of bank exposure to credit supply shock on households: no debt*

					Had no debt		
		β	SE	Pval	β	SE	Pval
1.	Liabilities	-0.084	0.037	0.021	0.001	0.006	0.900
2.	1+ debts	-0.028	0.025	0.275	-0.006	0.003	0.071
3.	2+ debts	-0.033	0.011	0.002	-0.002	0.002	0.308
4.	Real estate	-0.656	0.309	0.034	-0.033	0.040	0.413
5.	1+ houses	-0.030	0.016	0.061	0.001	0.002	0.391
6.	2+ houses	-0.021	0.017	0.221	-0.002	0.002	0.239
7.	Durables (stock)	-0.092	0.035	0.009	-0.004	0.004	0.421
8.	Financial assets	0.004	0.054	0.948	0.007	0.006	0.204
9.	Deposits	-0.011	0.042	0.797	0.003	0.004	0.441
10.	Monetary income	0.000	0.020	0.998	-0.001	0.002	0.560
12.	N. income earners	0.022	0.032	0.498	-0.003	0.004	0.434
13.	2+ earners	-0.002	0.020	0.917	0.003	0.002	0.157
14.	N. labour income earners	0.005	0.033	0.868	-0.004	0.004	0.252
15.	1+ lab. income earners	-0.011	0.010	0.258	-0.002	0.001	0.209
16.	2+ lab. income earners	0.002	0.020	0.914	-0.002	0.002	0.510
17.	Consumption expenditure	0.008	0.020	0.702	-0.001	0.002	0.556
18.	durables purchases	-1.115	0.786	0.156	-0.058	0.103	0.570

Each row reports results of OLS estimates of equation (3.2) for the specific (row) dependent variable. Robust standard errors. Sample include 2004 households. See appendix for detailed description of set of control variables.
Rows 1, 4, 7, 8, 9: ratios to household monetary income; rows 10, 17, 18: logs; rows 2, 3, 5, 613, 15, 16 are indicator variables; rows 12, 14: "number of".

of 2008 liabilities when associated to more exposed banks but, reflecting the fact that they were not in debt to start with, this is also partly explained by a marginally lower probability of having even a single debt. All other margins are unaffected by the initial debt status.

6 Conclusions

In this paper we document the effects of a negative credit supply shock on Italian households decisions. Tighter credit supply conditions caused by a bank's higher exposure to the interbank market at the onset of the GFC are associated with subsequent (two years later) lower liabilities and lower real assets (including stock of durables) of the bank's customers, while financial holdings and their composition are largely unaffected. The effects are not homogeneous across households. The (negative) credit supply shock reduces the stock of liabilities by reducing the probability that an already indebted household takes up an additional debt contract while the chances that households are altogether indebted are broadly unaffected. Similarly, the reduction in real assets happens mostly through households not acquiring the first house, while the odds of owning two or more houses are basically unchanged. Against these sizeable and heterogeneous effects on the household's decisions, we do not find evidence that households subsequently modify their consumption expenditure differentially depending on their bank's interbank exposure or increase their labour supply to offset the credit supply shock.

While the results are based on comparisons of the decisions of customers of banks differently exposed to the interbank market before the GFC, they suggest that lending shortages caused by tighter funding conditions might be unlikely to have major direct effects on household demand and labour supply (and thus income) and be likely limited to the housing market. The external validity of such results is obviously also limited to markets similar to the Italian one, where households mostly refer to banks for their lending and in which bank lending is primarily used for real estate purchases.

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