What do almost 20 years of micro data and two crises say about the relationship between central bank and interbank market liquidity? Evidence from Italy

Massimiliano Affinito*

This draft: November 2017

Abstract

In both global financial and sovereign debt crises, liquidity and liquidity markets have played a central role. In several systems around the world interbank markets (IMs) faced considerable impairments and many central banks (CBs) introduced a wide range of measures to improve the liquidity amount and flow. Although IMs and CB liquidity provision to banks are closely interrelated, their empirical joint analysis is scarce, at least with micro data. This paper contributes to fill this gap with the advantage of using a unique micro dataset containing seventeen years of monthly bank-by-bank data from 1998 to 2015 on all the relationships of each bank in Italy with the CB and each IM counterparty. The analysis investigates both the possible causal directions of the mutual relationship between CB and IM liquidity while controlling constantly for their mutual endogeneity and exploits counterparty-by-counterparty data to run a within counterparty estimation to disentangle the effects of interbank lending supply and demand. The results show that in Italy CB's liquidity circulates among banks and influences the IM redistribution. Banks obtaining CB liquidity do not use it only for their needs but redistribute it to other banks. Results of different IM segments (domestic versus foreign, secured versus unsecured, overnight versus longer-term) help explain the underlying reasons. CB liquidity injections allow banks to balance the euro area cross-border interbank reduction and to adjust their collateral and maturity profiles. The longer maturity of CB operations in the crises have a direct effect on the longer maturity of IM liquidity. The analysis shows that liquidity redistribution throughout the IM tends to be concentrated in a group of healthy "money" banks, which specialize in interbank lending.

JEL Classification: G21, E52, C30.
Keywords: liquidity, financial and sovereign crises, central bank intervention, interbank.

Contents

* Bank of Italy, Directorate General for Economics, Statistics and Research. Email address: massimiliano.affinito@bancaditalia.it. I would like to thank for their comments, without implicating them in responsibility, Giorgio Albareto, Riccardo De Bonis, Stefano Federico, Giuseppe Ferrero, Ruslán Gómez Nesterkín, Mario Pietrunti, Alessandro Secchi, Enrico Sette, Luigi Federico Signorini and participants at the seminar held at the Bank of Italy. The opinions expressed are only mine and do not necessarily reflect those of the Bank of Italy.

1. Introduction

In normal times central bank (CB) liquidity is typically provided as demanded, usually not much demanded, by the banking system in order to avoid interest rate volatility, while a well-functioning interbank market (IM) overcomes the asynchronous nature of loan and deposit creation across banks. The situation radically changed in the recent crises, both in the global financial crisis that erupted in 2007 and peaked with the Lehman Brothers collapse in 2008, and in the euro-area sovereign debt crisis that started in 2010 and worsened since the summer of 2011. In several systems around the world IMs experienced considerable impairments. Many CBs, including the ECB and the Federal Reserve, introduced a wide range of measures to improve the liquidity amount and flow, covering conventional strong reductions in policy rates, unconventional massive liquidity injections into the system, changes in the standard operational frameworks and the creation of more unusual forms of special liquidity schemes. The attention to liquidity and liquidity markets is substantially grown and so the need for a better understanding of both the effects of CBs' mighty liquidity provisions and IMs functioning mechanisms. This paper joins the debate by analyzing empirically and jointly the CB provision of liquidity (to each bank) and the IM liquidity circulation (by each bank).

CB provision of liquidity to banks may be viewed as the primary liquidity market, where liquidity is issued for the first time, while IM may be viewed as the secondary wholesale liquidity market, where the liquidity obtained in the primary market is reallocated among banks.[1] An adequate amount of liquidity in the system and an adequate liquidity circulation through the banking system are both crucial for the correct functioning of the economy. If liquidity is not channeled, CBs' monetary policy transmission mechanisms may be ineffective, the intermediation to households and firms may stagnate, the orderliness of the payment system is impaired. Until the global financial crisis, most macroeconomic models did not take into account that monetary policy is implemented through the banking system and IMs and the macroeconomic effects of monetary policy and its implementation through IMs were analyzed independently. In the aftermath of the crisis, numerous calls have been made for the development of macroeconomic models with an explicit role for banks and then for IMs. IMs (such as the fed funds market in the US and the EONIA in the euro-area) are crucial for banks and CBs: they are the first channels through which

[1] In the paper I consider all liquidity injected by CB through banks (both through open market operations with banks or direct loans to the banking system), which is the typical way to inject liquidity in the system, in particular in the euro area. Therefore, this total liquidity is on the asset side of CB balance sheet and on the liability side of banks' balance sheet. IM liquidity is the liquidity exchanged among banks, that is, it is on the asset side of some banks and on the liability side of other banks. Bank reserves, which are holdings of banks' deposits with CB (i.e., the liquidity on CB's liability side and banking system's asset side), is included in IM liquidity when it circulates among banks. Further institutional backgrounds are detailed in Section 2.

monetary policy is implemented, provide benchmark rates for all financial assets, allow efficient allocation of funds and risk sharing between banks, assure peer monitoring and market discipline, and are an important indicator of the functioning of the banking market overall as a failure in IMs may trigger bank domino effects and undermine the entire financial stability. Yet, the joint micro empirical analysis of the two liquidities is quite scarce, also because of the lack of comprehensive datasets. This paper tries to fill this gap with the goal of contributing to a better understanding of whether, to what extent and how the CB and IM liquidity react to each other. More in detail, the paper examines whether the relationship at bank level between CB and IM liquidity is positive or negative, that is, whether they have a complementary or a substitute role, and whether the uptake of CB liquidity spurs, inhibits or does not affect the liquidity exchange in the IMs and whether this relationship changes over time, in normal times and in the crises, during regular or massive liquidity injections.

A priori the expected sign of the relationship between CB and IM liquidity is uncertain. On the one hand, when CBs inject new liquidity, the portfolios of banks become more liquid and a part of risky assets are removed off banks' balance sheets (both directly, if the CB buys the assets in return for cash, and indirectly, if the assets are pledged as collateral for borrowing). In turn this strengthens banks' balance sheets, improves collateral values and lowers funding constraints so helping loosen credit constraints and support general and IM intermediation. These kinds of relations and predictions imply a complementary role between CB and IM liquidity and can be found in a large part of the literature (e.g., Freixas et al., 2000; Allen and Carletti, 2008; Acharya et al., 2008; Freixas et al., 2008; Sundaresan and Wang, 2009; Freixas et al., 2011; Diamond and Rajan, 2011; Acemoglu et al., 2012; Acharya et al, 2012; Bindseil, 2014; Hoerova and Monnet, 2016). On the other hand, when CBs introduce new liquidity, in particular through large injections, they may end up by intermediating between banks and bypassing the IM altogether. This opposite prediction, which postulate a crowding out effect of CB interventions on IM liquidity and a substitute role between the two liquidities, has gained space in the literature, in particular just during the crises (e.g., Allen et al., 2009; Bruche and Suarez, 2010; Brunetti et al., 2011; de Haan and van den End, 2013; Gale and Yorulmazer, 2013; Heider et al., 2015).

In trying to shed light on these conflicting views, the advantage of the paper is to use a unique micro dataset containing seventeen years of monthly bank-by-bank data from 1998 to 2015 on all relationships of each bank vis-à-vis the CB and each IM counterparty along with a large set of bank-level characteristics. The literature shows that analyzing micro data matters, as individual banks' behavior contributes to determine the effectiveness of monetary policy and the regular functioning of the system (Acharya et al., 2012; Castiglionesi and Wagner, 2013; Yellen, 2013) and

because of the relation between IM structure, resilience and robustness (Upper and Worms, 2004; Haldane, 2009; Markose et al., 2012; Memmel and Sachs, 2013; León et al., 2016). Specifically, using micro data on bank-by-bank behavior allows me to detect exactly the banks that obtain CB's liquidity and to analyze what they do with it throughout all liquidity markets, including over-the-counter segments; to explore the relationship between CB and IM liquidity investigating both possible causal directions between the two liquidities, constantly controlling for their mutual endogeneity by means of instrumental variable regressions; to analyze the effects of CB liquidity provided to each bank on its IM gross and net positions. Remarkably, using micro data on each bank's position towards each IM counterparty allows me to use a within counterparty estimation to disentangle the effects of interbank lending supply and demand, in line with the most recent literature on the transmission of shocks to banks (Khwaja and Mian, 2008; Paravisini, 2008; Schnabl, 2012). In fact, while this literature typically includes non-financial firm fixed effects in order to control for borrower observed and unobserved heterogeneity, my dataset allows me to include interbank counterparty fixed effects to control for interbank counterparty observed and unobserved heterogeneity. As far as I know, this is the first paper to apply this methodology to IM.

The analysis is carried out on the liquidity provided by the Eurosystem to each bank operating in Italy. The analysis of the Eurosystem suits well my purposes because the typical way to carry on monetary policy and to inject liquidity in the system by the ECB is the direct lending to banks, both in normal times and in the crises, at least until my sample period. The analysis is run on Italian banks since a comprehensive micro-database with all CB and IM relationships of each bank does not exist for the euro area as a whole (indeed a similar database exists only in few countries around the world), but it is available for Italy. The Italian banking system is an interesting case for two reasons: it is a leading euro-area banking system and, given Italy's bank-based economy, the interbank and bank credit markets are vital to the financing of the private sector.

My results show that in Italy even during the crises the relationship between CB and IM liquidity is complementary: banks that relied more on CB liquidity lent more to other banks and CB liquidity injections sped up interbank lending. Therefore, in situations of funding constraints, particularly experienced by Italian banks in international wholesale markets during the sovereign crisis, CB liquidity alleviates the inability to borrow and facilitates the flow of interbank liquidity. Insights on the reasons underlying the complementary relationship between CB and IMs arise when I split interbank exposures according to their IM segment. This analysis shows that CB liquidity injections prompt chiefly domestic interbank lending, thereby allowing banks to balance the cross-border interbank reduction caused by the euro area fragmentation. Moreover, the analysis of IM segments shows that CB liquidity allows banks to use interbank lending to adjust their collateral

and maturity profile (Diamond, 1991; Hellwig, 1994) through the alternation of secured versus unsecured and overnight versus longer-term exposures. Furthermore, the longer maturity of CB operations in the crises has a direct effect on the longer maturity of the liquidity exchanged among banks and banks appear more willing to lend at longer maturities provided that loans are secured.

The last part of the analysis investigates the key players of IM and CB liquidity. The literature has long since recognized that IM is not made of homogenous banks (as modelled by Allen and Gale, 2000), but of key and minor players. Therefore identifying bank types and key players in CB and IM liquidity completes the analysis of the relationship between IM and CB. My results show that, when the CB liquidity increases exponentially, the activity of liquidity redistribution throughout the IM tends to be concentrated in a group of sound, well capitalized banks, with abundant retail fundraising and few customer loans, which specialize in interbank lending and become liquidity spreaders of CB liquidity. These banks could be identified as "money center banks", that is, intermediaries helping the CB implement monetary policy (Stigum and Crescenzi, 2007). For example, money center banks were common in the pre-crisis US IM, where the FED typically acted with a small group of money market primary dealers. The long time dimension of my dataset allows me to document that the role of money center banks grows in Italy exactly when the CB injections increase exponentially.

Finally, it is worthwhile noticing that the paper is also related to the recent literature on the effects of CB interventions on bank lending to the private sector during the crises. The transmission channel is similar: the CB liquidity injections, thanks to a positive funding shock, can restore bank credit supply to the economy (e.g. Chodorow-Reich, 2014; Andrade et al., 2015; Di Maggio et al., 2016; Goldstein et al., 2016; Darmouni and Rodnyansky, 2016; Daetz et al., 2016; Alves et al., 2016; Kandrac and Schlusche, 2017; Carpinelli and Crosignani, 2017). However, compared to these contributions, my focus is not on the bank credit supply to the economy, but on an earlier step of the monetary policy transmission mechanism: the relationship and the causal effect between CB liquidity and IM lending.

The rest of the paper is organized as follows. Section 2 describes some institutional aspects of the Eurosystem monetary policy framework, in normal times and during the crises, and the euro-area IMs, also providing some comparisons with the US market. Section 3 presents the data. Section 4 summarizes the main features of the empirical methodology. Sections 5-7 report the results. Section 8 summarizes the robustness checks. Section 9 concludes.

2. Institutional background

This section provides some institutional background on the Eurosystem monetary policy framework and the euro-area IM, also briefly summarizing the range of adjustments during the crises and some comparison with the Federal Reserve. In all systems CB liquidity is mostly provided through the banking system and the IM. This holds even more true in the euro-area, where, compared to the FED and the US market, the role of banks in the financial system is more prominent, the IM is even more crucial, the Eurosystem operations are much more directed at the banking system, both in normal times and during the crises, and the number of banks participating in CB operations is much higher.

CBs usually have an ultimate objective (price stability or full employment), an intermediate objective (the short term interest rate), a more or less explicit operational target (the IM overnight interest rate), and several operational instruments: typically, open market operations, standing facilities and reserve requirements.[2] The CBs' first tool are the open market operations (OMOs), which are defined as CB transactions with banks and other counterparties at the CBs' initiative to inject (or absorb) liquidity against collateral and with an haircut applied to the collateral.[3] OMOs may be basically distinguished in two types: purchase or sales of assets (usually debt securities) and direct collateralized loans to the banking system. The Federal Reserve uses OMOs that typically are conducted in the open market and are directed to a limited number of banks and other intermediaries. The Eurosystem typically uses OMOs conducted through auctions with banks (refinancing). In both systems, OMOs normally take place in the form of reverse transactions. Eurosystem OMOs include four categories of operation: main refinancing, longer-term refinancing, fine tuning and structural operations.[4]

The CBs' second tool are the standing facilities. The standing facilities is the provision of direct lending to banks through CB operations at the initiative of banks, which CBs commit to carry out under certain conditions, and however against collateral and with an haircut applied to the collateral. The Federal Reserve standing facility is the discount window, which also provides a

[2] A different instrument, not analysed in this paper, is the emergency liquidity assistance (ELA). ELA is the exceptional provision of CB liquidity to an individual bank, which occurs when a bank cannot borrow from other banks or from the CB through normal facilities. In the euro-area a key characteristic of ELA is that its responsibility lies with the national CBs of the Eurosystem.

[3] To be counterparties of monetary policy operations, typically banks have to meet some requirements.

[4] During the crisis, the FED also operated the Term Auction Facility (TAF), which provided credit to banks through an auction mechanism. In the euro-area, prior to the crisis, main refinancing operations were the most important in that they were used to signal the stance of monetary policy each week. Longer-term refinancing operations were characterized by a maturity of 3 months, while during the crises the ECB recurred to LTROs more frequently and with a longer maturity. Fine-tuning operations are usually held on the last day of a reserve maintenance period.

source of funding both for individual banks and for the banking system as a whole.[5] The Eurosystem standing facilities include two types of operations, both with an overnight maturity: the marginal lending facility and the deposit facility. The two facilities allow the ECB to tune the so called IM interest rate "corridor", which is used to avoid excessive variability in interbank interest rates.[6]

The CBs' third tool are reserve requirements, which are a certain minimum level of deposits to be hold by all banks on their deposit accounts with the CB, according to the quantity and nature of the bank's customer deposits. A maintenance refinancing period determines the period over which this average is calculated. The main function of the minimum reserve requirements is to create a structural liquidity shortage in the banking system, which allows the ECB to control and stabilize IM rates.

Given an appropriately managed supply of aggregate liquidity, the distribution of liquidity among banks occurs through trades in the IM, which therefore plays a key role both in banks' liquidity management and for the implementation of monetary policy. This is the case in the US, where the overnight IM is known as the federal funds ("fed funds") market and the actual weighted average rate at which banks lend overnight is known as the fed funds rate, while the announced rate that the FED uses as its operational target of monetary policy is known as the fed funds target rate.[7] In the euro area, although the Eurosystem does not have an explicit operational target on IM rates, the role of IM is even more pervasive because it is a bank-dominated system.

Very often, in particular prior to the crises, macroeconomic textbooks described monetary policy implementation placing a heavy emphasis on OMOs. Actually, in normal times it is not the quantity of money but the terms on which it is available that influence interest rates. Indeed, CBs can move rates simply by announcing their intentions. Therefore in normal times the main function of OMOs is not to set interest rates but to adjust the supply of liquidity so as to accommodate the banking system's demand for liquidity and to keep the overnight interbank rate (and then the chain

[5] There are three types of discount window credit in the US: primary credit (for banks in sound conditions), secondary credit (banks not eligible for primary credit), and seasonal credit (for small banks with significant seasonal swings). The rate paid by banks for primary credit is lower than the rate paid for secondary or seasonal funding. At the Eurosystem, a comparable monetary policy tool to provide liquidity to banks facing temporary tensions at a higher-than-normal price would be ELA. Therefore, the FED discount window also includes the function carried out in the euro-area through the ELA. This explains why in the US the use of discount window by banks has more often had a stigma effect, that is a reputation for revealing banks' grave liquidity problems (see for example Bindseil, 2014; Garcia-de-Andoain et al., 2016).

[6] The term "corridor" comes from the fact that the interbank rate is expected to be bounded above by the marginal lending facility rate and below by the deposit rate. In fact, normally, banks would prefer to obtain liquidity from the lending facility rather than from the market if the market rate were above the CB's lending rate, and symmetrically would prefer to deposit reserves at the CB's deposit facility rather than lend them in the market if the market rate were lower than the CB's deposit rate. Since 2008 the Federal also has introduced a corridor system and is paying interest rates on excess reserve balances.

[7] The fed funds market is an over-the-counter market and transactions are typically uncollateralized. Alternative to the fed funds market, some transactions have longer maturities and banks can also use the repo market.

of rates) stable around the target, avoiding volatility.[8] During the crises instead CBs increased massively liquidity injections, and so their balance sheet size, by undertaking several unconventional monetary policy measures. An important difference across CBs has been the relative emphasis given to bank versus non-bank markets. The FED has focused heavily on non-bank credit markets as well as on operations involving private sector securities. The ECB kept emphasizing banking system liquidity and then the relationship between CB and IM liquidity at least until 2015, when the Eurosystem started its program of securities' purchase.

Until 2015, when my sample time ends, Eurosystem unconventional measures included basically the following features. (i) The fixed rate, full allotment tender procedure used in the auctions with the banks. This means that, while during normal times the ECB allotted only the amount of liquidity needed to cover the structural liquidity deficit of the banking system, in the crises banks can obtain all liquidity they wish for only subject to adequate collateral provision. (ii) The related extension of the eligible collateral accepted in all Eurosystem operations, which means that the only real condition to obtain CB liquidity is made much easier. (iii) The increase in the amount of liquidity provided through longer-term refinancing operations (LTROs) and the extension of their maturity, which means that the maturity of CB liquidity significantly lengthens.[9]

3. The data

I have two key variables: CB liquidity provided to each bank and IM exposures of each bank towards each other bank.

My first key variable – CB liquidity − is the ratio at bank level between the total liquidity provided by the CB to each bank in each period (alternatively gross or net of amounts re-deposited at the CB) and total assets. The total liquidity comprises all kinds of exposures, including loans granted through the non-standard measures taken by the Eurosystem during the crises. Indeed, the chance of using data on the *total* liquidity provided by the CB to each bank is a strength of the paper. For example, the empirical literature on banks' behavior in CBs' auctions utilizes data on the CB liquidity obtained by each bank, but it utilizes only partial data, that is, on single operations or types of operation or auction, which in my analysis would mislead the interchangeable role of CB different tools. In the Eurosystem view, even in normal times, the types of operation are unimportant for the effectiveness of the monetary policy exactly because they are interchangeable (ECB, 2011). For example, if one bank's bidding strategy fails or if the Eurosystem mistakenly

[8] Guthrie and Wright, 2000; Disyatat, 2008; Borio and Disyatat, 2010; McLeay et al., 2014; Bindseil, 2014; Jacab and Kumhof, 2015.

[9] For more details, see Cecioni *et al.* (2011); Eser *et al.* (2012); ECB (2012). In the case of the USA, it would have included the Term Auction Facility (TAF), the Term Securities Lending Facility (TSLF), the Term Asset-Backed Facility (TALF) and the Large-Scale Asset Purchases (L-SAP).

injects too little liquidity by market operations, the bank can make up the difference by accessing the standing facilities. Even more, this is true during the crises when banks asking for CB liquidity can benefit from the fixed rate, full allotment tender procedure, which permits unlimited access to CB liquidity subject to adequate collateral.[10]

My second key variables are the IM exposures. My data cover all possible types of interbank exposures, including over-the-counter transactions, and all types of IM segments. In addition to the study of the Total IM, I deepen my analysis splitting the Total exposures into different IM segments and investigating each segment separately. As shown in Table 1, I use three kinds of IM breakdowns.

The first breakdown (Table 1, first and second column) relies on the residence of counterparties (Domestic and Foreign) and at the same time on the bilateral or trilateral nature of exposures. The breakdown of Domestic and Foreign exposures is used to investigate the relationship between CB and both domestic and cross-border liquidity. The distinction between bilateral and trilateral exposures enables to explore the role played by the anonymous and guaranteed segment of CCPs, which gained greatly in importance during the crises (Affinito and Piazza, 2015). While bilateral transactions are the traditional transactions between pairs of banks, trilateral transactions are (typically anonymized and collateralized) transactions that occur through third parties (the so called Central Clearing Counterparties or CCPs), which mediate the lending operations between two banks with the purpose of mitigating counterparty credit risk.[11] In IM exposures via CCPs the ultimate counterparty can be a domestic or a non-domestic bank and then these exposures are not purely domestic or foreign. In this light, the first breakdown identifies four segments: the Domestic Extra-Group segment (i.e. the traditional *bilateral* interbank transactions carried out *domestically* among banks not belonging to any banking group or belonging to different banking groups); Foreign Extra-Group and Foreign Intra-Group (bilateral and cross-border exposures); and CCPs (trilateral and both domestic and foreign).

The second breakdown (Table 1, third column) is based on the seniority of exposures and detects two segments: the secured and unsecured segment. As shown in Table 1, CCP trilateral exposures are all fully secured, while bilateral exposures may be secured or unsecured. The distinction between secured and unsecured exposures serves because the crisis stressed the use of collateral in IM transactions and rendered thus more pressing the analysis of the relationship between CB liquidity (which is always secured) and IM liquidity (which may be or not).

[10] In any case, the distinction by type of CB liquidity is inapplicable in Italy, where CB liquidity comes almost entirely from main refinancing operations before the crisis and longer-term operations during the crises.

[11] Exposures via CCPs are structured as follows: i) the borrowing bank enters into a repurchase agreement with the CCP, borrowing the required amount and providing collateral; ii) the lending bank enters into a reverse repo with the CCP; iii) the CCP acts as the direct counterparty to the seller and the buyer, thus assuming the risk of borrower default.

The third breakdown (Table 1, fourth column) is based on maturity and distinguishes overnight and longer-term exposures, again a distinction affected by the crisis, when the maturity of CB liquidity lengthens significantly.

For each segment, I analyze separately the gross lending side (Credits), the gross borrowing side (Debts), and the Net Position (Credits minus Debts) of each bank. In fact, the IM is a two-sided market and the behavior of a bank cannot be seized by only, say, Credits regardless of Debts, or vice-versa, because both are crucial in order to define the bank's conduct. Likewise, even the Net-Position may be crucial because it represents the bank's equilibrium in the IM. Of course, results and implications for the relationship between CB and IM liquidity are different for the three positions. In the next Section, describing my strategy, I also delve into the issue.

Summing up, I use data on 9 IM breakdowns (Total; Domestic Extra-Group, Foreign Extra-Group, Foreign Intra-Group and CCPs; Secured and Unsecured; Overnight and Longer-term) and for everyone I analyze the three positions (Credits, Debts and Net-Position): therefore, I analyze the IM though 27 variables.

The main source of my bank-by-bank data are the Bank of Italy's prudential supervisory reports. The analysis is run on all liquidity provided by the Eurosystem through the Bank of Italy to all banks operating in Italy, domestic and foreign. I use quantitative measures of both CB and IM positions because in the crises the relevance lies in the amount of liquidity.[12] I use end-of-month stocks because, apart from information on auctions, which could replicate the frequency of the auctions themselves, the data are not available on a more frequent basis. Moreover, as the repeated extraordinary injections of CB liquidity and the non-standard monetary policy measures demonstrate, the CB liquidity supplied during the crisis is intended to meet longer-term funding needs and accordingly has a more stable maturity. The number $i = 1, 2, \ldots, N_t$ of banks in the sample varies in each period t reflecting the changes in the Italian banking system. My variables are computed aggregating at banking group or independent bank level monthly bank-by-bank data. The aggregation at group level is preferable insofar as a group comprising various banks may decide to resort to CB liquidity through one, several or all of them, and in any case these transactions are likely to be decided by the parent bank, and to fit into a group-specific scheme.[13]

My sample period runs from June 1998 to May 2015 (17 years of data; $t = 1, 2, \ldots, T_i$, where $T_i = 204$ months if the bank i is always present), the total number of observations $N_t \times T_i$ is equal to 130,226. To explore the impact of the crises on the relationship between CB and IM liquidity, I also

[12] From an estimation perspective, all the effects of interest rate developments are captured by the bank and month dummies, which are always included.

[13] In order to separate the Intra-Group exposures, I used information on the identity of each counterparty and its group of affiliation. For the banks that changed group during my sample period, I traced the current group of affiliation in each t.

split the entire sample period into three sub-periods: normal times, the global financial crisis and the sovereign debt crisis. Although I experiment with alternative dates as a check, my basic estimations define the three spans as follows: normal times is the period from June 1998 to July 2007 (T is equal to 110, the number of observations $N_t \times T_i$ is equal to 67,839); the global financial crisis is the period from August 2007 to July 2011 (T = 48 and $N_t \times T_i$ = 27,210); the sovereign debt crisis is the period from August 2011 to May 2015 (T = 46 and $N_t \times T_i$ = 24,240).

As mentioned, my estimations also exploit the interbank counterparty-by-counterparty dimension of my data. In fact, the Bank of Italy collects information on gross bilateral interbank exposures of each bank towards each interbank counterparty and the identity of every counterparty. The number of counterparties $j_{i,t}$ = 1,2, . . . , $C_{i,t}$ varies across banks and over time. When I use this dimension of the data, the number of observations is $N_t \times T_i \times C_{i,t}$ = 984,743 (of which 579,221 in normal times; 207,479 in the first crisis; and 198,043 in the second crisis).[14]

Figures 1 and 2 show that both the share of banks that are net-borrowers from the CB and the share of CB liquidity in banks' total assets grow during the two crises, in particular in the sovereign debt crisis after the two large 3-years LTROs conducted by the Eurosystem from the end of 2011. Figure 2 also shows that IM Net-Position of the Italian banking system is structurally negative; IM Credits and Debts in banks' total assets both decrease in the first part of the global financial crisis and then remount; and again fall and then progressively improve during the sovereign debt crisis. Figure 3 shows that the annual growth rates of CB liquidity peak twice: during the global financial crisis and then during the sovereign crisis. In the meantime, those of the IM gross positions first decrease and then bounce back.

Table 2 reports the summary statistics of the key variables. Table 3 shows the correlations. CB liquidity tends to be correlated positively with interbank Debts and Credits, and negatively with Net Positions. However, there are also non-linear effects, indirectly confirming the need for more sophisticated statistical tools. In addition to data on CB and IM liquidity, my analysis utilizes a long list of bank specific covariates, again drawn from the Bank of Italy's prudential supervisory reports. Table 4 lists the explanatory variables, tells how they are calculated, and gives their summary statistics. All regressors are natural logarithms, ratios or dummy variables. The scope of each regressor is detailed in the next Section.

[14] The IM exposures through CCPs are identified as with one counterparty exactly because these exposures are anonymous and centralized. The individual foreign counterparties are not available for all the sample period.

4. Empirical strategy

(1) Equations

The analysis explores jointly and at the bank level the CB and IM liquidity and investigates both the possible directions of the casual nexus between them. In fact, it is not trivial to infer *a priori* whether the IM reacts to the provision of liquidity by the CB or whether banks change their demand for CB liquidity in response to IM conditions. It is likely that both may be the case at different moments depending on liquidity needs, surpluses and opportunities. As a consequence, my analysis requires a two-way analysis and control for endogeneity in both cases, which I face using Instrumental Variable (IV) regressions. My analysis estimates three systems of equation.

I start by following the literature on banks' behavior in CBs' auctions, which estimates banks' demand for CB liquidity as the dependent variable.[15] I take banks' liquidity borrowing from CB (that is, the liquidity provided by CB to each bank) as the main dependent variable (on the left-hand side of my equation), and the IM position as the key explanatory variable (on the right-hand side). In formal terms, I start estimating the following system of equations:

$$\begin{cases} cb_{i,t} = \alpha'_1 \, im_{i,t} + \beta'_1 \, M_1{}^{R}{}_{i,t-1} + \gamma'_1 \, b_i + \delta'_1 \, p_t + \varepsilon_{1i,t} \\ \\ im_{i,t} = \eta'_1 \, M_1{}^{R}{}_{i,t-1} + \theta'_1 \, b_i + \lambda'_1 \, p_t + \varphi'_1 \, M_1{}^{I}{}_{i,t-1} + \xi_{1i,t} \end{cases} \qquad (1)$$

where $cb_{i,t}$ is the liquidity provided by the CB to bank i in the period t. It is the dependent variable in the first equation (which is called second stage in terms of the IV model). $im_{i,t}$ is the IM position (Debts, Credits or Net-Position) of the same bank i in the same period t. It is the *endogenous* covariate in the first equation and at the same time is the dependent variable in the second equation (which is called first stage in terms of the IV model), where it is instrumented by the matrix of instruments $M_1{}^{I}{}_{i,t-1}$, which are detailed below. The matrix of exogenous regressors $M_1{}^{R}{}_{i,t-1}$, which has to be included in both equations, contains bank characteristics (as I detail below).[16] Bank fixed effects b_i and month fixed effects p_t are always included in order to control for bank-level unobservable characteristics and to take into account macroeconomic trends and all unobservable time-varying variables. α_1, β_1, γ_1, δ_1, η_1, θ_1, λ_1, φ_1 are vectors of coefficients; $\varepsilon_{1i,t}$ and $\xi_{1i,t}$ are identically and independently distributed idiosyncratic errors.

[15] E.g. Peristiani, 1998; Breitung and Nautz, 2001; Nyborg *et al.*, 2002; Furfine, 2003; Linzert *et al.*, 2007; Craig and Fecht, 2007; Bindseil *et al.*, 2009; Armantier *et al.*, 2011.

[16] The regressors in the matrixes $M^{R}{}_{i,t-1}$ and $M^{I}{}_{i,t-1}$ are lagged to avoid new endogeneity in estimating $im_{i,t}$ and $cb_{i,t}$, and to replicate the publication delay needed for mutual assessment by banks. In order to verify the presence of further endogeneity problems, I also experiment lagging the endogenous covariate by a quarter, and accordingly using $M^{I}{}_{i,t-4}$.

This estimation answers the general question of the characteristics (determinants) of banks that ask for CB liquidity. In particular, the endogenous covariate $im_{i,t}$ is the key regressor and α_1 is my coefficient of interest. As I mentioned, I analyze all possible IM net and gross positions: Debts, Credits and Net-Position. When the regressor $im_{i,t}$ is the Net-Position, if the coefficient of interest α_1 is positive, this may indicate that banks that are asking for CB liquidity redistribute it in the IM (complementary relationship between CB and IM liquidity). Conversely, if α_1 is negative, this may indicate that banks that are demanding CB liquidity use it as a funding source (substitute relationship between CB and IM liquidity). In turn, the Net-Position may be driven by Debts, Credits or both and thus the analysis of gross positions is decisive.

When the regressor $im_{i,t}$ are the IM Debts, if the sign of α_1 is negative, this suggests that banks that are demanding CB liquidity use it as an alternative funding source (substitute); while if α_1 is positive it suggests that banks that are asking for CB liquidity are also using the IM liquidity (complementarity). I expect a negative sign of α_1 insofar as it is plausible that the same banks borrowing from the CB register less liquidity needs against the other banks and then borrow less in the IM. Instead, when the regressor $im_{i,t}$ are the IM Credits, the result is *a-priori* more uncertain: if the coefficient α_1 were positive, it would indicate clearly that banks asking for CB liquidity redistribute it in the IM (complementarity).[17]

Then, I reverse the experiment and estimate IM position as the main dependent variable and CB liquidity as the (endogenous) explanatory variable. In formal terms, the second system of equations is as follows:

$$\begin{cases} \mathrm{im}_{i,t} = \alpha'_2\, \mathrm{cb}_{i,t} + \beta'_2\, \mathrm{M2}^{\mathrm{R}}{}_{i,t-1} + \gamma'_2\, \mathrm{b}_i + \delta'_2\, \mathrm{p}_t + \varepsilon_{2i,t} \\ \mathrm{cb}_{i,t} = \eta'_2\, \mathrm{M2}^{\mathrm{R}}{}_{i,t-1} + \theta'_2\, \mathrm{b}_i + \lambda'_2\, \mathrm{p}_t + \varphi'_2\, \mathrm{M2}^{\mathrm{I}}{}_{i,t-1} + \xi_{2i,t} \end{cases} \tag{2}$$

where $im_{i,t}$ and $cb_{i,t}$ are defined as before, but now they have changed the position within the system of equations: $im_{i,t}$ is the dependent variable in the second stage and $cb_{i,t}$ is the endogenous covariate. Of course the matrix of instruments $M_2^I{}_{i,t-1}$ contains now different specific instruments. Bank fixed effects b_i and month fixed effects p_t are again always included. α_2, β_2, γ_2, δ_2, η_2, θ_2, λ_2, φ_2 are the new vectors of coefficients and α_2 is the new coefficient of interest; $\varepsilon_{2\mathrm{i,t}}$ and $\xi_{2\mathrm{i,t}}$ the new identically and independently distributed idiosyncratic errors.

[17] The system of equation (1) may be made up of more than two equations when two or more interbank segments or positions are analyzed simultaneously.

This second system is the central part of my analysis because it explicitly addresses the question of whether CB liquidity spurs (and then complements) interbank liquidity or on the contrary whether they are alternative. To exemplify, when the variable $im_{i,t}$ are the IM Credits, if the coefficient of interest α_2 is positive, this indicates that banks obtaining CB liquidity increase the IM lending (complementary role), while if α_2 is negative a substitute relationship prevails.

As mentioned since Introduction, it is possible to apply to the IM, and then to the bank-bank relationship, the same methodology applied by Khwaja and Mian (2008) and many others since then to the firm-bank relationship. More specifically, it is possible to run an estimation at (*i*, *j*, *t*) bank-interbank counterparty-time level, which allows to capture demand for interbank lending through the inclusion of interbank counterparties fixed effect. Further, compared to the literature on bank-firm relationships, here the presence of counterparty fixed effects allows to control alternatively for demand or supply effects, since IM is a two-sided market. Specifically, when I analyze IM Credits, the presence of counterparty fixed effects (which in the case of Credits are borrowing banks) allows me to control for demand effects, while analyzing Debts, the presence of counterparty fixed effects (which in the case of Debts are lending banks) allows me to control for supply effects.[18] In formal terms, I estimate a third system of equations as follows:

$$\begin{cases} \mathrm{im}_{i,j,t} = \alpha'_3 \, \mathrm{cb}_{i,t} + \beta'_3 \, \mathrm{M_2^R}_{i,t-1} + \gamma'_3 \, \mathrm{b}_i + \delta'_3 \, \mathrm{p}_t + \chi'_3 \, \mathrm{j}_{i,t} + \varepsilon_{3i,j,t} \\ \\ \mathrm{cb}_{i,t} = \eta'_3 \, \mathrm{M_2^R}_{i,t-1} + \theta'_3 \, \mathrm{b}_i + \lambda'_3 \, \mathrm{p}_t + \varphi'_3 \, \mathrm{M_2^I}_{i,t-1} + \xi_{3i,t} \end{cases} \tag{3}$$

where $im_{i,j,t}$ is again the dependent variable in the second stage and again represents the IM position (Debts, Credits or Net-Position) of the bank *i* in the period *t*. However, it no longer refers to the total position of the bank *i* in the IM (or some IM segment) but now it refers to the position towards each single interbank counterparty *j*. The second change is that the estimation now includes interbank counterparty fixed effects $j_{i,t}$, in addition to bank fixed effects b_i and month fixed effects p_t. The three kinds of fixed effects, bank-counterparty-time, may be variously combined. In particular, interacting bank-counterparty fixed effects $\mathrm{b}_i \times \mathrm{j}_{i,t}$ allows to absorb any bank-counterparty time-invariant characteristics, including any time-invariant bank characteristic. Interacting counterparty-time fixed effects $\mathrm{p}_t \times \mathrm{j}_{i,t}$ allows to control for both observable and

[18] In the rest of the paper, I refer to these controls as control for counterparty effects or, in analogy with the literature on firm-bank relationship, simply as a control for demand effects.

unobservable interbank counterparty heterogeneity, crucially capturing interbank counterparty demand (or supply) for interbank lending at time *t*. The rest of the equation system (3) is unchanged compared to (2). In particular, the endogenous covariate CB liquidity $cb_{i,t}$, the matrix of instruments $M_2^{I}{}_{i,t-1}$ and the matrix of regressors $M_1^{\mathrm{R}}{}_{\mathrm{i,t-1}}$ are defined as before, and vary as before in bank *i* and period *t* while they cannot vary in *j*. The α_3, β_3, γ_3, δ_3, η_3, θ_3, λ_3, φ_3, χ_3 are the new vectors of coefficients and α_3 is the new coefficient of interest; $\varepsilon_{3\mathrm{i,j,t}}$ and $\xi_{3\mathrm{i,j,t}}$ the new identically and independently distributed idiosyncratic errors.

In the estimations of all the three systems of equation, the observations are always clustered at banking group level (and at bank level for independent banks), thus obtaining heteroskedasticity-robust standard errors and controlling for possible autocorrelations across the same banking group.

(2) Estimation method

As mentioned, my basic estimation model is the IV two-stage-least-squares regression model. IV method is well suited to a joint analysis of CB and IMs because allows me to handle the endogeneity problem, which may exist in both directions of the casual nexus. In such situations, ordinary least squares produce biased and inconsistent estimates, while IV furnishes consistent estimates provided that the instrument is valid. The instrument needs to satisfy two requirements. First, it has to be relevant: that is, the instrument needs to be coherent with the findings of the literature and, conditional on the other covariates, it has to induce significant changes in the endogenous covariate (i.e. strong versus weak instrument). Second, it does not have to produce independent effects on the dependent variable (that is, the instrument cannot be correlated with the error term in the explanatory equation, i.e. exclusion restriction).

In practice it is never trivial to find convincing instruments; indeed any instrument may be liable to criticisms. In this light, I alternate several instruments and use several checks. Moreover, I test the robustness of my results presenting broad diagnostics on my instruments regarding the two conditions. First, the strength of instruments (which is crucial in order not to have wrong intervals and significance tests) is directly assessed because both endogenous covariates and the instruments are observable (and the coefficients of my instruments are always shown in the Tables). Second, as for the exclusion restriction, since the assumption that the instruments are not correlated with the error term in the equation of interest is testable whenever the model is overidentified, I often include more instruments in the same estimation and run the most common test of these overidentifying restrictions (the Sargan-Hansen test). The instruments pass all tests and checks, and the results always hold and provide univocal indications, both alternating the casual nexuses and rotating different instrumental variables.

(3) Instruments

Of course, the instrumental variables change in the matrixes of instruments $M_1^I{}_{i,t-1}$ and $M_2^I{}_{i,t-1}$ depending on the endogenous variable alternatively investigated. However, in both cases, I experiment with alternative instruments: I always try with the lagged values of the endogenous variable, as it is easy and standard in many applications, but more importantly I add other specific instruments.

In the first system of equation, when the endogenous covariate is $im_{i,t}$ (the IM positions), I use as instruments a pair of variables on banks' credit rating taken from the agency Fitch: the variable Rating is coded so as to take values from 1 to 10, from best to worst, plus 11 to designate unrated banks; the variable Banks without Rating is a dummy that takes the value of 1 for banks with no rating and 0 otherwise (Table 4). The two variables are always considered simultaneously: on the one hand, in order not to lose observations on non-rated banks, and, on the other hand, in order not to interpret the missing rating as worse than the actually worst rating because the ad hoc dummy constantly control for non-rated banks (e.g., Angelini et al., 2011). As for the strength of these instruments, an unanimous literature documents the relevance of rating scores for interbank positions (e.g. Morgan, 2002; Ashcraft and Bleakley, 2006; Angelini et al., 2011; Affinito, 2011).[19] As for the exogeneity, Tables 5 provides preliminary evidence on both relevance and exogeneity of my instruments. For each instrument, and for each quartile of each instrument, Table 5 presents the summary statistics of all bank variables. While the data show a clear trend between instruments and the relevant endogenous variable, the absence of a systematic pattern between the instruments and the other banks' specific variables support the assumption of orthogonality with the other potential determinants. The exogeneity of the variable Rating is explained by the fact that the variable also seizes unrated banks (which are very different from each other) and by the fact that rating agencies' scores are complex financial assessments that do depend on banks' individual characteristics but are likely to relate not only to a specific trait but to the bundle of bank characteristics as a whole.

In the second and third system of equation, which are crucial in the analysis, when the endogenous covariate is $cb_{i,t}$, I use as instruments either the pair of variables GDP gap and inflation rates (in line with a sort of Taylor rule), or as an alternative the pair of variables official rates and CB's total assets (in line with the idea of the recent empirical literature of using conventional and unconventional monetary policy proxies). As for the relevance of these instruments, it looks plain since an abundant literature and the CBs themselves state the relevance of macro-variables in their behavioral function (see for example Clarida *et al.*, 2000; ECB, 2011; Bernanke, 2015). As for the exogeneity, it appears quite obvious that the macro-variables are relevant for monetary policy

[19] In particular, Angelini *et al.* (2011) find that Fitch ratings are the most informative in the assessment of banks and financial firms.

decisions while are exogenous with respect to the changes in the position of each single bank. Moreover, their exogeneity is also confirmed by an unreported exercise similar to that of Table 5. In the case of macro variables, in order to keep time fixed effects, my instruments are defined at bank-level by using as weights the ratios of total assets of each bank to the euro-area banking system's total assets. This implies that the market share of each bank contributes to characterize the instrumental variables. However, as I show later on in the Section of Robustness checks, results are not affected by the definition at bank level and do not change when time fixed effects are removed and replaced by a long list of macro-variables. Nevertheless, I prefer keeping time fixed effects, which assure a stronger control and allow to interact counterparty fixed effects for taking into account demand side (and supply side) characteristics in equation system (3).[20]

(4) Explanatory variables

The analysis includes the exam of individual bank characteristics as determinants of positions in both CB and IM liquidity. To this purpose, in the systems of equation (1), (2) and (3) the matrixes $M^{R}_{i,t-1}$ contain three relevant sets of explanatory variables (Table 4). The first set includes two covariates that allow to extend the analysis of liquidity circulation from the wholesale to the retail liquidity markets: the variable Retail Fundraising serves to ascertain whether banks with more deposits and bonds from their retail customers take less CB liquidity and/or redistribute more in the IM; the variable Retail Loans verifies whether banks taking CB or IM liquidity intermediate it onward to the economy (in addition to or in place of lending to banks). The second set includes three variables measuring banks' health (Capital, ROE, Bad Loans), which are used to verify whether banks borrowing in the two wholesale liquidity markets are sounder, and whether sounder banks borrow from CB or IMs. The third set of variables (Portfolio of domestic or foreign Government Debt Securities and Bank Bonds) analyzes whether and to what extent the availability of collateral influences borrowing from CB and IMs.

Other variables are used as control variables. Size (log of banks' total assets) constitutes a standard control to capture the effect of bank size on individual choices. The Domestic Intra-Group

[20] Later on, I provide additional diagnostics on the exogeneity of my instruments and on the issue of possible heterogeneous results (i.e. ATE versus LATE results). For completeness on this issue, I also can say in advance that the standard tests corroborate my choices. First, as for the strength, the *F*-statistic of the reduced form is always sufficiently high (Stock et al, 2012), being the same also for the coefficients of the instruments, which may be verified in the Tables. Second, as for validity, the Sargan-Hansen test is always passed, even if, for the first system of equations, when IM positions are the endogenous variable, the number of instruments is over the number of endogenous variables because of the use of two related variables (Banks without Rating and Rating). In this light, in order to further check the robustness of my instruments, I used lagged values of the endogenous covariates as an alternative and results do hold. It is to notice that the pairs of variables "Debts and Net Position" and "Credit and Net Position" are never estimated in the same specification because of evident problems of collinearity. On the other hand, the two variables Debts and Credits can be included in the same specification, but this requires more instruments. In this case, in order not to weaken my instruments, I employed again lagged values of the endogenous covariates as an additional instrument. The strength of my instruments also overcomes the issue of the bias of the IV estimations (Angrist and Pischke, 2009).

exposures (i.e. domestic transactions among banks belonging to the same group) are treated separately from the other interbank exposures as they capture the internal capital market of banking groups and do not constitute a real IM. In some specifications where I analyze as dependent variables the positions in the IM single segments, I also use the other segments as additional covariates to investigate if the IM segments influence each other.

(*5) The impact of the two crises*

As mentioned, as far as the impact of the two crises is concerned, my long sample period is split into three spans: the normal times, the global financial crisis and the sovereign debt crisis. All the estimations of all determinants are identically repeated over the three sub-periods. This helps verify whether and to what extent the determinants of all liquidity markets change over time, not only in the comparison to normal times, but also across the two phases of the crisis. This is remarkable for Italy since the sovereign debt crisis impacted Italy much more and during it the ECB liquidity injections involved particularly Italian banks.

5. Bank determinants of CB liquidity provision

As argued in the previous Section, in order to investigate the relationship between CB and IM liquidity, I start by following the literature on liquidity auctions. This literature estimates banks' participation in CB liquidity auctions as the dependent variable on the left hand side and bank characteristics as the determinists on the right hand side. Similarly, I estimate banks' comprehensive recourse to CB liquidity as the main dependent variable on the left hand side of the system of equation (1) and in my case banks' individual characteristics on the right hand side refer first of all to IM positions. This estimation answers the question whether CB liquidity depends on banks' IM position and how banks that are seeking CB liquidity behave in the IM: in particular whether they use CB liquidity as an alternative funding source (substitute role) or to redistribute it (complementary role). The results are reported in Table 6, which contains both coefficients and corresponding marginal effects.

Results show that on the whole period CB liquidity is obtained by banks with less IM Debts (i.e. banks obtaining CB liquidity are those that demand less liquidity from other banks), more IM Credits (i.e. banks obtaining CB liquidity grant more liquidity to other banks) and accordingly present a positive IM Net-Position (which then is positive given both the effects of more Credits and less Debts). In other words, banks asking for CB liquidity are on average interbank lenders (or liquidity redistributors). All the three positions of the Total Interbank Market are statistically non-significant in normal times (when CB liquidity borrowing was smaller) and become significant during the two crises (exactly when banks' demand for CB liquidity rises). This also indicates that

the IM is more reactive when CB liquidity is injected more intensely. Marginal effects indicate that the upshot is also economically relevant.

The relationship between CB and IM appears therefore to be substitute with regard to Debts (who borrows form CB does not borrow also from IM), whereas it is clearly complementary with regard to Credits (who borrows from CB lend to other banks). The first (substitute) effect was somehow more expectable for Debts, while the second (complementary) effect on Credits is more meaningful because a-priori one might guess that banks obtaining CB liquidity could decide to use it for their needs, while on the contrary banks are found to redistribute the CB liquidity. The complementary (redistributive) relationship between CB and IM liquidity prevails also when it is measured in quantitative terms by the marginal effects: passing from the 25th to the 75th percentile of IM Credits (Debts), the CB liquidity rises (decreases) by around 18 (10) percentage points in proportion to total assets.[21]

6. Determinants of IM liquidity

As argued in Section 4, the analysis of the relationship between CB and IM liquidity needs to be subjected to a reverse-causation investigation where the CB liquidity is the determinant/driver of IM positions: such as in equation systems (2) and (3). The equation system (2) reverses the IV experiment instrumenting banks' liquidity borrowing from CB in the first stage and then using it as the key explanatory variable to estimate the IM positions in the second stage. The results are reported for the Total Interbank Market in Table 7 and for the single interbank segments in Tables 8 (bilateral/trilateral nature and residence), 9 (Secured versus Unsecured) and 10 (Overnight versus Longer-term). Then, in addition to reverse the IV experiment, the equation system (3) also takes into account that banks borrowing with the CB could redistribute more because they happen to have more demanding interbank counterparties. To control for this, equation system (3) includes

[21] For brevity's sake, results on the single segments are not reported in the first exercise, while they are in the second, reversed estimation (see next Section). They are available upon request. However, the outcomes tend to be analogous to those of the reversed exercise. The estimations also show the other determinants of CB liquidity (Table 6). The flow of liquidity is confirmed by variables describing bank retail markets. First, the variable Retail Loans is positive, which signals that banks getting resources from the CB are those with a higher incidence of loans not only to other banks but also to the economy. This positive effect of loans may be explained in part by their use as collateral in CB operations, but, while this use is minor as a matter of stylized fact (Bank of Italy, 2011b and 2015), the positive estimated economic effect is considerable in terms of marginal effects. Second, the variable Retail Fundraising is always negative and has a large economic impact: banks with large-scale deposits and retail bonds have less need for liquidity and thus do not demand CB liquidity, even in the crises. The covariates regarding banks' health indicate that more profitable and capitalized banks tend to have less recourse to CB liquidity, perhaps because they find more easily founding sources in the IM and retail markets (Afonso et al., 2011). Instead banks with more Bad Loans present mixed results evidence (Drechsler et al., 2016; Acharya et al., 2014). In any case, the economic impact of these variables is modest. The variables concerning the kinds of collateral show that the availability of collateral of any type eases the recourse to CB liquidity. The impact is relevant mainly for domestic Government securities, which amount grows in the portfolio of Italian banks during the crises (Affinito et al. 2016). The remaining variables are as controls, in particular banks' Size tends to be positive confirming that larger banks have a greater direct recourse to CB liquidity (Ashcraft *et al.*, 2008; Fecht *et al.*, 2011).

counterparty fixed effects in order to capture interbank demand (or supply). Total IM and segments' results are reported in Tables 12 and 13.

Table 7 shows that the sign of CB liquidity is always negative as determinant of IM Debts, which means that those banks that borrow from CB borrow significantly less from the market (substitute relationship). However, the sign of CB liquidity is always positive as determinant of IM Credits, which means that banks obtaining CB liquidity on average redistribute the liquidity more strongly (complementarity). In quantitative terms measured by the marginal effects, the overall outcome is complementary. In other words, while reducing the liquidity needs of borrowing banks, the CB provision of liquidity spurs interbank lending.

The breakdown of IM segments helps explain the reasons behind this uplift of interbank lending. First, the breakdown between bilateral/trilateral exposures and counterparties' residence shows that, while outcomes differ for CCPs (banks borrowing from CB also borrow from CCPs and do not use this segment as a redistribution channel), the Total IM results are confirmed for the Domestic and Foreign Extra-Group segments: banks borrowing from the CB borrow significantly less in the two segments and tend to redistribute more. In particular, this is significantly true towards domestic counterparties (Table 8). Therefore, while cross-border wholesale funding became more constrained because of the euro area fragmentation during the crises (IMF, 2013, de Andoain et al., 2014), the CB liquidity turns out to have encouraged the replacement of the reduced cross-border interbank lending with a rise in domestic interbank lending. This also confirms that in situations of funding constraints, particularly experienced by Italian banks in international wholesale markets during the sovereign crisis, CB interventions alleviate the inability to borrow and facilitate interbank lending (Borio and Disyatat, 2010).

Second, the breakdown between Secured and Unsecured segments (Table 9) allows to find out that, while reducing all interbank Debts and improving all Net-Positions, CB liquidity impels interbank Unsecured Credits in the global financial crisis and interbank Secured Credits in the sovereign crisis. This is probably because the sovereign debt crisis affected Italy more heavily and exacerbated the need of Italian banks to protect themselves from bank counterparties' credit risk. Moreover, in a global trend making collateral an ever scarcer resource (Levels and Capel, 2012; Williamson, 2016), the sovereign crisis strengthened the need of banks to use the IM as a tool to adjust their collateral availability and profile.

Third, the breakdown between Overnight and Longer-term segments (Table 10) indicates that, while reducing again all interbank Debts and improving all Net-Positions, CB liquidity spurs interbank Overnight Credits in the global financial crisis and Longer-term Credits in the sovereign crisis. This is likely linked to the longer maturity of CB liquidity operations in the period, which

therefore turn out to have a direct effect on the following maturity of the liquidity exchanged among banks. Combining the findings of the two breakdowns, CB liquidity prompts Unsecured Credits that have a short maturity in the first crisis; while prompts Secured Credits that have a longer maturity in the second crisis. In other words, banks seem to be willing to lend at longer maturities provided that loans are secured.

To further test my outcomes, I also ran a regression where the variables are measured in variations (instead than amounts) to total assets. The results are substantially equivalent (Table 11). Some minor changes involve a few control regressors and are explained by the new definition of the variables. Most important, CB liquidity injections are confirmed to reduce interbank liquidity needs (of banks obtaining CB liquidity) and boost interbank lending, particularly during the sovereign debt crisis.

Notably, all results are confirmed when I use data on interbank counterparty-by-counterparty in order to control for bank counterparties' heterogeneities. Tables 12 and 13 report the results of the equation system (3) for the Total IM positions and for the Secured versus Unsecured and Overnight versus Longer-Term segments. Bank characteristics are always included as well, as in Tables 7-11, but not reported for brevity. In addition, for each segment and each phase, four specifications are adopted, variously combining the three possible fixed effects: bank, time and interbank counterparty. The first specification includes bank and time fixed effects, such as in Tables 7-11, where they were the only possible fixed effects. The second specification includes separately the three fixed effects: bank, time and interbank counterparty. The third specification includes bank fixed effects and the interaction interbank counterparty-time fixed effects, which control for both observable and unobservable counterparty heterogeneity. The fourth specification includes again the interaction interbank counterparty-time fixed effects and adds the interaction bank-interbank counterparty fixed effects, which absorb any bank-counterparty time-invariant characteristic, including any time-invariant bank characteristic.

Results are always confirmed; indeed they tend to be more statistically significant, also for the single segments and phases. Therefore, even controlling for the possible different demand for interbank credit (or different supply for interbank debts) by the counterparties facing banks that obtain the CB liquidity, the CB liquidity impels IM liquidity and lending, in particular Overnight and Unsecured transactions in the global crisis and Longer-Term and Secured transactions in the sovereign crisis.[22]

[22] As in the case of CB liquidity, my estimations also show the other determinants of liquidity positions (Tables 7-11). The two variables related to retail liquidity markets indicate that banks with more retail funds borrow less and lend more in the IM; symmetrically banks with more Retail Loans borrow more and lend less in the IM. Interestingly, the variables Rating and Banks without Rating (which are to be considered together) and the variable Bad Loans

7. Bank types and money center banks

The analysis has shown that CB liquidity, even more when it is enormously fed up, is redistributed in the interbank system. In this respect, different types of banks are likely to exist: banks that demand and redistribute the CB liquidity, banks that do not demand the CB liquidity but only use the IM liquidity, and so on. The literature has long since recognized that IM is not made of homogenous banks (as modelled by Allen and Gale, 2000), but of key and minor players. Therefore identifying bank types and key players in CB and IM liquidity is a natural extension of my analysis on the relationship between IM and CB.

Table 14 identifies six possible types of bank on the basis of their potential behavior in the two liquidity markets. The possible behavior vis-à-vis the CB is measured by the net position with the CB on the rows, while the possible conduct in the IM is measured by the Total IM Net-Position on the columns. For example, "secondary liquidity users" (first cell of the matrix) are banks that present a negative Total IM Net-Position and do not borrow from the CB (or even present a positive net-deposit with the CB). "Secondary liquidity redistributors" are banks that again do not borrow from the CB, but have a positive Total IM Net-Position (thus they are likely to redistribute the IM or retail liquidity). "Liquidity eagers" are banks that borrow at the same time from the CB and the IM. "Primary liquidity redistributors" are banks that are net-borrowers with the CB while present a positive Net-Position in the Total Interbank Market. As for column, Table 14 groups banks according to their IM Net-Position: "IM liquidity users" are a sum of secondary liquidity users and liquidity eagers, that is, they are IM net-borrowing banks. Likewise, "IM liquidity redistributors" are IM net-lending banks. As for row, Table 14 groups banks according to their relationship with the CB, whether or not they use the CB liquidity.

Table 15 shows the percentage shares of these different types of bank and their development over time in Italy, in terms both of number of banks and total assets.[23] The table confirms that banks asking for CB liquidity grow in the crises: in normal times "CB liquidity users" account for only 3 per cent in terms of banks' number and 44 per cent in terms of banks' total assets, while in the sovereign debt crisis account for 21 per cent for banks and 86 per cent for total assets. Confirming the previous analysis, the IM is more reactive when the CB liquidity increases: "IM liquidity redistributors" decrease in terms of number of banks but increase in terms of total assets. What

corroborate the existence of a peer monitoring in the IMs as lower-rated and troubled banks receive less funds. Further, results indicate that the peer monitoring is stronger in the traditional bilateral segment than via CCPs (Table 8), which in fact were created precisely in order to attenuate counterparty risk. The other measures of banks' health (ROE, Capital) indicate that sounder banks use less the IM liquidity (such as they turned out to use less CB liquidity) perhaps as raise higher retail funds. The covariates on banks' securities holdings (Portfolio of Government Debt Securities, domestic and foreign, and Bank Bonds) confirm that their availability facilitates IM exposures.

[23] The two middle cells (i.e., "wholesale liquidity uninterested" and "only primary liquidity users") are not reported because of very low figures. However, they are included in the total of rows and columns.

emerges again is the complementary role of CB and IMs. Indeed the IM liquidity redistribution of CB liquidity strengthens in the crises as “primary liquidity redistributors” become the most of IM liquidity redistributors. In fact, “secondary liquidity redistributors” decrease during the crises, both in terms of number of banks (from around 70 to around 25 per cent) and in terms of total assets (from 17 to 3 per cent), while “primary liquidity redistributors” (banks borrowing from the CB to redistribute in the IM) rise from less than 1 to more than 8 per cent in terms of number of banks, and from 4 to 23 per cent in terms of total assets. Likewise, liquidity users do not appear to substitute the IM liquidity with the CB liquidity. In fact “primary liquidity users” (banks only borrowing from CB) maintain negligible (unreported) figures, while “liquidity eagers” (the banks that are net-borrowers simultaneously from the CB and IMs) increase from 2 to 11 per cent in terms of number of banks and from 40 to 63 per cent in terms of total assets.

Therefore, in normal times the banks that redistribute liquidity in the IM are mainly the “secondary liquidity redistributors”, that is, banks that do not redistribute the primary liquidity just injected by the CB but redistribute the liquidity already existing in the system, drawn from the retail customers or the IM itself. Instead, in the crises the banks that redistribute liquidity in the IM are “primary liquidity redistributors”, that is during the crises several banks take the role of borrowing from the CB and redistributing to other banks. Figure 7 shows that in terms of total assets the composition of bank types of the Italian IM was more homogeneous in normal times, while tends to polarize in the sovereign crisis in two types of banks: liquidity eagers and primary liquidity redistributors. Compared to normal times, the increase of primary liquidity redistributors is much more substantial.

Primary liquidity redistributors may be likened to those intermediaries that are often indicated in the literature with the term “money center banks”. This term is generally associated with large banks dominating wholesale activity in money markets thereby helping the CB implement monetary policy (Stigum and Crescenzi, 2007). For example, money center banks were common in the pre-crisis US IM, where the FED typically acted with a small group of money market primary dealers. Craig and von Peter (2014) and in’t Veld and van Lelyveld (2014) document a core-periphery structure, respectively for the German and the Dutch IM, where a very strict core of money center banks play an essential role in holding together the periphery banks into a single IM. However, their analysis cannot incorporate information on CB liquidity and therefore does not deal with the issue of the relationship between CB liquidity and IM reallocation. León et al. (2016) make a step ahead including data on CB liquidity and show the existence in the Colombian market of few money center banks that contribute to spread the CB liquidity in the IM in the period 2010-2013, when the CB liquidity overwhelms the IM liquidity of six times. The long

time dimension of my dataset allows me to document that the role of money center banks grows exactly when the CB injections increase exponentially.

Table 16 shows in percentage terms the transition matrix of the bank types across the different phases of my analysis. The 60 per cent of banks that are primary liquidity redistributors during the sovereign crisis were on average secondary liquidity redistributors in normal times and therefore they already had a vocation for liquidity redistributing. Instead, the 27 per cent were secondary liquidity users or liquidity eagers and thus did not have any inclination to redistribute and appear to assume the role as a new opportunity.

A further step is to verify whether the bank types follow systematic patterns, that is whether bank-specific features help explain the joint behavior towards CB and IM liquidity. In this light Table 17 presents the results of two random effects probit estimations for two bank types (the twos prevailing in the last phase: primary liquidity redistributors and liquidity eagers). In the first estimation the dependent variable is a binary variable equal to 1 if bank *i* is found to be a primary liquidity redistributor in the period *t* and 0 otherwise; and in the second estimation if bank *i* is a liquidity eager.[24] The odds of a bank to be a primary liquidity redistributor grow significantly whenever the CB increases the liquidity injections, in any phase. Interestingly, the huge liquidity injections in the sovereign crisis do not affect the chance of being a liquidity eager. For both types of banks, the odds rise in size: earlier works on the US IM suggested instead that small banks tend to turn over surplus funds to large banks (Ho and Saunders, 1985; Allen and Saunders, 1986; Bech and Atalay, 2010). The results indicate that the primary liquidity redistributors turn out to be systematically sound banks, more capitalized and with more funds from retail customers, while liquidity eagers tend to raise less retail funds, and thus need more wholesale liquidity. Primary liquidity redistributors grant less loans to retail customers, probably just because they tend to specialize in the IM, while liquidity eagers present more liquidity needs as they lend more to retail customers. The more a bank is equipped with collateral, the less it is likely to become a primary liquidity redistributor and the more to become a liquidity eager. These outcomes may simply indicate again that the banks that invest more in interbank lending put less resources in other assets, or they may be a confirmation that banks need more collateral to be IM net-borrowers.

8. Other robustness checks

I verified the robustness of the results in several ways.

[24] In this case the issue of endogeneity handled in the rest of the paper is less pressing in the sense that the dependent variable is in any case a combination of the two key variables and the estimation aims at identifying clear correlations rather than casual nexuses.

a) Alternative instrumental variables

As mentioned, my results are robust to the instrumental variables. In particular, when the endogenous covariate is $cb_{i,t}$ (equation systems 2 and 3), I alternate three kinds of instruments: the lagged values of CB liquidity to each bank; the pair of variables GDP gap and inflation rates; and the pair of variables official rates and CB total assets. Results remain always equivalent. Results remain the same even if I weigh or not at bank-level the instruments made of macro variables. As an example, Tables 18 and 19 show some alternative IV estimations of equation systems (2) and (3) replacing my instrumental variables. The dependent variable $im_{i,t}$ is the Total IM Net Position (upper panel) or Credits (middle panel) or Debts (lower panel); and $cb_{i,t}$ is the key regressor.

In Table 18, the instruments are the same of my previous estimations (that is, the pair of variables GDP gap and inflation rates); however, now they are not defined at bank-level (by weighting through the market share of each bank). This implies that now I cannot control anymore for time fixed effects since the instruments are pure macro variables. However, as an offset to the loss of time fixed effects, I balance with a long list of time-varying macro variables.[25] In Table 19, the instruments are the pair of variables official rates and CB's total assets, again weighting or not through the market share of each bank (and including the other macro-variables when time fixed effects are removed).

In spite of the changes in the magnitude of coefficients (just due to the different underlying estimations) and some minor and seldom changes in the level of significance, results remain basically equivalent. Moreover, the few changes regard Net-Position and Deposits, never Credits. Nevertheless, as argued above, I preferred keeping the definition at bank level since it allowed me to maintain in the estimations the time fixed effects and the interaction between counterparties and time effects.

b) Heterogeneous IV tests

Another concern with IV estimations regards the fact that results may be heterogeneous just because of the instrument (Imbens and Angrist, 1994; Heckman, 1997). In other words, results may be not representative for the entire population of banks (the average treatment effect, ATE), but just for a group of banks that change their treatment owing to the instrument (local average treatment effect, LATE). To verify the concern, I ran a set of panel regressions with the same dependent

[25] The list includes a set of time varying macro-variables on the developments of Italian economy: exports and imports of goods and services; household consumption; gross fixed investment; households' both financial assets and liabilities; non-financial corporations' financial assets; non-financial corporations' both bonds and shares and other equity; General government's both debt and deficit; mutual fund shares. All these variables are taken as ratios to GDP. Furthermore, the list includes: the gross yield to maturity on 10-year General government bonds; the aggregated growth rate of bank lending to the private sector; the average interest rates on loans and deposits; persons in work and unemployment rate.

variables and covariates as before, but including as new covariates the interactions between each regressor and the variables used as instruments in the IV estimations (Buono and Formai, 2016). Table 20 (specification 2) reports the results of a panel estimation adding at the same time the interactions between each regressor and the variables Rating and Banks without Rating (that is, the variables used as instruments in the IV regressions of IM positions). If the effect of Rating and Banks without Rating on IM positions were heterogeneous in relation to bank characteristics, the coefficients of the interaction terms would be significantly different from zero. Instead, while the coefficients of the basic regressors do not vary substantially, the coefficients of the interaction terms are rarely and scarcely significant.

c) Interaction terms

Regarding the analysis of the impact of the two crises, instead of using a sample time splitting (repeating the same estimations across different time spans), another way is to use interaction-terms between each regressor and two time-dummies (one for each phase of the crisis). Results are basically equivalent.

d) Net CB liquidity

As noted in my basic estimations the key variable CB liquidity is measured as banks' *gross* borrowing form CB. I re-measured it as *net* borrowing, subtracting (from the gross liquidity that the CB grants to each bank) the amounts that each bank re-deposits at the CB. The results remain substantially unchanged. However, I preferred to use the gross variable because deposits at the CB are driven by the euro-area reserve requirement and their inclusion is inconsistent with the variable Retail Fundraising, which is worth keeping because it provides very meaningful results.

e) Foreign banks

A set of checks was run on foreign banks. Since I analyze the Eurosystem liquidity provision, which is decentralized, foreign banks could influence the results if they massively exploit the option to refinance at a given CB. However, the results remain unchanged when foreign banks are dropped. Moreover, I estimated the basic specifications adding the impact of a dummy taking the value of 1 for foreign banks (but renouncing the fixed effects b_i). This check stresses the role played by foreign banks since the dummy tends to be positive, both in normal times and during the two crises, reconfirming that international banking groups raise funds in a decentralized manner.

f) Time spans

In order to test the sensitivity of my results to different time spans, I experimented with alternative dates as starting or ending dates of the two phases of the crisis. As a start date of the

global financial crisis, I tried bringing forward August 2007 by one or two months and postponing it by one to two months; likewise, I tested as a start date September 2008 (the Lehman Brothers failure) and October 2008 (introduction of the Eurosystem full allotment procedure). As far as the sovereign debt crisis, I put to the tests other close dates up to December 2011 (when the first 3-years Longer Term Refinancing Operation was executed). Results always remained the same.

9. Conclusions

Since the outbreak of the crises, liquidity and liquidity markets have been at the center of academic and policy debate. In several systems around the world IMs faced worrying impairments and many CBs introduced a wide range of measures to increase liquidity amount and flow. The literature reminds that the coexistence of IMs with CB liquidity provision is a common goal of CBs and banks as they allow liquidity insurance and risk sharing between banks, assure peer monitoring and market discipline, play a key role in the transmission of monetary policy and provide benchmark rates for the pricing of financial assets throughout the economy. It is therefore crucial to improve the knowledge on how two so interrelated liquidities react and interact each other. This paper contributes to the purpose with the advantage of using an unique micro database containing seventeen years of monthly micro bank-by-bank and counterparty-by-counterparty data, which cross two crises. The analysis has investigated both the possible causal directions of the mutual relationship between CB and interbank liquidity while controlling for their mutual endogeneity and for demand and supply effects, obtaining univocal outcomes.

My results show that in Italy CB and IM liquidities have a complementary role, even in the crises. The CB's liquidity circulates among banks and influences the IM redistribution, affects banks' IM conduct and feeds the retail liquidity circulation. CB larger liquidity provisions amplify IM reactivity as banks obtaining CB liquidity do not limit to use it for their needs but redistribute it to other banks speeding up interbank lending. CB liquidity allows banks to compensate and adjust domestic and cross-border interbank exposures, secured and unsecured transactions, short-term and longer-term interbank lending. More, when CB liquidity is provided abundantly, some banks tend to take on a pivotal role in liquidity management as borrowers from the CB and redistributors to other banks. Redistributing banks tend to be healthy, specialized in interbank activity and with smaller portfolios of collateral, which are instead concentrated in the net borrowing banks. Future research could try to understand also another aspect of the relationship between CB and IM liquidities: whether there is an impact of CB injections on banks' positions in the intricate web of IM networks.

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Figure 1. Percentage shares of the number of banks' borrowing and depositing with the CB

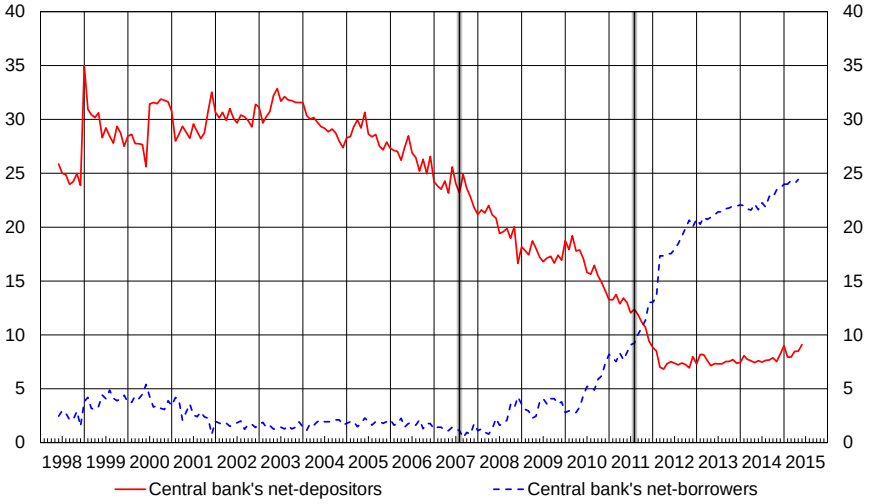


Figure 2. CB and IM liquidity in Italy 1998-2015

(percentage shares of banks' total assets)

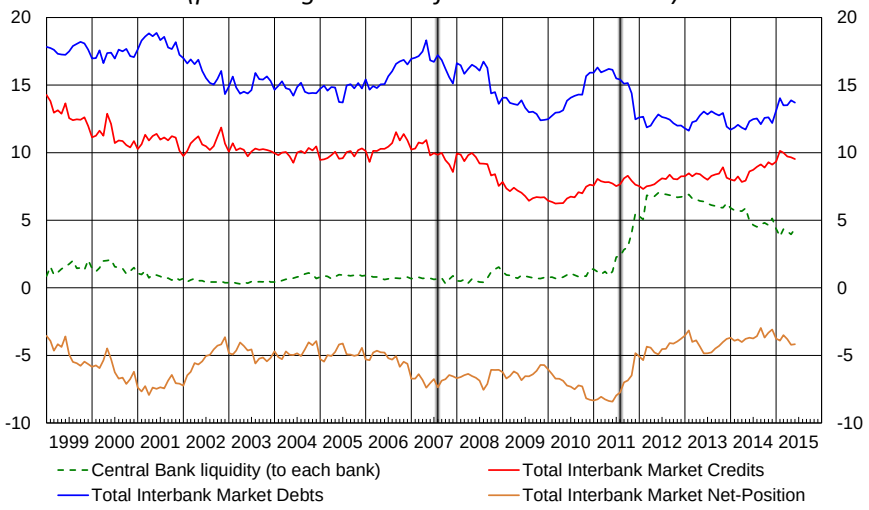
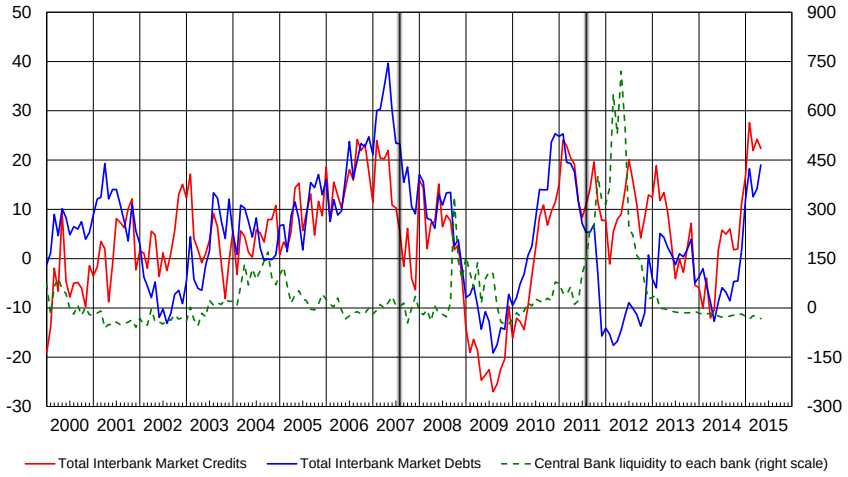


Figure 3. CB and IM liquidity developments in Italy 2000-2015

(12-month percentage changes)



My sample period runs from June 1998 to May 2015. Normal times is defined as the period from June 1998 to July 2007; the global financial crisis is defined as the period from August 2007 to July 2011; the euro-area sovereign debt crisis is defined as the period from August 2011 onwards. Grey vertical lines indicate the starting dates for the global financial crisis and the sovereign debt crisis.

Table 1. Breakdown of Interbank Market in segments

Residence of counterparties	Bilateral or trilateral nature of exposures	Seniority	Maturity
Domestic Extra-Group	Bilateral	Secured and Unsecured	Overnight and Longer-term
Foreign Extra-Group			
Foreign Infra-Group			
CCPs	Trilateral	Secured	
Total Interbank Market =	Total Interbank Market =	Total Interbank Market =	Total Interbank Market

The Total IM may be split into segments: (i) on the basis of the residence of counterparties (e.g. the Domestic Extra-Group segment includes the traditional *bilateral* interbank exposures among domestic banks not belonging to any banking group or belonging to different banking groups); CCPs are the *trilateral* extra-group interbank exposures via central counterparties in which the ultimate counterparty can be a domestic or a non-domestic bank); (ii) on the basis of the bilateral or trilateral nature of exposures; (iii) on the seniority of exposures; (iv) on the maturity of exposures.

Table 2. Summary statistics of the key variables

Key variables (scaled by total assets)				Obs	Mean	Sd. Dev.	Min	Max
Central Bank liquidity (provided to each bank)				130,226	0.006	0.034	0.000	0.162
Total Interbank Market			*Net*	130,226	0.000	0.219	-1.000	0.143
			Credits	130,226	0.094	0.138	0.000	0.226
			Debts	130,226	0.094	0.200	0.000	0.286
Interbank Market segments	Residence of counterparties and bilateral or trilateral nature of exposures	Domestic Extra-Group	*Net*	130,226	0.033	0.133	-1.000	0.137
			Credits	130,226	0.075	0.102	0.000	0.163
			Debts	130,226	0.042	0.092	0.000	0.121
		CCPs	*Net*	130,226	-0.001	0.018	-0.571	0.050
			Credits	130,226	0.000	0.009	0.000	0.052
			Debts	130,226	0.002	0.018	0.000	0.074
		Foreign Extra-Group	*Net*	130,226	-0.032	0.172	-1.000	0.188
			Credits	130,226	0.019	0.088	0.000	0.221
			Debts	130,226	0.050	0.179	0.000	0.230
		Foreign Infra-Group	*Net*	130,226	0.000	0.004	-0.134	0.030
			Credits	130,226	0.000	0.002	0.000	0.066
			Debts	130,226	0.000	0.005	0.000	0.148
	Seniority	Unsecured	*Net*	130,226	0.000	0.214	-1.000	0.136
			Credits	130,226	0.088	0.130	0.000	0.188
			Debts	130,226	0.088	0.195	0.000	0.206
		Secured	*Net*	130,226	0.000	0.043	-1.000	0.002
			Credits	130,226	0.006	0.039	0.000	0.002
			Debts	130,226	0.006	0.036	0.000	0.002
	Maturity	Overnight	*Net*	130,226	0.025	0.175	-1.000	0.139
			Credits	130,226	0.083	0.125	0.000	0.178
			Debts	130,226	0.058	0.150	0.000	0.130
		Longer-term	*Net*	130,226	-0.024	0.116	-1.000	0.010
			Credits	130,226	0.012	0.048	0.000	0.025
			Debts	130,226	0.035	0.115	0.000	0.085
Domestic Infra-Group			*Debts or Credits*	130,226	0.003	0.018	0.000	0.390

Table 3. Relations among key variables

		Central Bank liquidity (to each bank)	Total Interbank Market			Domestic Extra-Group			CCPs			Foreign Extra-Group			Foreign Infra-Group			Unsecured			Secured			Overnight			Longer-term			Domestic Infra-Group
			Net	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	*Net*	*Credits*	*Debts*	
Central Bank liquidity (to each bank)		**1**																											
Total Interbank Market	*Net*	-0.0080*	**1**																										
	Credits	0.0618*	**0.4445***	**1**																									
	Debts	0.0511*	**-0.7881***	**0.2011***	**1**																								
Domestic Extra-Group	*Net*	-0.0212*	0.6136*	0.5356*	-0.3029*	**1**																							
	Credits	0.0186*	0.4801*	0.7665*	0.0017	**0.7240***	**1**																						
	Debts	0.0514*	-0.3524*	0.0795*	0.4400*	**-0.6394***	**0.0674***	**1**																					
CCPs	*Net*	-0.1727*	0.0859*	0.0299*	-0.0733*	0.0140*	0.0157*	-0.003	**1**																				
	Credits	0.0536*	0.0346*	0.0821*	0.0186*	0.0171*	0.0242*	0.0022	**0.2488***	**1**																			
	Debts	0.1992*	-0.0700*	0.0088*	0.0826*	-0.006	-0.004	0.0038	**-0.8884***	**0.2236***	**1**																		
Foreign Extra-Group	*Net*	0.0248*	0.7905*	0.1500*	-0.7614*	0.0089*	0.0513*	0.0443*	-0.0079*	0.0046	0.0101*	**1**																	
	Credits	0.0690*	0.1352*	0.6667*	0.3102*	-0.004	0.0368*	0.0462*	0.0053	0.001	-0.005	**0.1745***	**1**																
	Debts	0.0101*	-0.6933*	0.1832*	0.8840*	-0.0103*	-0.0313*	-0.0199*	0.0101*	-0.004	-0.0121*	**-0.8754***	**0.3233***	**1**															
Foreign Infra-Group	*Net*	-0.0102*	0.0227*	0.0012	-0.0239*	0.0212*	0.0213*	-0.007	-0.0155*	-0.0157*	0.0081*	-0.006	-0.0132*	-5E-04	**1**														
	Credits	0.0271*	-0.0179*	0.0080*	0.0250*	-0.0222*	-0.0328*	-0.005	-0.0400*	0.0360*	0.0573*	0.0044	0.0187*	0.005	**-0.2844***	**1**													
	Debts	0.0213*	-0.0256*	0.0032	0.0302*	-0.0268*	-0.0323*	0.0027	-0.0094*	0.0299*	0.0236*	0.0068	0.0192*	0.0029	**-0.8697***	**0.7206***	**1**												
Unsecured	*Net*	-9E-04	0.9809*	0.4169*	-0.7857*	0.5826*	0.4543*	-0.3362*	0.002	0.0145*	0.0049	0.7983*	0.1240*	-0.7063*	0.0278*	-0.0198*	-0.0303*	**1**											
	Credits	0.0281*	0.4321*	0.9584*	0.1862*	0.5239*	0.7286*	0.0544*	0.0196*	0.0157*	-0.0123*	0.1439*	0.6527*	0.1821*	0.0152*	-0.0117*	-0.0170*	**0.4397***	**1**										
	Debts	0.0197*	-0.7863*	0.1809*	0.9837*	-0.2893*	-0.0128*	0.4042*	0.0109*	-0.005	-0.0135*	-0.7780*	0.2982*	0.8941*	-0.0204*	0.0139*	0.0219*	**-0.8022***	**0.1836***	**1**									
Secured	*Net*	-0.0362*	0.2190*	0.1900*	-0.1088*	0.2281*	0.1841*	-0.1247*	0.4316*	0.1052*	-0.3845*	0.0574*	0.0730*	-0.0193*	-0.0229*	0.0075*	0.0205*	0.0250*	0.0153*	-0.0172*	**1**								
	Credits	0.1241*	0.1272*	0.3362*	0.0919*	0.1456*	0.2776*	0.0989*	0.0400*	0.2356*	0.0714*	0.0464*	0.1787*	0.0431*	-0.0456*	0.0665*	0.0672*	0.0078*	0.0535*	0.0270*	**0.6145***	**1**							
	Debts	0.1780*	-0.1199*	0.1420*	0.2286*	-0.1106*	0.0852*	0.2550*	-0.4660*	0.1326*	0.5317*	-0.0172*	0.1086*	0.0698*	-0.0226*	0.0635*	0.0491*	-0.0210*	0.0403*	0.0497*	**-0.5109***	**0.3642***	**1**						
Overnight	*Net*	-0.0149*	0.8484*	0.4682*	-0.6056*	0.5184*	0.4891*	-0.2047*	0.0101*	0.0101*	-0.005	0.6781*	0.1647*	-0.5709*	0.0360*	-0.0294*	-0.0412*	0.8629*	0.4962*	-0.6145*	**0.0317***	**0.0007**	**-0.0367***	**1**					
	Credits	0.0059	0.4664*	0.9380*	0.1348*	0.5259*	0.7167*	0.0383*	0.0219*	0.0145*	-0.0152*	0.1856*	0.6348*	0.1332*	0.0163*	-0.0147*	-0.0193*	0.4731*	0.9787*	0.1329*	0.0239*	0.0524*	0.0289*	**0.5468***	**1**				
	Debts	0.0224*	-0.6049*	0.2342*	0.8220*	-0.1685*	0.0251*	0.2718*	0.0064	0.0002	-0.006	-0.6396*	0.3368*	0.7801*	-0.0286*	0.0221*	0.0321*	-0.6163*	0.2353*	0.8310*	-0.0173*	0.0429*	0.0671*	**-0.7154***	**0.1938***	**1**			
Longer-term	*Net*	0.0075*	0.6028*	0.1295*	-0.5698*	0.3720*	0.1646*	-0.3546*	0.1464*	0.0498*	-0.1237*	0.4649*	0.0063	-0.4437*	-0.0116*	0.0107*	0.0139*	0.5449*	0.0651*	-0.5531*	0.3642*	0.2383*	-0.1703*	0.0890*	0.0533*	-0.0598*	**1**		
	Credits	0.1628*	0.0593*	0.4273*	0.2288*	0.1680*	0.3335*	0.1289*	0.0288*	0.1983*	0.0650*	-0.0562*	0.2602*	0.1817*	-0.0388*	0.0614*	0.0597*	-0.0358*	0.2016*	0.1732*	0.4840*	0.8298*	0.3329*	-0.0807*	0.0875*	0.1676*	**0.2332***	**1**	
	Debts	0.0602*	-0.5850*	0.0468*	0.6716*	-0.3063*	-0.0277*	0.4123*	-0.1361*	0.0321*	0.1522*	-0.4936*	0.1018*	0.5244*	-0.004	0.0148*	0.0108*	-0.5661*	0.0180*	0.6316*	-0.1670*	0.1043*	0.3108*	-0.1236*	-0.0175*	0.1302*	**-0.9145***	**0.1803***	**1**
Domestic Infra-Group	*Debts or Credits*	0.0570*	-0.0230*	-0.0200*	0.0114*	-0.0411*	-0.0555*	-0.002	-0.0600*	0.0546*	0.0863*	0.0178*	0.0178*	-0.0084*	-0.4471*	0.3516*	0.5045*	-0.0237*	-0.0460*	-0.005	0.0004	0.0821*	0.0890*	-0.0400*	-0.0526*	0.003	0.0170*	0.0798*	0.0161*

* denotes statistical significance at 10 % level.

Table 4. Summary statistics of explanatory and instrumental variables

Matrix	Name	Definition	Obs	Mean	Sd. Dev.	Min	Max
Matrix $M^R_{i,t}$: banks' characteristics/ regressors	Size	Log (Total assets)	130,226	5.741	1.756	2.390	13.666
	Reatil Loans	Total performing (non-securitized) loans to the domestic private sector / Total assets	130,226	0.556	0.189	0.000	1.000
	Retail Fundraising	(Total deposits and bonds) / Total assets	130,226	0.671	0.218	0.000	1.000
	Bad Loans	Total non-performing (non-securitized) loans (private sector) / Total performing (non-securitized) loans (private sector)	130,226	0.054	0.077	0.000	1.000
	ROE	Net profits / (Capital and reserves)	130,226	0.073	0.137	0.000	1.000
	Capital	Regulatory capital / Total risk weighted assets	119,289	0.119	0.051	0.000	0.806
	Portfolio of domestic Government Debt Securities	Holdings of Italian Government bonds / Total assets	130,226	0.177	0.125	0.000	0.908
	Portfolio of euro countries' Government Debt Securities	Holdings of other Euro-area countries' Government bonds / Total assets	130,226	0.001	0.008	0.000	0.623
	Portfolio of Bank Bonds	Holdings of their own bonds and of other banks' bonds / Total assets	130,226	0.027	0.037	0.000	0.625
Matrix $M^I_{i,t-1}$: instruments for Interbank Market positions	Lagged IM positions				see Table 1		
	Rating	Rating agency scores	130,226	10.729	1.288	2.000	11.000
	Banks without rating (0-1)	Banks without rating (0-1)	130,226	0.955	0.207	0.000	1.000
Matrix $M^I_{i,t-1}$: instruments for Central Bank liquidity	Lagged CB liquidity (to each bank)				see Table 1		
	Eurosystem total assets	(weighted for banks' total assets)	130,226	251.9	2018.6	0.053	66784
	ECB official rates	(weighted for banks' total assets)	130,226	0.00	0.0	0.000	0.09
	Euro-area GDP gap	(weighted for banks' total assets)	130,226	0.00	0.0	-0.020	0.01
	Euro area inflation rates	(weighted for banks' total assets)	130,226	0.000	0.002	-0.012	0.077

Table 5. Distribution of variables conditional on instrumental variables of IM positions: Rating and Banks without Rating

For each quartile of the instrumental variable Rating, and for the two possible values of the variable Banks without Rating, the table presents the summary statistics of each bank variable in the dataset.

Variables		Quartiles of Rating				Dummy rating	
		1	2	3	4	yes	not
Total Interbank Market	*Debts*	0,018	0,016	0,013	0,011	0,019	0,009
	Credits	0,030	0,040	0,058	0,080	0,030	0,080
	Net	-0,041	-0,041	0,028	0,032	-0,043	0,030
Domestic Extra-Group	*Debts*	0,050	0,040	0,003	0,001	0,050	0,000
	Credits	0,010	0,022	0,047	0,050	0,030	0,050
	Net	-0,006	-0,009	0,024	0,033	-0,001	0,033
Foreign Extra-Group	*Debts*	0,061	0,060	0,000	0,000	0,000	0,050
	Credits	0,000	0,020	0,040	0,000	0,000	0,040
	Net	-0,020	-0,010	0,000	0,000	-0,010	0,000
Foreign Infra-Group	*Debts*	0,012	0,003	0,000	0,000	0,008	0,000
	Credits	0,000	0,002	0,005	0,000	0,004	0,000
	Net	-0,006	-0,001	0,001	0,000	-0,004	0,000
CCPs	*Debts*	0,000	0,000	0,003	0,004	0,014	0,001
	Credits	0,000	0,020	0,018	0,000	0,003	0,000
	Net	-0,018	-0,018	0,000	0,000	-0,012	-0,001
Domestic Infra-Group	*Debts or Credits*	0,06	0,03	0,04	0,00	0,04	0,00
Central Bank liquidity (to each bank)		0,000	0,004	0,000	0,010	0,000	0,010
Size		9,67	6,60	5,76	5,57	8,63	5,27
Retail Loans		0,53	0,52	0,47	0,56	0,51	0,56
Bad Loans		0,05	0,05	0,08	0,06	0,05	0,05
Portfolio of Gov't Debt Securities		0,12	0,11	0,11	0,18	0,08	0,18
Portfolio of Bank Bonds		0,02	0,01	0,01	0,02	0,02	0,01
Portfolio of euro Gov't Debt Securities		0,001	0,001	0,002	0,001	0,002	0,001
ROE		0,09	0,07	0,07	0,07	0,08	0,07
Capital		0,12	0,10	0,09	0,12	0,10	0,12
Retail Fundraising		0,60	0,57	0,63	0,71	0,64	0,70

Table 6. Determinants of CB liquidity (to each bank)

Results of the equation system 1. Sample time splitting: each specification is identically repeated in each span. Dependent variable $cb_{i,t}$: ratio of CB liquidity provided to the bank on its total assets. Estimation method: IV. Endogenous and instrumented set of regressors $im_{i,t}$: total IM positions. Instruments: Rating and Banks without Rating.

		Total period			Normal times			Global financial crisis			Sovereign debt crisis			*Marginal effects*			
Specifications:		1	2	3	1	2	3	1	2	3	1	2	3	Total period	Normal times	Global financial crisis	Sovereign debt crisis
	Debts			-1.118 *** *0.065*			-0.053 *0.051*			-0.181 *0.121*			-0.356 *** *0.109*	-10.3	ns	ns	-7.2
Total Interbank Market	*Credits*		1.300 *** *0.122*			-0.031 *0.023*			0.152 *** *0.052*			2.101 *** *1.659*		17.6	ns	13.8	18.1
	Net	0.639 *** *0.032*			-0.052 *0.039*			0.106 *** *0.037*			0.304 *** *0.094*			28.8	ns	16.5	25.2
Domestic Infra-Group	*Debts or Credits*	0.215 *** *0.017*	0.968 *** *0.093*	-0.455 *** *0.031*	-0.056 *** *0.015*	-0.057 *** *0.016*	-0.052 *** *0.016*	0.059 *** *0.015*	0.150 *** *0.039*	-0.056 *0.069*	-0.217 *** *0.038*	0.548 *0.649*	-0.347 *** *0.043*	ns	-1.0	1.0	-1.0
Size		0.027 *** *0.001*	0.005 *** *0.001*	0.044 *** *0.002*	0.001 ** *0.000*	0.001 ** *0.000*	0.002 *** *0.000*	0.004 *** *0.001*	-0.006 *0.006*	0.017 ** *0.008*	0.057 *** *0.003*	-0.008 *0.044*	0.068 *** *0.007*	15.7	5.6	18.1	12.8
Reatil Loans		0.461 *** *0.023*	0.781 *** *0.073*	0.135 *** *0.008*	-0.035 *0.026*	-0.018 *0.012*	0.005 *0.006*	0.091 *** *0.034*	0.094 *** *0.034*	0.041 *0.031*	0.167 ** *0.065*	1.281 *1.045*	0.022 *** *0.008*	20.6	ns	27.1	14.6
Reatil Fundraising		-0.362 *** *0.017*	-0.030 *** *0.004*	-0.610 *** *0.034*	0.015 *0.018*	-0.007 *** *0.001*	-0.030 *0.021*	-0.078 *** *0.025*	-0.023 *** *0.006*	-0.108 * *0.068*	-0.314 *** *0.049*	-0.400 ** *0.194*	-0.299 *** *0.045*	-22.8	-4.8	-28.3	-12.2
Bad Loans		-0.081 *** *0.004*	0.005 *0.005*	-0.157 *** *0.009*	0.002 *0.004*	-0.003 *** *0.001*	-0.009 * *0.005*	-0.001 *0.007*	0.022 *** *0.004*	-0.020 *0.025*	-0.030 *** *0.007*	0.076 *0.075*	-0.048 *** *0.011*	-1.5	-1.3	1.0	-1.0
ROE		0.003 *0.002*	0.001 *0.004*	0.004 *0.003*	0.004 *** *0.001*	0.003 *** *0.001*	0.002 * *0.001*	-0.003 *0.003*	-0.003 *0.003*	0.000 *0.004*	-0.042 *** *0.008*	-0.051 ** *0.025*	-0.041 *** *0.007*	ns	0.7	ns	-1.2
Capital		-0.127 *** *0.007*	-0.287 *** *0.030*	-0.472 *** *0.027*	0.013 *0.012*	-0.006 *** *0.002*	-0.024 *0.019*	-0.025 *0.016*	-0.017 *0.013*	-0.013 *0.022*	-0.116 *** *0.013*	0.238 *0.276*	-0.176 *** *0.024*	-1.9	-1.6	ns	-1.1
Portfolio of domestic Gov't Debt Securities		0.524 *** *0.022*	0.855 *** *0.072*	0.191 *** *0.006*	-0.023 *0.022*	-0.009 *0.011*	0.010 *** *0.003*	0.124 *** *0.035*	0.144 *** *0.041*	0.052 *** *0.019*	0.307 *** *0.077*	1.426 *1.079*	0.118 *** *0.018*	8.8	2.7	12.2	8.2
Portfolio of Gov't Debt Securities of oether euro-area countries		0.735 *** *0.041*	1.304 *** *0.127*	0.162 *** *0.021*	-0.032 *0.055*	0.006 *0.026*	0.056 *** *0.015*	0.075 *** *0.026*	0.113 *** *0.038*	-0.003 *0.013*	0.155 ** *0.070*	1.121 *0.934*	-0.008 *0.028*	0.9	1.0	0.9	1.0
Portfolio of Bank Bonds		0.378 *** *0.017*	0.656 *** *0.058*	0.101 *** *0.006*	-0.011 *0.022*	0.002 *0.011*	0.021 *** *0.003*	0.087 *** *0.026*	0.108 *** *0.033*	0.025 *** *0.010*	0.083 ** *0.039*	0.678 *0.569*	-0.018 * *0.011*	0.1	0.9	0.5	ns
Inflation		-0.131 *** *0.008*	-0.277 *** *0.021*	-0.019 * *0.011*	-0.005 * *0.003*	-0.005 * *0.003*	-0.005 * *0.003*	-0.014 *** *0.005*	-0.006 * *0.004*	-0.041 *** *0.009*	-0.020 ** *0.009*	-0.019 * *0.011*	-0.021 * *0.011*				
GDP gap		0.177 *** *0.011*	0.361 *** *0.028*	0.088 *** *0.014*	0.004 * *0.002*	0.004 * *0.002*	0.000 * *0.000*	0.076 *** *0.029*	0.044 ** *0.022*	0.231 *** *0.053*	0.391 *** *0.070*	0.312 *** *0.090*	0.470 *** *0.114*				
Bank fixed effects		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				
Time fixed effets		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				
Number of observations		119,289	119,289	119,289	67,839	67,839	67,839	27,210	27,210	27,210	24,240	24,240	24,240				
Adj R-squared		0.82	0.81	0.87	0.85	0.86	0.92	0.91	0.91	0.91	0.91	0.92	0.91				

Table reports regression coefficients and associated standard errors in italics. ***, **, and * denote statistical significance at 1, 5 and 10 % level. Last columns report marginal effects of estimations shown in Tables 5 and 6. The marginal effects quantify the estimated economic impact of each regressor on the dependent variable 'CB liquidity (to each bank)', other things being equal. The estimated effect of each determinant is computed as the change in the percentage share of the total loans from CB to total assets between the 25th to the 75th percentile of each variable.

Table 7. Determinants of Total IM positions

Results of the equation system 2. Sample time splitting: each specification is identically repeated in each span. Dependent variable $im_{i,t}$: total IM positions. Estimation method: IV. Endogenous and instrumented regressor $cb_{i,t}$: ratio of CB liquidity provided to the bank on its total assets. Instr: GDP gap and inflation rates weighted for banks' total assets.

	Net	Credits	Debts	Net	Credits	Debts	Net	Credits	Debts	Net	Credits	Debts	*Marginal effects*									
	Total period			Normal times			Global financial crisis			Sovereign debt crisis			Net	Credits	Debts	Net	Credits	Debts	Net	Credits	Debts	Net	Credits	Debts
Specifications:	1	2	3	1	2	3	1	2	3	1	2	3	Total period			Normal times			Global financial crisis			Sovereign debt crisis		
Central Bank liquidity (to each bank)	0.816 *** *0.008*	0.088 *** *0.007*	-0.727 *** *0.005*	1.210 *** *0.047*	0.317 *** *0.040*	-0.894 *** *0.028*	0.597 *** *0.030*	0.033 * *0.020*	-0.566 *** *0.020*	0.811 *** *0.011*	0.160 *** *0.009*	-0.651 *** *0.009*	18.1	10.1	-8.6	5.8	2.2	-12.2	20.0	8.7	-3.7	14.0	5.2	-4.9
Domestic Infra-Group *Debts or Credits*	-0.249 *** *0.022*	-0.649 *** *0.019*	-0.400 *** *0.015*	-0.276 *** *0.030*	-0.580 *** *0.025*	-0.304 *** *0.018*	0.027 *0.060*	-0.472 *** *0.048*	-0.500 *** *0.041*	0.086 *0.059*	-0.264 *** *0.047*	-0.350 *** *0.047*	-4.9	-1.6	-1.4	-6.1	-3.2	-2.5	ns	-2.9	-3.3	ns	-1.6	-1.5
Size	-0.036 *** *0.001*	0.002 ** *0.001*	0.038 *** *0.001*	-0.015 *** *0.001*	-0.007 *** *0.001*	0.008 *** *0.001*	-0.008 *** *0.003*	0.056 *** *0.003*	0.064 *** *0.002*	-0.064 *** *0.003*	0.012 *** *0.002*	0.076 *** *0.002*	-15.9	0.2	0.9	-7.3	-1.6	0.1	-6.8	3.6	5.0	-7.7	0.0	2.8
Retail Loans	-0.649 *** *0.003*	-0.531 *** *0.003*	0.117 *** *0.002*	-0.572 *** *0.004*	-0.460 *** *0.004*	0.112 *** *0.003*	-0.748 *** *0.008*	-0.507 *** *0.006*	0.241 *** *0.005*	-0.510 *** *0.008*	-0.463 *** *0.006*	0.047 *** *0.006*	-6.0	-3.3	0.5	-2.4	-4.8	0.2	-5.2	-5.1	1.2	-5.4	-4.4	0.8
Retail Fundraising	0.523 *** *0.003*	0.002 *0.003*	-0.520 *** *0.002*	0.433 *** *0.005*	0.041 *** *0.005*	-0.392 *** *0.003*	0.594 *** *0.008*	0.090 *** *0.007*	-0.504 *** *0.006*	0.598 *** *0.008*	0.140 *** *0.006*	-0.458 *** *0.006*	16.9	ns	-1.8	18.5	0.6	-5.6	14.3	2.8	-5.9	8.6	1.1	-3.2
Bad Loans	0.119 *** *0.004*	-0.017 *** *0.004*	-0.136 *** *0.003*	0.102 *** *0.005*	-0.003 *0.005*	-0.105 *** *0.003*	0.165 *** *0.015*	-0.013 *0.012*	-0.178 *** *0.010*	0.041 *** *0.009*	-0.030 *** *0.007*	-0.071 *** *0.008*	2.2	-2.4	-12.5	0.3	ns	-1.2	0.2	ns	-1.2	1.1	-1.0	-1.1
ROE	0.009 ** *0.004*	-0.003 *0.003*	-0.006 ** *0.003*	0.029 ** *0.004*	0.013 *** *0.004*	-0.016 ** *0.003*	0.072 ** *0.009*	0.054 *** *0.007*	-0.018 ** *0.006*	0.029 ** *0.008*	-0.011 * *0.006*	-0.040 *** *0.006*	1.0	ns	-1.0	0.8	1.0	-1.0	0.2	0.9	-1.0	1.0	-1.0	-1.0
Capital	0.166 *** *0.008*	-0.224 *** *0.007*	-0.390 *** *0.005*	0.306 *** *0.011*	-0.037 *** *0.010*	-0.343 *** *0.007*	0.368 *** *0.019*	0.248 *** *0.015*	-0.120 *** *0.013*	0.268 *** *0.022*	-0.001 *0.018*	-0.269 *** *0.018*	2.7	-1.2	-1.3	2.0	-1.1	-1.9	4.3	0.6	-1.2	1.7	ns	-1.3
Portfolio of domestic Gov't Debt Securities	-0.672 *** *0.004*	-0.519 *** *0.003*	0.152 *** *0.002*	-0.474 *** *0.005*	-0.410 *** *0.004*	0.064 *** *0.003*	-0.767 *** *0.009*	-0.607 *** *0.007*	0.159 *** *0.006*	-0.675 *** *0.008*	-0.470 *** *0.006*	0.205 *** *0.006*	-11.7	-5.2	0.2	-10.2	-2.6	0.7	-18.4	-2.7	0.5	-2.8	-2.6	0.6
Portfolio of euro Gov't Debt Securities	-1.015 *** *0.025*	-0.862 *** *0.021*	0.153 *** *0.017*	-1.333 *** *0.033*	-1.023 *** *0.028*	0.310 *** *0.020*	-0.333 *** *0.041*	-0.348 *** *0.033*	-0.015 *0.028*	-0.537 *** *0.039*	-0.392 *** *0.031*	0.145 *** *0.031*	-3.0	-2.2	0.8	-1.0	-1.0	1.0	-1.1	-1.0	ns	-1.0	-1.0	1.0
Portfolio of Bank Bonds	-0.493 *** *0.007*	-0.412 *** *0.006*	0.082 *** *0.005*	-0.498 *** *0.011*	-0.410 *** *0.009*	0.087 *** *0.007*	-0.617 *** *0.017*	-0.532 *** *0.014*	0.085 *** *0.012*	-0.272 *** *0.014*	-0.249 *** *0.011*	0.023 ** *0.011*	-3.8	-2.5	0.7	-2.6	-1.3	0.9	-4.8	-1.4	0.9	-0.5	-1.2	1.0
Rating	0.010 *** *0.001*	0.008 *** *0.001*	-0.002 *** *0.001*	0.007 *** *0.002*	0.011 *** *0.002*	0.004 *** *0.001*	-0.009 ** *0.003*	-0.011 *** *0.003*	-0.005 ** *0.002*	0.007 * *0.004*	0.004 * *0.003*	-0.004 ** *0.002*	3.0	1.0	-1.0	3.4	0.4	0.4	-9.0	-2.3	-1.0	2.2	0.5	-1.2
Banks without Rating	0.039 *** *0.013*	0.049 *** *0.012*	0.016 * *0.009*	0.088 * *0.055*	0.037 ** *0.019*	-0.076 ** *0.033*	0.119 *** *0.019*	0.091 *** *0.015*	-0.027 ** *0.013*	-0.323 *** *0.022*	-0.037 ** *0.017*	0.286 *** *0.017*	7.3	0.6	0.9	3.8	0.9	-2.1	9.1	0.1	-1.3	-4.3	-1.4	0.7
Constant	0.382 *** *0.014*	0.413 *** *0.012*	0.031 *** *0.009*	0.184 *** *0.020*	0.405 *** *0.017*	0.221 *** *0.012*	0.143 *** *0.044*	-0.185 *** *0.035*	-0.328 *** *0.030*	0.620 *** *0.044*	0.175 *** *0.035*	-0.445 *** *0.035*												
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes												
Time fixed effets	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes												
Number of observations	119,289	119,289	119,289	67,839	67,839	67,839	27,210	27,210	27,210	24,240	24,240	24,240												
Adj R-squared	0.94	0.94	0.87	0.77	0.77	0.91	0.87	0.87	0.90	0.95	0.92	0.92												

Table reports regression coefficients and associated standard errors in italics. ***, **, and * denote statistical significance at 1, 5 and 10 % level. The marginal effects quantify the estimated economic impact of each regressor on the dependent variable, other things being equal. The estimated effect of each determinant is computed as the change in the percentage share of IM positions to total assets between the 25th to the 75th percentile of each variable. ns denotes statistically non-significant regressors.

Table 8. Determinants of each IM segment positions: Domestic Extra-Group versus CCPs versus Foreign Extra-Group

Results of the equation system 2. Sample time splitting: each specification is repeated in each span. Dependent variable $im_{i,t}$: IM positions in each segment. Estimation method: IV. Endogenous and instrumented regressor $cb_{i,t}$: ratio of CB liquidity to each bank on its total assets. Instruments: GDP gap and inflation rates weighted for banks' total assets.

Dependent variable:	Domestic Extra-Group			CCPs			Foreign Extra-Group			Domestic Extra-Group			CCPs			Foreign Extra-Group			Domestic Extra-Group			CCPs			Foreign Extra-Group		
	Net-Position									**Credits**									**Debts**								
	Normal times	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**
Central Bank liquidity (to each bank)	0.970 *** *0.095*	0.608 *** *0.055*	0.792 *** *0.019*	0.002 *0.001*	-0.055 ** *0.024*	-0.010 *0.017*	0.559 *0.418*	0.211 ** *0.092*	0.189 *** *0.049*	0.329 *** *0.057*	0.058 * *0.034*	0.159 *** *0.024*	0.001 *0.001*	-0.011 * *0.006*	0.001 *0.003*	0.041 *0.205*	-0.014 *0.015*	0.014 *0.014*	-0.547 *** *0.082*	-0.552 *** *0.052*	-0.627 *** *0.023*	-0.001 *0.002*	0.050 * *0.026*	0.033 * *0.019*	-0.491 ** *0.241*	-0.199 ** *0.090*	-0.195 *** *0.073*
Domestic Extra-Group *Net or Debts or Credits*				0.000 *0.000*	-0.010 *** *0.003*	0.001 *0.010*	-0.211 *** *0.053*	-0.236 *** *0.065*	-0.164 *** *0.043*				-0.001 *** *0.000*	-0.004 *0.004*	0.006 *0.004*	-0.163 *** *0.047*	-0.068 * *0.034*	-0.140 *** *0.060*				0.000 *0.000*	-0.004 *0.004*	0.030 * *0.016*	-0.175 ** *0.079*	-0.209 ** *0.090*	-0.202 *** *0.076*
CCPs *Net or Debts or Credits*	0.310 *0.503*	-0.133 * *0.071*	-0.043 * *0.024*				0.374 *0.295*	0.032 *0.042*	0.033 *0.026*	-0.849 * *0.493*	0.024 *0.137*	0.155 ** *0.063*				-0.206 *0.276*	-0.028 *0.025*	0.031 *0.039*	-0.115 *0.202*	-0.090 * *0.048*	-0.041 ** *0.020*				-0.160 *0.172*	0.090 *0.067*	0.045 *0.036*
Foreign Extra-Group *Net or Debts or Credits*	-0.514 *** *0.021*	-0.386 *** *0.032*	-0.467 *** *0.026*	0.000 *0.000*	0.004 * *0.002*	0.054 *** *0.011*				-0.568 *** *0.026*	-0.228 *** *0.048*	-0.568 *** *0.041*	0.000 *0.000*	-0.001 *0.001*	0.009 ** *0.004*				-0.344 *** *0.024*	-0.300 *** *0.019*	-0.398 *** *0.027*	0.000 *0.000*	0.016 *** *0.004*	0.084 *** *0.018*			
Foreign Infra-Group *Net or Debts or Credits*	-0.085 *0.072*	-0.323 *0.227*	-0.479 *** *0.105*	0.004 *0.003*	-0.392 *** *0.141*	-0.006 *0.133*	-0.200 *0.129*	-0.208 *0.192*	-0.549 *** *0.075*	-0.267 *** *0.062*	-1.039 *** *0.189*	-0.502 *** *0.130*	0.007 *0.006*	0.226 *** *0.055*	0.065 *0.063*	0.032 *0.125*	-0.596 *0.634*	-0.395 *** *0.116*	-0.184 *** *0.034*	-0.281 *0.211*	-0.493 *** *0.180*	0.001 *0.002*	-0.421 *** *0.153*	-0.093 *0.139*	-0.152 * *0.093*	-0.061 *0.133*	-0.432 *** *0.123*
Domestic Infra-Group *Debts or Credits*	-0.280 *** *0.025*	-0.049 *0.048*	0.172 *** *0.039*	0.003 *** *0.001*	0.010 *0.015*	-0.150 ** *0.066*	-0.018 *0.070*	0.055 *0.075*	0.126 ** *0.056*	-0.509 *** *0.025*	-0.385 *** *0.037*	-0.309 *** *0.046*	0.009 *** *0.001*	0.012 * *0.007*	0.045 *** *0.013*	-0.243 *** *0.090*	-0.182 *** *0.063*	-0.070 *0.063*	-0.180 *** *0.016*	-0.331 *** *0.038*	-0.461 *** *0.035*	0.006 *** *0.001*	0.001 *0.015*	0.213 *** *0.067*	-0.249 *** *0.055*	-0.309 *** *0.092*	-0.228 ** *0.093*
Size	-0.019 *** *0.003*	0.011 * *0.006*	-0.015 *** *0.006*	0.000 ** *0.000*	0.001 *0.001*	-0.028 *** *0.005*	0.004 *0.009*	-0.028 *0.025*	-0.036 * *0.019*	-0.014 *** *0.003*	0.042 *** *0.006*	0.011 * *0.006*	0.000 *0.000*	-0.001 *0.001*	0.001 *0.001*	0.015 ** *0.007*	0.021 * *0.012*	0.003 *0.007*	0.002 *0.002*	0.029 *** *0.004*	0.024 *** *0.006*	0.000 *0.000*	-0.002 *0.002*	0.028 *** *0.005*	0.009 * *0.005*	0.056 ** *0.027*	0.040 * *0.021*
Retail Loans	-0.527 *** *0.009*	-0.661 *** *0.019*	-0.491 *** *0.018*	0.000 ** *0.000*	0.013 ** *0.005*	0.054 *** *0.009*	-0.217 *** *0.054*	-0.365 *** *0.095*	-0.227 *** *0.075*	-0.430 *** *0.008*	-0.495 *** *0.017*	-0.459 *** *0.020*	0.000 *** *0.000*	0.009 *** *0.003*	0.022 *** *0.004*	-0.153 *** *0.043*	-0.086 *** *0.028*	-0.154 ** *0.062*	0.097 *** *0.006*	0.147 *** *0.011*	0.042 *** *0.010*	0.000 *0.000*	-0.010 *** *0.004*	-0.033 *** *0.006*	0.040 ** *0.018*	0.171 ** *0.075*	0.060 *0.050*
Retail Fundraising	0.369 *** *0.016*	0.479 *** *0.023*	0.728 *** *0.017*	0.000 ** *0.000*	-0.032 *** *0.006*	-0.197 *** *0.016*	0.196 *** *0.056*	0.342 *** *0.110*	0.246 *** *0.065*	0.043 *** *0.012*	0.086 *** *0.013*	0.135 *** *0.012*	0.000 *0.000*	0.004 *** *0.001*	0.007 ** *0.003*	-0.004 *0.033*	-0.004 *0.019*	0.013 *0.027*	-0.299 *** *0.010*	-0.373 *** *0.016*	-0.581 *** *0.017*	-0.001 * *0.000*	0.042 *** *0.006*	0.227 *** *0.018*	-0.188 *** *0.042*	-0.320 *** *0.118*	-0.256 *** *0.091*
Bad Loans	0.079 *** *0.012*	0.020 *0.025*	0.102 *** *0.016*	0.000 *0.000*	0.003 * *0.002*	-0.035 *** *0.005*	0.057 ** *0.023*	0.201 *** *0.063*	-0.006 *0.028*	-0.003 *0.008*	-0.056 ** *0.025*	-0.013 *0.011*	0.000 *0.000*	0.002 *0.001*	0.002 * *0.001*	-0.004 *0.023*	0.036 *0.038*	-0.026 ** *0.012*	-0.073 *** *0.010*	-0.055 *** *0.013*	-0.113 *** *0.016*	0.000 * *0.000*	0.000 *0.002*	0.041 *** *0.006*	-0.059 *** *0.017*	-0.178 *** *0.056*	-0.026 *0.036*
ROE	0.012 *0.009*	0.055 *** *0.020*	0.027 * *0.015*	0.000 *0.000*	0.007 * *0.004*	0.005 *0.012*	0.033 ** *0.014*	0.030 *0.022*	0.008 *0.022*	0.002 *0.007*	0.023 * *0.014*	0.008 *0.010*	0.000 *0.000*	0.010 ** *0.004*	0.001 *0.004*	0.020 *0.015*	0.029 ** *0.013*	-0.031 *0.023*	-0.009 * *0.005*	-0.029 ** *0.012*	-0.013 *0.013*	0.000 *0.000*	0.003 *0.003*	-0.001 *0.013*	-0.013 ** *0.005*	0.003 *0.017*	-0.038 ** *0.017*
Capital	0.298 *** *0.029*	0.238 *** *0.037*	0.437 *** *0.057*	0.000 *0.000*	0.018 * *0.010*	-0.077 *** *0.027*	0.075 * *0.042*	0.238 *** *0.089*	-0.088 *0.075*	-0.033 *0.025*	0.153 *** *0.033*	0.026 *0.055*	0.000 ** *0.000*	-0.009 * *0.005*	0.003 *0.012*	-0.036 *0.040*	0.144 *** *0.052*	-0.075 * *0.043*	-0.319 *** *0.018*	-0.061 *** *0.020*	-0.413 *** *0.041*	0.000 *0.000*	-0.026 ** *0.011*	0.094 *** *0.026*	-0.100 ** *0.041*	-0.069 *0.083*	-0.008 *0.081*
Portfolio of domestic Gov't Debt Securities	-0.448 *** *0.009*	-0.694 *** *0.019*	-0.581 *** *0.016*	0.000 *0.000*	-0.025 *** *0.006*	-0.079 *** *0.010*	-0.166 *** *0.041*	-0.300 *** *0.072*	-0.150 *** *0.044*	-0.393 *** *0.009*	-0.587 *** *0.018*	-0.469 *** *0.018*	0.000 *0.000*	0.001 *0.004*	0.013 *** *0.004*	-0.118 *** *0.034*	-0.090 *** *0.031*	-0.120 ** *0.049*	0.054 *** *0.006*	0.094 *** *0.008*	0.117 *** *0.011*	0.000 *** *0.000*	0.021 *** *0.004*	0.089 *** *0.006*	0.025 * *0.013*	0.081 *** *0.029*	0.018 *0.023*
Portfolio of Gov't Debt Securities of other euro-area countries	-1.270 *** *0.063*	-0.235 ** *0.101*	-0.519 *** *0.087*	-0.007 ** *0.004*	-0.046 *** *0.013*	0.006 *0.020*	-0.411 *** *0.126*	-0.231 ** *0.109*	-0.151 *** *0.056*	-0.979 *** *0.106*	-0.291 *** *0.102*	-0.397 *** *0.075*	0.003 ** *0.001*	0.003 *0.008*	0.017 *** *0.006*	-0.292 *** *0.112*	-0.138 *0.127*	-0.109 ** *0.052*	0.294 *** *0.109*	-0.081 ** *0.034*	0.128 *** *0.025*	0.011 ** *0.005*	0.047 *** *0.012*	0.007 *0.017*	0.065 *0.046*	-0.002 *0.058*	0.033 *0.024*
Portfolio of Bank Bonds	-0.488 *** *0.024*	-0.496 *** *0.021*	-0.259 *** *0.022*	0.000 *0.000*	-0.007 *0.006*	-0.017 ** *0.007*	-0.141 *** *0.038*	-0.335 *** *0.076*	-0.045 * *0.025*	-0.404 *** *0.032*	-0.455 *** *0.018*	-0.231 *** *0.020*	0.000 *0.000*	-0.009 ** *0.004*	-0.011 *** *0.004*	-0.100 *** *0.031*	-0.142 *** *0.044*	-0.050 * *0.026*	0.084 *** *0.032*	0.013 *0.012*	0.028 * *0.015*	0.000 * *0.000*	-0.006 *0.006*	0.004 *0.007*	0.016 *0.021*	0.106 *** *0.037*	-0.012 *0.018*
Rating	0.004 ** *0.002*	-0.004 * *0.002*	0.004 * *0.002*	0.000 *** *0.000*	-0.002 *** *0.000*	0.008 ** *0.003*	0.010 ** *0.005*	-0.010 * *0.005*	0.005 * *0.003*	0.007 *** *0.001*	-0.005 *** *0.002*	0.001 * *0.000*	-0.001 *** *0.000*	0.001 *** *0.000*	0.002 * *0.001*	0.008 * *0.004*	-0.009 ** *0.004*	-0.002 * *0.001*	0.003 *** *0.001*	-0.003 * *0.002*	-0.005 ** *0.002*	0.000 *** *0.000*	0.003 *** *0.000*	0.004 * *0.002*	-0.009 * *0.005*	-0.007 * *0.004*	-0.004 * *0.002*
Banks without Rating	0.027 *0.021*	0.097 *** *0.008*	-0.109 *** *0.019*	0.000 *0.000*	0.006 *** *0.002*	-0.168 *** *0.030*	-0.071 ** *0.036*	0.052 *** *0.017*	0.040 * *0.023*	0.034 ** *0.017*	0.080 ** *0.006*	-0.038 * *0.021*	0.001 ** *0.000*	-0.001 * *0.001*	-0.006 * *0.003*	-0.062 ** *0.030*	0.024 *** *0.007*	0.001 * *0.001*	0.023 * *0.012*	-0.013 ** *0.006*	0.088 *** *0.020*	0.001 * *0.001*	-0.007 *** *0.001*	0.161 *** *0.030*	0.099 *** *0.031*	-0.017 * *0.010*	0.039 * *0.022*
Constant	0.298 *** *0.044*	-0.043 *0.081*	0.025 *0.071*	0.002 *** *0.001*	0.004 *0.017*	0.379 *** *0.060*	-0.082 *0.077*	0.157 *0.184*	0.189 *0.120*	0.467 *** *0.036*	-0.094 *0.074*	0.197 *** *0.075*	0.005 *** *0.001*	-0.004 *0.008*	-0.046 *** *0.015*	0.012 *0.053*	0.023 *0.085*	0.130 *** *0.056*	0.165 *** *0.022*	-0.026 *0.050*	0.170 ** *0.074*	0.003 *** *0.001*	-0.003 *0.018*	-0.427 *** *0.062*	0.108 *** *0.037*	-0.116 *0.182*	-0.031 *0.141*
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effets	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,839	27,210	24,240	67,839	27,210	24,240	67,839	27,210	24,240	67,839	27,210	24,240	67,839	27,210	24,240	67,839	27,210	24,240	67,839	27,210	24,240	67,839	27,210	24,240	67,839	27,210	24,240
Adj R-squared	0.80	0.85	0.90	0.92	0.84	0.80	0.85	0.85	0.84	0.76	0.84	0.87	0.72	0.71	0.76	0.75	0.82	0.84	0.86	0.86	0.91	0.84	0.82	0.83	0.85	0.82	0.84

Table reports regression coefficients and associated standard errors in italics. ***, **, and * denote statistical significance at 1, 5 and 10 % level.

Table 9. Determinants of each IM segment positions: Secured versus Unsecured segment

Dependent variable:	Secured			Unsecured			Secured			Unsecured			Secured			Unsecured		
	Net-Position						**Credits**						**Debts**					
	Normal times	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**
Central Bank liquidity (to each bank)	0.148 *** *0.052*	0.013 *0.024*	0.188 *** *0.045*	1.063 *** *0.101*	0.584 *** *0.054*	0.625 *** *0.048*	0.150 *** *0.032*	-0.030 ** *0.015*	0.152 *** *0.043*	0.167 ** *0.078*	0.059 * *0.036*	0.003 *0.042*	0.002 *0.043*	-0.043 *0.028*	-0.036 *** *0.012*	-0.896 *** *0.076*	-0.525 *** *0.048*	-0.622 *** *0.021*
Domestic Infra-Group *Debts or Credits*	-0.024 * *0.013*	0.200 *** *0.034*	-0.148 * *0.083*	-0.251 *** *0.026*	-0.173 *** *0.052*	0.231 *** *0.063*	-0.024 * *0.014*	0.006 *0.016*	-0.029 *0.034*	-0.556 *** *0.024*	-0.480 *** *0.037*	-0.337 *** *0.052*	0.000 *0.009*	-0.194 *** *0.032*	0.119 *0.073*	-0.305 *** *0.019*	-0.307 *** *0.035*	-0.569 *** *0.038*
Size	0.000 *0.002*	-0.014 *** *0.002*	-0.004 *0.008*	-0.015 *** *0.003*	0.006 *0.010*	-0.063 *** *0.008*	0.006 *** *0.001*	-0.004 *** *0.001*	0.011 ** *0.005*	-0.013 *** *0.003*	0.060 *** *0.007*	0.003 *0.008*	0.006 *** *0.001*	0.010 *** *0.002*	0.016 ** *0.006*	0.002 *0.002*	0.054 *** *0.007*	0.066 *** *0.008*
Retail Loans	-0.062 *** *0.005*	0.006 *0.006*	0.048 *** *0.008*	-0.510 *** *0.009*	-0.753 *** *0.020*	-0.556 *** *0.020*	-0.065 *** *0.005*	-0.027 *** *0.005*	0.006 *0.006*	-0.395 *** *0.007*	-0.481 *** *0.017*	-0.470 *** *0.021*	-0.003 *0.002*	-0.032 *** *0.005*	-0.042 *** *0.007*	0.115 *** *0.006*	0.272 *** *0.018*	0.086 *** *0.021*
Retail Fundraising	0.073 *** *0.008*	0.046 *** *0.008*	-0.085 *** *0.016*	0.360 *** *0.015*	0.548 *** *0.022*	0.684 *** *0.019*	0.017 ** *0.007*	0.014 *** *0.004*	0.042 *** *0.010*	0.024 ** *0.012*	0.076 *** *0.013*	0.095 *** *0.014*	-0.057 *** *0.006*	-0.032 *** *0.008*	0.128 *** *0.013*	-0.336 *** *0.009*	-0.473 *** *0.019*	-0.588 *** *0.016*
Bad Loans	-0.001 *0.007*	0.039 *** *0.005*	-0.004 *0.008*	0.104 *** *0.011*	0.126 *** *0.027*	0.045 ** *0.020*	-0.014 *** *0.004*	-0.006 ** *0.003*	0.018 *** *0.006*	0.012 *0.011*	-0.011 *0.025*	-0.049 *** *0.014*	-0.013 ** *0.006*	-0.045 *** *0.005*	0.022 *** *0.005*	-0.092 *** *0.008*	-0.137 *** *0.029*	-0.094 *** *0.017*
ROE	-0.013 *** *0.004*	0.019 * *0.010*	0.020 *0.014*	0.041 *** *0.009*	0.053 *** *0.020*	0.011 *0.017*	-0.005 *0.003*	0.028 *** *0.009*	-0.007 *0.006*	0.018 ** *0.007*	0.026 ** *0.013*	-0.005 *0.012*	0.007 *** *0.003*	0.010 *** *0.004*	-0.027 * *0.014*	-0.023 *** *0.005*	-0.027 ** *0.013*	-0.016 *0.012*
Capital	0.042 ** *0.019*	0.017 *0.012*	-0.016 *0.048*	0.264 *** *0.028*	0.353 *** *0.048*	0.271 *** *0.069*	-0.044 *** *0.014*	-0.029 *** *0.010*	-0.070 ** *0.034*	0.007 *0.023*	0.278 *** *0.046*	0.075 *0.056*	-0.085 *** *0.012*	-0.046 *** *0.013*	-0.054 *0.035*	-0.258 *** *0.019*	-0.075 *** *0.027*	-0.196 *** *0.042*
Portfolio of domestic Gov't Debt Securities	-0.075 *** *0.005*	-0.110 *** *0.007*	-0.149 *** *0.015*	-0.398 *** *0.009*	-0.657 *** *0.019*	-0.526 *** *0.021*	-0.074 *** *0.005*	-0.025 *** *0.004*	-0.034 *** *0.013*	-0.336 *** *0.008*	-0.582 *** *0.018*	-0.436 *** *0.019*	0.001 *0.004*	0.085 *** *0.006*	0.115 *** *0.008*	0.063 *** *0.005*	0.075 *** *0.009*	0.089 *** *0.013*
Portfolio of Gov't Debt Securities of other euro-area countries	-0.343 ** *0.144*	-0.029 *0.020*	-0.055 ** *0.022*	-0.990 *** *0.150*	-0.304 *** *0.109*	-0.481 *** *0.079*	-0.040 * *0.022*	0.024 *0.015*	-0.006 *0.013*	-0.983 *** *0.116*	-0.371 *** *0.107*	-0.386 *** *0.073*	0.303 ** *0.133*	0.053 *** *0.019*	0.049 ** *0.020*	0.007 *0.040*	-0.067 * *0.036*	0.095 *** *0.023*
Portfolio of Bank Bonds	-0.114 *** *0.010*	-0.078 *** *0.008*	-0.016 *0.020*	-0.384 *** *0.024*	-0.539 *** *0.022*	-0.257 *** *0.028*	-0.099 *** *0.009*	-0.046 *** *0.006*	-0.059 *** *0.017*	-0.311 *** *0.031*	-0.483 *** *0.018*	-0.187 *** *0.023*	0.015 *** *0.006*	0.031 *** *0.009*	-0.043 *** *0.010*	0.072 ** *0.033*	0.056 *** *0.014*	0.070 *** *0.015*
Rating	0.002 *** *0.001*	-0.012 *** *0.001*	-0.011 ** *0.006*	0.006 *** *0.002*	0.003 *0.003*	0.013 *** *0.005*	0.004 *** *0.001*	0.000 *0.001*	-0.005 *0.003*	0.008 *** *0.001*	-0.010 *** *0.002*	0.009 ** *0.004*	0.002 *** *0.000*	0.011 *** *0.001*	0.007 * *0.004*	0.002 *0.001*	-0.013 *** *0.003*	-0.004 * *0.002*
Banks without Rating	0.015 *0.010*	0.027 *** *0.005*	-0.070 * *0.037*	0.073 *** *0.020*	0.091 *** *0.008*	-0.240 *** *0.030*	-0.011 *0.009*	0.003 ** *0.002*	0.057 *** *0.017*	0.022 *0.016*	0.086 *** *0.006*	-0.091 *** *0.026*	-0.026 *** *0.006*	-0.024 *** *0.004*	0.127 *** *0.032*	-0.050 *** *0.013*	-0.005 *0.006*	0.150 *** *0.025*
Constant	-0.008 *0.021*	0.185 *** *0.024*	0.118 *0.103*	0.191 *** *0.042*	-0.048 *0.124*	0.569 *** *0.110*	-0.027 *0.017*	0.066 *** *0.017*	-0.127 ** *0.062*	0.432 *** *0.035*	-0.266 *** *0.095*	0.282 *** *0.100*	-0.020 *0.013*	-0.118 *** *0.023*	-0.245 *** *0.082*	0.241 *** *0.021*	-0.217 ** *0.095*	-0.287 *** *0.107*
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effets	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,050	27,202	23,732	67,050	27,202	23,732	67,050	27,202	23,732		27,202	23,732	67,050	27,202	23,732	67,050	27,202	23,732
Adj R-squared	0.51	0.55	0.72	0.84	0.89	0.91	0.71	0.62	0.61	0.84	0.88	0.88	0.68	0.55	0.77	0.92	0.91	0.94

Table 10. Determinants of each IM segment positions: Overnight versus Longer-term segment

Dependent variable:	Overnight			Longer-term			Overnight			Longer-term			Overnight			Longer-term		
	Net-Position						**Credits**						**Debts**					
	Normal times	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**	**Normal times**	**Global financial crisis**	**Sovereign debt crisis**
Central Bank liquidity (to each bank)	0.516 *** *0.077*	0.484 *** *0.046*	0.386 *** *0.045*	0.694 *** *0.088*	0.113 *** *0.033*	0.428 *** *0.043*	-0.044 *0.069*	0.066 * *0.037*	-0.034 *0.042*	0.361 *** *0.047*	-0.037 ** *0.015*	0.189 *** *0.043*	-0.560 *** *0.068*	-0.418 *** *0.044*	-0.419 *** *0.015*	-0.334 *** *0.059*	-0.150 *** *0.036*	-0.239 *** *0.017*
Domestic Infra-Group *Debts or Credits*	-0.292 *** *0.026*	-0.139 *** *0.050*	0.333 *** *0.070*	0.016 *0.014*	0.165 *** *0.036*	-0.250 * *0.125*	-0.569 *** *0.025*	-0.438 *** *0.037*	-0.111 ** *0.052*	-0.011 *0.014*	-0.036 ** *0.018*	-0.256 *** *0.063*	-0.277 *** *0.017*	-0.299 *** *0.031*	-0.444 *** *0.037*	-0.027 ** *0.012*	-0.201 *** *0.033*	-0.006 *0.081*
Size	-0.007 ** *0.003*	0.006 *0.010*	-0.062 *** *0.008*	-0.008 *** *0.002*	-0.013 *** *0.003*	-0.005 *0.008*	-0.013 *** *0.003*	0.056 *** *0.007*	-0.003 *0.008*	0.006 *** *0.001*	0.001 *0.002*	0.017 *** *0.005*	-0.006 *** *0.002*	0.050 *** *0.008*	0.059 *** *0.008*	0.014 *** *0.002*	0.014 *** *0.003*	0.022 *** *0.007*
Retail Loans	-0.476 *** *0.009*	-0.723 *** *0.020*	-0.547 *** *0.021*	-0.096 *** *0.006*	-0.024 *** *0.009*	0.039 *** *0.012*	-0.390 *** *0.007*	-0.471 *** *0.017*	-0.426 *** *0.020*	-0.070 *** *0.005*	-0.037 *** *0.005*	-0.039 *** *0.007*	0.086 *** *0.006*	0.253 *** *0.018*	0.121 *** *0.022*	0.026 *** *0.005*	-0.013 * *0.007*	-0.077 *** *0.011*
Retail Fundraising	0.290 *** *0.015*	0.468 *** *0.023*	0.559 *** *0.019*	0.144 *** *0.010*	0.126 *** *0.011*	0.040 ** *0.017*	0.028 ** *0.012*	0.070 *** *0.014*	0.116 *** *0.014*	0.013 * *0.007*	0.020 *** *0.005*	0.022 ** *0.011*	-0.261 *** *0.009*	-0.398 *** *0.020*	-0.443 *** *0.016*	-0.131 *** *0.008*	-0.106 *** *0.010*	-0.018 *0.015*
Bad Loans	0.102 *** *0.012*	0.152 *** *0.028*	-0.022 *0.021*	0.000 *0.008*	0.013 *0.009*	0.063 *** *0.011*	0.016 *0.010*	-0.005 *0.026*	-0.040 *** *0.015*	-0.019 *** *0.004*	-0.012 *** *0.004*	0.009 *0.008*	-0.086 *** *0.009*	-0.157 *** *0.029*	-0.018 *0.017*	-0.019 *** *0.007*	-0.024 *** *0.009*	-0.054 *** *0.012*
ROE	0.044 *** *0.008*	0.041 ** *0.020*	0.042 *** *0.015*	-0.016 *** *0.005*	0.031 *** *0.011*	-0.011 *0.015*	0.019 ** *0.007*	0.022 * *0.013*	-0.005 *0.012*	-0.006 * *0.003*	0.032 *** *0.009*	-0.006 *0.006*	-0.026 *** *0.005*	-0.019 *0.013*	-0.048 *** *0.011*	0.010 ** *0.004*	0.001 *0.006*	0.005 *0.015*
Capital	0.267 *** *0.027*	0.265 *** *0.050*	0.155 ** *0.063*	0.039 * *0.023*	0.104 *** *0.027*	0.100 ** *0.045*	-0.013 *0.022*	0.235 *** *0.047*	0.045 *0.056*	-0.024 *0.017*	0.014 *0.014*	-0.040 *0.034*	-0.280 *** *0.020*	-0.030 *0.029*	-0.111 *** *0.037*	-0.063 *** *0.014*	-0.090 *** *0.021*	-0.140 *** *0.039*
Portfolio of domestic Gov't Debt Securities	-0.384 *** *0.009*	-0.632 *** *0.019*	-0.471 *** *0.020*	-0.090 *** *0.006*	-0.135 *** *0.008*	-0.204 *** *0.015*	-0.333 *** *0.008*	-0.572 *** *0.018*	-0.396 *** *0.020*	-0.077 *** *0.005*	-0.035 *** *0.005*	-0.074 *** *0.013*	0.051 *** *0.005*	0.060 *** *0.009*	0.075 *** *0.012*	0.013 *** *0.005*	0.100 *** *0.007*	0.130 *** *0.010*
Portfolio of Gov't Debt Securities of other euro-area countries	-1.025 *** *0.148*	-0.299 *** *0.109*	-0.390 *** *0.076*	-0.309 ** *0.142*	-0.034 *0.028*	-0.146 *** *0.034*	-0.982 *** *0.115*	-0.381 *** *0.107*	-0.356 *** *0.070*	-0.041 * *0.022*	0.033 ** *0.017*	-0.036 ** *0.014*	0.043 *0.038*	-0.082 ** *0.038*	0.034 *0.025*	0.268 ** *0.132*	0.067 *** *0.024*	0.110 *** *0.029*
Portfolio of Bank Bonds	-0.379 *** *0.024*	-0.526 *** *0.022*	-0.223 *** *0.028*	-0.119 *** *0.012*	-0.091 *** *0.010*	-0.050 ** *0.021*	-0.318 *** *0.031*	-0.459 *** *0.018*	-0.165 *** *0.023*	-0.092 *** *0.009*	-0.070 *** *0.007*	-0.081 *** *0.017*	0.061 * *0.033*	0.067 *** *0.014*	0.058 *** *0.016*	0.027 *** *0.007*	0.021 ** *0.010*	-0.031 ** *0.015*
Rating	0.003 ** *0.002*	0.028 *** *0.003*	0.005 ** *0.002*	0.004 *** *0.001*	-0.036 *** *0.003*	-0.003 *0.005*	0.007 *** *0.001*	0.007 *** *0.002*	0.004 ** *0.002*	0.004 *** *0.001*	-0.017 *** *0.002*	0.000 *0.002*	0.004 *** *0.001*	-0.021 *** *0.003*	0.000 *0.002*	0.000 *0.001*	0.020 *** *0.002*	0.003 *0.004*
Banks without Rating	0.046 ** *0.020*	0.072 *** *0.008*	-0.285 *** *0.024*	0.041 *** *0.012*	0.047 *** *0.006*	-0.026 *0.034*	0.012 *0.016*	0.065 *** *0.006*	-0.065 *** *0.022*	-0.001 *0.009*	0.025 *** *0.003*	0.031 ** *0.015*	-0.034 *** *0.013*	-0.007 *0.006*	0.220 *** *0.025*	-0.042 *** *0.010*	-0.022 *** *0.005*	0.057 * *0.032*
Constant	0.147 *** *0.043*	-0.158 *0.126*	0.787 *** *0.103*	0.037 *0.027*	0.295 *** *0.041*	-0.100 *0.099*	0.413 *** *0.034*	-0.353 *** *0.094*	0.317 *** *0.095*	-0.008 *0.017*	0.154 *** *0.024*	-0.162 *** *0.061*	0.265 *** *0.023*	-0.195 ** *0.098*	-0.471 *** *0.105*	-0.045 ** *0.022*	-0.141 *** *0.037*	-0.062 *0.086*
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effets	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,050	27,202	23,732	67,050	27,202	23,732	67,050	27,202	23,732	67,050	27,202	23,732	67,050	27,202	23,732	67,050	27,202	23,732
Adj R-squared	0.78	0.83	0.80	0.80	0.80	0.76	0.83	0.88	0.85	0.70	0.67	0.69	0.88	0.81	0.81	0.88	0.84	0.77

Table 11. Determinants of Δ Total Interbank Market positions

Results of the equation system 2. Sample time splitting: each specification is identically repeated in each span. Dependent variable $im_{i,t}$: month changes in total IM positions. Estimation method: IV. Endogenous and instrumented regressor $cb_{i,t}$: ratio of CB liquidity provided to the bank on its total assets. Instruments: GDP gap and inflation rates weighted for banks' total assets.

	Net	Credits	Debts	Net	Credits	Debts	Net	Credits	Debts	Net	Credits	Debts
	Total period			Normal times			Global financial crisis			Sovereign debt crisis		
Specifications:	1	2	3	1	2	3	1	2	3	1	2	3
Δ Central Bank liquidity (to each bank)	0,615 ***	0,119	-0,495 ***	0,603 ***	0,113	-0,491 ***	0,524 *	0,133	-0,391 ***	0,889 ***	0,110 **	-0,779 ***
	0,151	*0,089*	*0,065*	*0,147*	*0,073*	*0,049*	*0,297*	*0,125*	*0,100*	*0,109*	*0,049*	*0,046*
Δ Domestic Infra-Group *Debts or Credits*	-0,122 ***	-0,254 ***	-0,132 ***	-0,139 **	-0,196 ***	-0,057 *	-0,054	-0,383 ***	-0,329 ***	0,043	-0,238 ***	-0,281 ***
	0,043	*0,032*	*0,023*	*0,059*	*0,046*	*0,031*	*0,060*	*0,054*	*0,043*	*0,077*	*0,060*	*0,056*
Size	0,000	0,001 ***	0,001 ***	0,000	0,000	0,001	-0,001	0,002	0,002 **	0,002	0,003 ***	0,001
	0,001	*0,000*	*0,000*	*0,002*	*0,001*	*0,000*	*0,006*	*0,001*	*0,001*	*0,004*	*0,001*	*0,001*
Δ Retail Loans	-0,490 ***	-0,423 ***	0,067 ***	-0,447 ***	-0,356 ***	0,092 ***	-0,663 ***	-0,567 ***	0,096 ***	-0,487 ***	-0,498 ***	-0,010
	0,023	*0,004*	*0,003*	*0,025*	*0,006*	*0,004*	*0,050*	*0,008*	*0,006*	*0,060*	*0,008*	*0,007*
Δ Retail Fundraising	0,368 ***	0,113 ***	-0,255 ***	0,269 ***	0,093 ***	-0,175 ***	0,569 ***	0,200 ***	-0,368 ***	0,523 ***	0,073 ***	-0,450 ***
	0,021	*0,005*	*0,004*	*0,026*	*0,005*	*0,004*	*0,036*	*0,008*	*0,006*	*0,036*	*0,011*	*0,011*
Δ Bad Loans	0,114 **	0,086 ***	-0,029 ***	0,100	0,098 ***	-0,001	0,017	-0,062 ***	-0,079 ***	0,177 ***	0,140 ***	-0,037 ***
	0,048	*0,006*	*0,005*	*0,063*	*0,008*	*0,006*	*0,083*	*0,014*	*0,011*	*0,036*	*0,011*	*0,010*
Δ ROE	0,003	0,003	0,000	0,009	0,005	-0,004	-0,028	0,002	0,029 ***	-0,002	-0,014 *	-0,012 *
	0,011	*0,004*	*0,003*	*0,012*	*0,005*	*0,004*	*0,025*	*0,008*	*0,007*	*0,024*	*0,008*	*0,007*
Δ Capital	0,182 ***	-0,211 ***	-0,393 ***	0,099	-0,197 ***	-0,296 ***	0,272 **	-0,094 ***	-0,365 ***	0,386 ***	-0,494 ***	-0,880 ***
	0,060	*0,010*	*0,007*	*0,078*	*0,013*	*0,009*	*0,113*	*0,014*	*0,011*	*0,112*	*0,022*	*0,021*
Δ Portfolio of domestic Government Securities	-0,634 ***	-0,567 ***	0,067 ***	-0,471 ***	-0,432 ***	0,038 ***	-0,910 ***	-0,855 ***	0,055 ***	-0,960 ***	-0,797 ***	0,163 ***
	0,013	*0,004*	*0,003*	*0,015*	*0,005*	*0,004*	*0,031*	*0,008*	*0,007*	*0,020*	*0,007*	*0,006*
Δ Portfolio of euro-area Government Securities	-0,801 ***	-0,672 ***	0,129 ***	-0,810 ***	-0,491 ***	0,320 ***	-0,790 ***	-0,835 ***	-0,045 *	-0,919 ***	-0,792 ***	0,127 ***
	0,072	*0,021*	*0,016*	*0,152*	*0,037*	*0,025*	*0,102*	*0,029*	*0,023*	*0,058*	*0,034*	*0,031*
Δ Portfolio of Bank Bonds	-0,494 ***	-0,509 ***	-0,016 *	-0,502 ***	-0,499 ***	0,003	-0,640 ***	-0,662 ***	-0,022	-0,311 ***	-0,347 ***	-0,037 **
	0,048	*0,012*	*0,009*	*0,076*	*0,017*	*0,011*	*0,067*	*0,023*	*0,019*	*0,042*	*0,017*	*0,016*
Δ Rating	0,003	-0,004 **	-0,007 ***	0,004	-0,001	-0,005 **	0,000	-0,007	-0,008 **	-0,003	-0,013 ***	-0,011 ***
	0,003	*0,002*	*0,001*	*0,004*	*0,003*	*0,002*	*0,004*	*0,005*	*0,004*	*0,003*	*0,003*	*0,003*
Banks without Rating	0,001	0,001	0,000	0,090 ***	0,022	-0,068 ***	0,005	0,005	0,000	-0,017	0,009	0,026 ***
	0,003	*0,007*	*0,005*	*0,010*	*0,034*	*0,023*	*0,006*	*0,010*	*0,008*	*0,017*	*0,007*	*0,007*
Constant	-0,003	-0,015 ***	-0,012 ***	0,005	-0,001	-0,007	-0,007	-0,027 *	-0,020	-0,025	-0,042 ***	-0,016
	0,012	*0,005*	*0,004*	*0,026*	*0,009*	*0,006*	*0,066*	*0,016*	*0,013*	*0,041*	*0,013*	*0,012*
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effets	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	118.749	118.749	118.749	67.299	67.299	67.299	27.210	27.210	27.210	24.240	24.240	24.240
Adj R-squared	0,56	0,58	0,54	0,57	0,54	0,55	0,57	0,56	0,55	0,55	0,54	0,55

Table reports regression coefficients and associated standard errors in italics. ***, **, and * denote statistical significance at 1, 5 and 10 % level.

Table 12. Determinants of Total IM segment positions, and Secured vs Unsecured segments

Results of the equation system (3). Sample time splitting: each specification is repeated in each span. Dependent variable $im_{i,j,t}$: IM positions towards each counterparty. Estimation method: IV. Endogenous and instrumented regressor $cb_{i,t}$: ratio of CB liquidity to each bank on its total assets. Instruments: GDP gap and inflation rates weighted for banks' total assets. For each segment and each phase, four specifications are adopted, variously combining the three possible fixed effects: bank, time and interbank counterparty. The specification 1 includes bank and time fixed effects, such as in Tables 7-11, where they were the only possible fixed effects. The specification 2 includes separately the three fixed effects. The specification 3 includes bank fixed effects and the interaction interbank counterparty-time fixed effects. The specification 4 includes the interactions interbank counterparty-time fixed effects and bank-interbank counterparty fixed effects.

	Total IM positions												**Secured**												**Unsecured**											
Dependent variable:	**Net-Position**												**Net-Position**												**Net-Position**											
	Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	0.078 ***	0.077 ***	0.075 ***	0.072 ***	0.059 ***	0.059 ***	0.041 ***	0.038 ***	0.106 ***	0.107 ***	0.123 ***	0.126 ***	0.018 ***	0.018 ***	0.016 ***	0.017 ***	0.015 ***	0.015 ***	0.011 ***	0.009 ***	0.024 ***	0.024 ***	0.036 ***	0.040 ***	0.065 ***	0.064 ***	0.063 ***	0.055 ***	0.059 ***	0.059 ***	0.045 ***	0.033 ***	0.093 ***	0.092 ***	0.097 ***	0.103 ***
	0.005	*0.005*	*0.006*	*0.006*	*0.003*	*0.003*	*0.004*	*0.005*	*0.007*	*0.007*	*0.009*	*0.009*	*0.004*	*0.003*	*0.003*	*0.003*	*0.001*	*0.001*	*0.002*	*0.002*	*0.005*	*0.005*	*0.007*	*0.008*	*0.004*	*0.004*	*0.005*	*0.005*	*0.003*	*0.003*	*0.004*	*0.005*	*0.006*	*0.006*	*0.007*	*0.008*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	511,220	510,833	477,487	474,340	180,208	180,163	167,582	166,505	169,282	169,273	161,043	160,172
Adj R-squared	0.19	0.20	0.16	0.22	0.25	0.26	0.22	0.24	0.20	0.20	0.15	0.17	0.05	0.05	0.02	0.03	0.12	0.12	0.09	0.09	0.08	0.08	0.04	0.07	0.32	0.32	0.28	0.34	0.36	0.36	0.32	0.35	0.31	0.31	0.26	0.30
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes
Dependent variable:	**Credits**												**Credits**												**Credits**											
	Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	0.040 ***	0.040 ***	0.034 ***	0.029 ***	0.019 ***	0.018 ***	0.004 *	0.004 *	0.012 *	0.012 *	0.021 ***	0.022 ***	0.009 ***	0.010 ***	0.010 ***	0.010 ***	0.002 ***	0.002 ***	0.000	0.001	0.012 **	0.012 **	0.016 **	0.017 **	0.030 ***	0.029 ***	0.024 ***	0.020 ***	0.030 ***	0.029 ***	0.012 ***	0.006 *	0.002	0.002	0.011	0.016 **
	0.005	*0.005*	*0.006*	*0.007*	*0.002*	*0.002*	*0.002*	*0.002*	*0.006*	*0.006*	*0.008*	*0.009*	*0.002*	*0.002*	*0.002*	*0.002*	*0.001*	*0.001*	*0.001*	*0.001*	*0.005*	*0.005*	*0.006*	*0.007*	*0.005*	*0.005*	*0.007*	*0.008*	*0.003*	*0.003*	*0.003*	*0.004*	*0.005*	*0.005*	*0.007*	*0.007*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	511,220	510,833	477,487	474,340	180,208	180,163	167,582	166,505	169,282	169,273	161,043	160,172
Adj R-squared	0.24	0.26	0.22	0.25	0.29	0.30	0.26	0.29	0.27	0.28	0.24	0.25	0.12	0.12	0.08	0.09	0.18	0.18	0.15	0.14	0.13	0.13	0.06	0.06	0.40	0.40	0.38	0.41	0.45	0.45	0.42	0.45	0.41	0.41	0.37	0.39
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes
Dependent variable:	**Debts**												**Debts**												**Debts**											
	Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	-0.037 ***	-0.037 ***	-0.040 ***	-0.043 ***	-0.040 ***	-0.040 ***	-0.039 ***	-0.037 ***	-0.094 ***	-0.095 ***	-0.102 ***	-0.104 ***	-0.009 ***	-0.009 ***	-0.007 ***	-0.006 **	-0.013 ***	-0.013 ***	-0.011 ***	-0.008 ***	-0.012 ***	-0.012 ***	-0.020 ***	-0.022 ***	-0.035 ***	-0.035 ***	-0.040 ***	-0.035 ***	-0.029 ***	-0.029 ***	-0.033 ***	-0.026 ***	-0.091 ***	-0.090 ***	-0.086 ***	-0.087 ***
	0.007	*0.007*	*0.008*	*0.009*	*0.003*	*0.003*	*0.004*	*0.004*	*0.004*	*0.004*	*0.004*	*0.005*	*0.003*	*0.003*	*0.003*	*0.003*	*0.001*	*0.001*	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*	*0.002*	*0.006*	*0.006*	*0.008*	*0.009*	*0.003*	*0.003*	*0.004*	*0.004*	*0.003*	*0.003*	*0.004*	*0.004*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	511,220	510,833	477,487	474,340	180,208	180,163	167,582	166,505	169,282	169,273	161,043	160,172
Adj R-squared	0.13	0.13	0.08	0.15	0.17	0.17	0.13	0.16	0.19	0.20	0.14	0.16	0.06	0.06	0.04	0.08	0.08	0.08	0.05	0.07	0.07	0.07	0.04	0.07	0.19	0.18	0.13	0.20	0.23	0.23	0.18	0.21	0.34	0.35	0.29	0.34
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes

Table 13. Determinants of Total IM segment positions, and Overnight versus Longer-term segments

Results of the equation system (3). Sample time splitting: each specification is repeated in each span. Dependent variable $im_{i,j,t}$: IM positions towards each counterparty. Estimation method: IV. Endogenous and instrumented regressor $cb_{i,t}$: ratio of CB liquidity to each bank on its total assets. Instruments: GDP gap and inflation rates weighted for banks' total assets. See note of Table 12.

	Total IM positions												**Overnight**											
Dependent variable:	**Net-Position**												**Net-Position**											
	Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	0.078 *** *0.005*	0.077 *** *0.005*	0.075 *** *0.006*	0.072 *** *0.006*	0.059 *** *0.003*	0.059 *** *0.003*	0.041 *** *0.004*	0.038 *** *0.005*	0.106 *** *0.007*	0.107 *** *0.007*	0.123 *** *0.009*	0.126 *** *0.009*	0.052 *** *0.003*	0.052 *** *0.003*	0.047 *** *0.004*	0.045 *** *0.004*	0.050 *** *0.003*	0.049 *** *0.003*	0.032 *** *0.004*	0.022 *** *0.004*	0.040 *** *0.005*	0.040 *** *0.006*	0.054 *** *0.007*	0.067 *** *0.007*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	511,220	510,833	477,487	474,340	180,208	180,163	167,583	166,505	169,282	169,273	161,046	160,172
Adj R-squared	0.19	0.20	0.16	0.22	0.25	0.26	0.22	0.24	0.20	0.20	0.15	0.17	0.31	0.31	0.31	0.36	0.40	0.40	0.36	0.39	0.28	0.28	0.22	0.25
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes

	Longer-term											
Dependent variable:	**Net-Position**											
	Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	0.030 *** *0.004*	0.030 *** *0.004*	0.032 *** *0.004*	0.028 *** *0.004*	0.023 *** *0.002*	0.023 *** *0.002*	0.021 *** *0.003*	0.021 *** *0.003*	0.066 ** *0.005*	0.067 *** *0.005*	0.071 ** *0.007*	0.074 *** *0.008*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945
Adj R-squared	0.15	0.15	0.11	0.12	0.13	0.12	0.07	0.09	0.15	0.15	0.10	0.13
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes

Dependent variable:	**Credits**												**Credits**											
	Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	0.040 *** *0.005*	0.040 *** *0.005*	0.034 *** *0.006*	0.029 *** *0.007*	0.019 *** *0.002*	0.018 *** *0.002*	0.004 * *0.002*	0.004 * *0.002*	0.012 * *0.006*	0.012 * *0.006*	0.021 *** *0.008*	0.022 *** *0.009*	0.028 *** *0.005*	0.028 *** *0.005*	0.022 *** *0.006*	0.016 ** *0.007*	0.030 *** *0.002*	0.030 *** *0.002*	0.011 *** *0.003*	0.006 * *0.003*	-0.004 *0.005*	-0.003 *0.005*	0.002 *0.007*	0.015 ** *0.007*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	511,220	510,833	477,487	474,340	180,208	180,163	167,583	166,505	169,282	169,273	161,046	160,172
Adj R-squared	0.24	0.26	0.22	0.25	0.29	0.30	0.26	0.29	0.27	0.28	0.24	0.25	0.41	0.41	0.38	0.41	0.46	0.46	0.43	0.45	0.41	0.41	0.36	0.39
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes

	Credits											
Dependent variable:	Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	0.015 *** *0.002*	0.015 *** *0.002*	0.015 *** *0.002*	0.016 *** *0.002*	0.001 *0.001*	0.001 *0.001*	0.000 *0.001*	0.001 *0.001*	0.012 ** *0.005*	0.012 ** *0.005*	0.016 ** *0.007*	0.019 ** *0.008*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945
Adj R-squared	0.11	0.11	0.09	0.09	0.16	0.16	0.12	0.18	0.13	0.13	0.07	0.09
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes

Dependent variable:	**Debts**												**Debts**											
	Normal times				Global financial crisis				Sovereign debt crisis				Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	-0.037 *** *0.007*	-0.037 *** *0.007*	-0.040 *** *0.008*	-0.043 *** *0.009*	-0.040 *** *0.003*	-0.040 *** *0.003*	-0.039 *** *0.004*	-0.037 *** *0.004*	-0.094 *** *0.004*	-0.095 *** *0.004*	-0.102 *** *0.004*	-0.104 *** *0.005*	-0.024 *** *0.006*	-0.024 *** *0.006*	-0.025 *** *0.007*	-0.029 *** *0.008*	-0.019 *** *0.002*	-0.019 *** *0.002*	-0.021 *** *0.003*	-0.016 *** *0.003*	-0.044 *** *0.002*	-0.043 *** *0.002*	-0.052 *** *0.003*	-0.052 *** *0.003*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	511,220	510,833	477,487	474,340	180,208	180,163	167,583	166,505	169,282	169,273	161,046	160,172
Adj R-squared	0.13	0.13	0.08	0.15	0.17	0.17	0.13	0.16	0.19	0.20	0.14	0.16	0.12	0.12	0.11	0.15	0.22	0.22	0.17	0.20	0.28	0.28	0.23	0.26
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes

	Debts											
Dependent variable:	Normal times				Global financial crisis				Sovereign debt crisis			
	1	2	3	4	1	2	3	4	1	2	3	4
Central Bank liquidity (to each bank)	-0.015 *** *0.004*	-0.015 *** *0.004*	-0.016 *** *0.004*	-0.012 *** *0.004*	-0.022 *** *0.002*	-0.022 *** *0.002*	-0.021 *** *0.003*	-0.020 *** *0.003*	-0.054 ** *0.003*	-0.055 *** *0.003*	-0.055 ** *0.003*	-0.056 *** *0.003*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945
Adj R-squared	0.18	0.18	0.14	0.15	0.13	0.13	0.08	0.10	0.15	0.15	0.11	0.13
Bank fixed effects	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no
Time fixed effets	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Counterparty fixed effects	no	yes	no	no	no	yes	no	no	no	yes	no	no
Counterparty FE × Time FE	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Bank fixed effects × Counterparty FE	no	no	no	yes	no	no	no	yes	no	no	no	yes

Table 14. Bank types detected on the basis of their possible behavior vis-à-vis CB and IM

The table identifies and names six possible types of banks, detected on the basis of their possible behavior in the two wholesale liquidity markets (measured by the Net-Position in the Total Interbank Market and the total Liquidity net-borrowed form CB). For example, "secondary liquidity users" are identified as banks that present a negative Net-Position in the Total Interbank Market while do not borrow from CB (or even present a positive net-deposit to it). Likewise, "primary liquidity redistributors" are defined as banks that are net-borrowers of the CB while present a positive Net-Position in the Total Interbank Market.

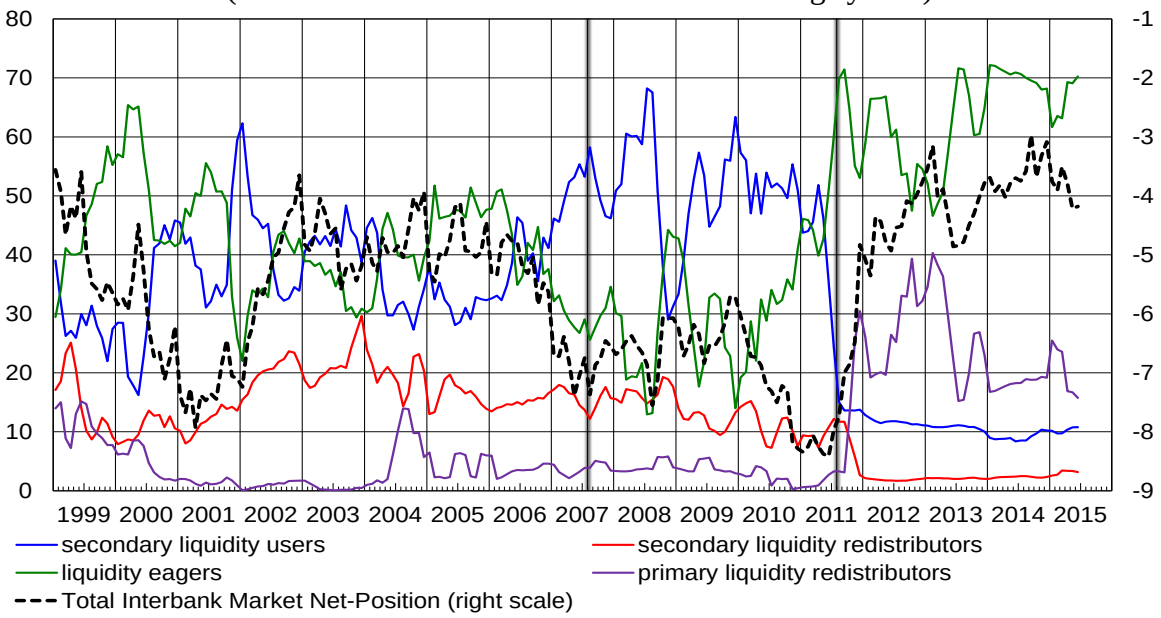
		Total Interbank Market - Net Position			
		< 0	**= 0**	**> 0**	
Net-liquidity position with the CB	**≥ 0**	secondary liquidity users	wholesale liquidity uninterested	secondary liquidity redistributors	**CB liquidity non-users**
	< 0	liquidity eagers	only primary liquidity users	primary liquidity redistributors	**CB liquidity users**
		IM liquidity users	**IM liquidity uniterested**	**IM liquidity reditributors**	**Total**

Table 15. Bank types detected on the basis of their actual behavior vis-à-vis CB and IM in Italy

The table shows the percentage shares of representativeness of each of the main categories of banks identified in Table 12. For example, the "secondary liquidity users" represent in the pre-crisis period the 21.5 per cent of the total number of banks operating in Italy, the 38.2 per cent of the total assets of the system. Two types of banks ("wholesale liquidity uninterested" and "primary liquidity users") are excluded because of very low figures.

		Total Interbank Market - Net Position																	
		< 0						> 0											
Net-liquidity position with the CB	≥ 0	secondary liquidity users						secondary liquidity redistributors						CB liquidity non-users					
		Normal times		Global financial crisis		Sovereign debt crisis		Normal times		Global financial crisis		Sovereign debt crisis		Normal times		Global financial crisis		Sovereign debt crisis	
		Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets
		21.5	38.2	21.0	49.9	52.8	10.9	68.8	17.1	73.2	12.9	25.5	2.9	97.0	55.5	93.4	62.8	79.3	13.7
	< 0	liquidity eagers						primary liquidity redistributors						CB liquidity users					
		Normal times		Global financial crisis		Sovereign debt crisis		Normal times		Global financial crisis		Sovereign debt crisis		Normal times		Global financial crisis		Sovereign debt crisis	
		Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets
		1.8	40.3	2.8	30.9	11.4	63.4	0.7	4.2	0.9	3.3	8.3	22.8	3.0	44.5	6.6	37.2	20.7	86.3
		IM liquidity users						IM liquidity reditributors						Total					
		Normal times		Global financial crisis		Sovereign debt crisis		Normal times		Global financial crisis		Sovereign debt crisis		Normal times		Global financial crisis		Sovereign debt crisis	
		Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets	Number of banks	Total assets
		30.5	78.7	25.8	83.8	66.2	74.4	69.5	21.3	74.1	16.2	33.8	25.6	100.0	100.0	100.0	100.0	100.0	100.0

Figure 7. Bank types detected by their actual behavior vis-à-vis CB and IM
(as a share of total assets of the Italian banking system)



The figure shows the development of the shares of Italian banking system's total assets for four types of bank. The four types of bank are identified on the basis of their behavior in the two wholesale liquidity markets, measured by the Net-Position in the Total Interbank Market and the total Liquidity net-borrowed form CB (see Tables 12 and 13). "Secondary liquidity users" are banks that present a negative Net-Position in the Total Interbank Market while do not borrow from CB (or even present a positive net-deposit to it). "Primary liquidity redistributors" are banks that are net-borrowers of the CB while present a positive Net-Position in the Total Interbank Market.

Table 16. Transition matrix of bank types

		To: Sovereign debt crisis			
		secondary liquidity users	secondary liquidity redistributors	liquidity eagers	primary liquidity redistributors
From: Normal times	secondary liquidity users	**14,5**	11,5	32,7	22,9
	secondary liquidity redistributors	76,0	**68,2**	52,2	60,4
	liquidity eagers	1,6	0,0	**4,4**	4,2
	primary liquidity redistributors	1,3	0,0	2,6	**0,0**
	other	6,6	20,4	8,1	12,5
	Total	100,0	100,0	100,0	100,0

		To: Sovereign debt crisis			
		secondary liquidity users	secondary liquidity redistributors	liquidity eagers	primary liquidity redistributors
From: Global financial crisis	secondary liquidity users	**21,8**	3,8	24,8	12,5
	secondary liquidity redistributors	76,0	**89,2**	44,3	68,8
	liquidity eagers	0,0	0,0	**20,4**	4,2
	primary liquidity redistributors	0,3	0,0	4,4	**10,4**
	other	1,9	7,0	6,2	4,2
	Total	100,0	100,0	100,0	100,0

Table 17. Likelihood to be "Primary liquidity redistributors" and "Liquidity eagers"

Results of the first equation of equation system 2. Dependent variable $im_{i,t}$: a binary variable equal to 1 if bank *i* is found to be a "primary liquidity redistributor" in the period *t* and 0 otherwise, in the first estimation; a "liquidity eager" in the second estimation. "Primary liquidity redistributors" are banks that are net-borrowers of the CB while present a positive Net-Position in the Total Interbank Market. "Liquidity eagers" are banks that are net-borrowers of the CB and IM. Estimation method: RE probit model. Sample time splitting: each specification is identically repeated in each span.

	primary liquidity redistributors			liquidity eagers		
	Normal times	Global financial crisis	Sovereign debt crisis	Normal times	Global financial crisis	Sovereign debt crisis
Central Bank liquidity (to each bank)	32.125 ***	22.481 ***	27.763 ***	9.798 ***	17.451 ***	0.454
	2.470	*2.001*	*1.015*	*1.314*	*1.503*	*0.510*
Domestic Infra-Group *Debts or Credits*	-5.749 ***	-9.977 **	-2.958	2.243 *	-0.524	4.853 *
	2.069	*4.129*	*3.189*	*1.239*	*2.421*	*2.734*
Size	0.447 ***	0.897 ***	0.536 ***	0.634 ***	1.229 ***	1.229 ***
	0.068	*0.180*	*0.090*	*0.088*	*0.172*	*0.097*
Retail Loans	-1.354 **	-1.339 *	-3.132 ***	4.243 ***	3.195 ***	6.663 ***
	0.562	*0.749*	*0.569*	*0.892*	*0.987*	*0.632*
Retail Fundraising	2.211 ***	2.682 ***	8.057 ***	-5.613 ***	-1.680 **	-2.412 ***
	0.589	*0.874*	*0.735*	*0.652*	*0.700*	*0.449*
Bad Loans	1.805 ***	0.593	0.638	-1.181	-5.252 *	-4.547 ***
	0.692	*2.202*	*1.027*	*0.803*	*2.812*	*1.030*
ROE	-1.093	-1.777	-0.823	-1.387 **	-0.191	-1.062 **
	0.754	*1.155*	*0.632*	*0.618*	*0.987*	*0.514*
Capital	-5.896 ***	7.567 ***	10.257 ***	-3.695	-10.755 ***	5.063 ***
	2.222	*1.927*	*1.596*	*2.358*	*2.527*	*1.832*
Portfolio of domestic Gov't Debt Securities	-3.559 ***	-10.196 ***	-10.748 ***	2.665 ***	-0.140	9.401 ***
	0.918	*1.810*	*0.698*	*0.944*	*1.555*	*0.678*
Por. Gov't Debt Se. other euro-area countries	11.713 ***	4.269	-17.889 ***	15.682 ***	-7.062	9.176 ***
	2.789	*3.786*	*3.164*	*3.824*	*8.637*	*3.272*
Portfolio of Bank Bonds	0.551	-7.611 ***	-6.435 ***	5.076 ***	3.434 **	7.654 ***
	1.772	*2.133*	*1.110*	*1.599*	*1.697*	*0.916*
Rating	0.091	-0.812 ***	-0.159	-0.870 ***	0.130	-0.065
	0.133	*0.219*	*0.149*	*0.109*	*0.100*	*0.132*
Banks without Rating	-1.104	6.542 ***	2.157 **	4.099 ***	-0.414	-0.276
	0.909	*1.599*	*1.005*	*0.796*	*0.586*	*0.943*
Constant	-7.181 ***	-9.685 ***	-11.849 ***	-3.672 ***	-15.490 ***	-15.783 ***
	1.175	*2.214*	*1.477*	*1.267*	*2.208*	*1.449*
Bank random effects	yes	yes	yes	yes	yes	yes
Time fixed effets	yes	yes	yes	yes	yes	yes
Number of observations	65,073	27,210	24,240	65,073	27,210	24,240
rho	0.67	0.71	0.79	0.78	0.80	0.80

Table 18. Robustness check: Determinants of Total IM positions – estimated with alternative instruments: GDP gap and inflation rates non-weighted for banks' total assets

Results of the equation systems (2) and (3) replacing instrumental variables. Instruments: GDP gap and inflation rates non-weighted for banks' total assets. No time fixed effect. Sample time splitting: each specification is identically repeated in each span. Dependent variable $im_{i,t}$: total IM positions. Estimation method: IV. Endogenous and instrumented regressor $cb_{i,t}$: ratio of CB liquidity provided to the bank on its total assets. Since time fixed effects are removed, regressions include a list of time varying macro-variables on the developments of Italian economy: exports and imports of goods and services; household consumption; gross fixed investment; households' both financial assets and liabilities; non-financial corporations' financial assets; non-financial corporations' both bonds and shares and other equity; General government's both debt and deficit; mutual fund shares. All these variables are taken as ratios to GDP. Furthermore, the list includes: the gross yield to maturity on 10-year General government bonds; the aggregated growth rate of bank lending to the private sector; the average interest rates on loans and deposits; persons in work and unemployment rate.

	without bank-counterparty fixed effects			***with bank-counterparty fixed effects***								
Dependent variable:	**Net-Position**											
	Normal times	Global financial crisis	Sovereign debt crisis	Normal times			Global financial crisis			Sovereign debt crisis		
				1	2	3	1	2	3	1	2	3
Central Bank liquidity (to each bank)	1.230*** *0.109*	0.595*** *0.0598*	0.788*** *0.0221*	0.0815*** *0.005*	0.0806*** *0.005*	0.0798*** *0.005*	0.0517*** *0.004*	0.0508*** *0.004*	0.0494*** *0.004*	0.0974*** *0.007*	0.0980*** *0.007*	0.0976*** *0.007*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,839	27,210	24,240	579,221	579,212	545,875	207,479	207,470	194,888	198,043	198,041	189,815
Adj R-squared	0.82	0.88	0.91	0.19	0.19	0.25	0.25	0.26	0.29	0.20	0.20	0.23
Bank fixed effects	yes	yes	yes	yes	yes	no	yes	yes	no	yes	yes	no
Time fixed effets	no	no	no	no	no	no	no	no	no	no	no	no
Macro control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Counterparty fixed effects	-	-	-	no	yes	no	no	yes	no	no	yes	no
Counterparty FE × Time FE	-	-	-	no	no	no	no	no	no	no	no	no
Bank fixed effects × Counterparty FE	-	-	-	no	no	yes	no	no	yes	no	no	no

Dependent variable:	**Credits**											
	Normal times	Global financial crisis	Sovereign debt crisis	Normal times			Global financial crisis			Sovereign debt crisis		
				1	2	3	1	2	3	1	2	3
Central Bank liquidity (to each bank)	0.325*** *0.0768*	0.304*** *0.094*	0.145*** *0.0243*	0.0424*** *0.01*	0.0413*** *0.01*	0.0390*** *0.01*	0.0174*** *0.00*	0.0165*** *0.00*	0.0190*** *0.00*	0.0133* *0.01*	0.0134* *0.01*	0.0134* *0.01*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,839	27,210	24,240	579,221	579,212	545,875	207,479	207,470	194,888	198,043	198,041	189,815
Adj R-squared	0.84	0.88	0.88	0.24	0.25	0.28	0.29	0.30	0.33	0.26	0.27	0.29
Bank fixed effects	yes	yes	yes	yes	yes	no	yes	yes	no	yes	yes	no
Time fixed effets	no	no	no	no	no	no	no	no	no	no	no	no
Macro control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Counterparty fixed effects	-	-	-	no	yes	no	no	yes	no	no	yes	no
Counterparty FE × Time FE	-	-	-	no	no	no	no	no	no	no	no	no
Bank fixed effects × Counterparty FE	-	-	-	no	no	yes	no	no	yes	no	no	no

Dependent variable:	**Debts**											
	Normal times	Global financial crisis	Sovereign debt crisis	Normal times			Global financial crisis			Sovereign debt crisis		
				1	2	3	1	2	3	1	2	3
Central Bank liquidity (to each bank)	-0.905*** *0.085*	-0.564*** *0.057*	-0.642*** *0.0242*	-0.0391*** *0.007*	-0.0393*** *0.007*	-0.0408*** *0.007*	-0.0343*** *0.003*	-0.0343*** *0.003*	-0.0305*** *0.003*	-0.0841*** *0.003*	-0.0846*** *0.003*	-0.0842*** *0.004*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,839	27,210	24,240	579,221	579,212	545,875	207,479	207,470	194,888	198,043	198,041	189,815
Adj R-squared	0.92	0.91	0.92	0.13	0.13	0.18	0.17	0.17	0.21	0.18	0.19	0.21
Bank fixed effects	yes	yes	yes	yes	yes	no	yes	yes	no	yes	yes	no
Time fixed effets	no	no	no	no	no	no	no	no	no	no	no	no
Macro control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Counterparty fixed effects	-	-	-	no	yes	no	no	yes	no	no	yes	no
Counterparty FE × Time FE	-	-	-	no	no	no	no	no	no	no	no	no
Bank fixed effects × Counterparty FE	-	-	-	no	no	yes	no	no	yes	no	no	no

Table 19. Robustness check: Determinants of Total IM positions – estimated with alternative instruments

Results of the equation systems (2) and (3) replacing instrumental variables. Instruments: Official rates and CB's total assets weighted for banks' total assets, weighted and not for banks' total assets. When instruments are not weighted at bank level, there are no time fixed effect. Sample time splitting: each specification is identically repeated in each span. Dependent variable $im_{i,t}$: total IM positions. Estimation method: IV. Endogenous and instrumented regressor $cb_{i,t}$: ratio of CB liquidity provided to the bank on its total assets. When time fixed effects are removed, regressions include a list of time varying macro-variables on the developments of Italian economy (see Table 18).

	without bank-counterparty fixed effects			***with bank-counterparty fixed effects***																					
Instruments:	*Official rates and CB's total assets weighted for banks' total assets*			*Official rates and CB's total assets non-weighted for banks' total assets*			*Official rates and CB's total assets weighted for banks' total assets*												*Official rates and CB's total assets non-weighted for banks' total assets*								
Dependent variable:	**Net-Position**																										
	Normal times	Global financial crisis	Sovereign debt crisis	Normal times	Global financial crisis	Sovereign debt crisis	Normal times				Global financial crisis				Sovereign debt crisis				Normal times			Global financial crisis			Sovereign debt crisis		
							1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	2	3	1	2	3
Central Bank liquidity (to each bank)	1.888** *0.575*	0.938* *0.529*	3.656* *1.857*	2.970* *1.705*	3.774*** *1.046*	1.949*** *0.459*	0.494** *0.172*	0.515** *0.175*	0.148 *0.186*	0.199 *0.175*	0.106*** *0.030*	0.19*** *0.031*	0.212*** *0.037*	0.254*** *0.042*	0.0913* *0.048*	0.0979* *0.059*	0.229* *0.123*	0.374* *0.159*	0.235* *0.096*	0.217* *0.096*	0.237* *0.096*	0.158* *0.080*	0.158* *0.079*	0.121 *0.090*	0.169*** *0.026*	0.157*** *0.027*	0.048 *0.038*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,839	27,210	24,240	67,839	27,210	24,240	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	579,221	579,212	545,875	207,479	207,470	194,888	198,043	198,041	189,815
Adj R-squared	0.85	0.88	0.60	0.81	0.82	0.61	0.17	0.17	0.16	0.22	0.25	0.26	0.21	0.24	0.18	0.18	0.15	0.15	0.19	0.19	0.25	0.25	0.26	0.29	0.17	0.17	0.20
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes	no
Time fixed effets	yes	yes	yes	no	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no	no	no	no	no	no	no
Macro control variables	no	no	no	yes	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Counterparty fixed effects	-	-	-	-	-	-	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	yes	no	no	yes	no
Counterparty FE × Time FE	-	-	-	-	-	-	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no	no	no	no	no
Bank fixed effects × Counterparty FE	-	-	-	-	-	-	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	yes	no	no	yes	no	no	no
Dependent variable:	**Credits**																										
	Normal times	Global financial crisis	Sovereign debt crisis	Normal times	Global financial crisis	Sovereign debt crisis	Normal times				Global financial crisis				Sovereign debt crisis				Normal times			Global financial crisis			Sovereign debt crisis		
							1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3
Central Bank liquidity (to each bank)	1.54** *0.764*	3.268** *1.259*	2.882* *1.639*	17.74*** *5.094*	3.117*** *0.935*	0.718*** *0.153*	0.607*** *0.107*	0.597*** *0.116*	0.237* *0.136*	0.192* *0.102*	0.0915*** *0.025*	0.0997*** *0.026*	0.244*** *0.030*	0.311*** *0.034*	0.140** *0.043*	0.143*** *0.043*	0.500*** *0.108*	0.523*** *0.140*	0.258*** *0.07*	0.240*** *0.07*	0.177* *0.07*	0.269*** *0.07*	0.266*** *0.07*	0.301*** *0.08*	0.0606*** *0.02*	0.0810*** *0.02*	0.0969*** *0.02*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,839	27,210	24,240	67,839	27,210	24,240	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	579,221	579,212	545,875	207,479	207,470	194,888	198,043	198,041	189,815
Adj R-squared	0.86	0.77	0.62	0.71	0.78	0.88	0.21	0.22	0.22	0.25	0.29	0.30	0.25	0.27	0.25	0.26	0.19	0.20	0.24	0.25	0.28	0.27	0.29	0.31	0.26	0.26	0.27
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes	no
Time fixed effets	yes	yes	yes	no	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no	no	no	no	no	no	no
Macro control variables	no	no	no	yes	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Counterparty fixed effects	-	-	-	-	-	-	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	yes	no	no	yes	no
Counterparty FE × Time FE	-	-	-	-	-	-	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no	no	no	no	no
Bank fixed effects × Counterparty FE	-	-	-	-	-	-	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	yes	no	no	yes	no	no	no
Dependent variable:	**Debts**																										
	Normal times	Global financial crisis	Sovereign debt crisis	Normal times	Global financial crisis	Sovereign debt crisis	Normal times				Global financial crisis				Sovereign debt crisis				Normal times			Global financial crisis			Sovereign debt crisis		
							1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3
Central Bank liquidity (to each bank)	-0.848 *0.679*	-4.106** *1.493*	-6.538 *3.843*	-20.49*** *5.164*	-0.657 *0.743*	1.167 *0.81*	-0.113 *0.162*	-0.082 *0.164*	-0.0108 *0.179*	-0.0193 *0.165*	-0.0809** *0.026*	-0.0808** *0.027*	-0.0314 *0.033*	0.0562 *0.037*	-0.221*** *0.056*	-0.241*** *0.057*	-0.271* *0.122*	0.149 *0.151*	0.0228 *0.084*	0.0236 *0.084*	-0.0606 *0.083*	-0.111* *0.055*	-0.108* *0.055*	-0.18** *0.057*	-0.109*** *0.031*	-0.0765* *0.031*	0.0509 *0.032*
Bank characteristics and control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	67,839	27,210	24,240	67,839	27,210	24,240	579,221	579,212	545,875	542,700	207,479	207,470	194,888	193,812	198,043	198,041	189,815	188,945	579,221	579,212	545,875	207,479	207,470	194,888	198,043	198,041	189,815
Adj R-squared	0.92	0.77	0.55	0.85	0.91	0.47	0.12	0.13	0.14	0.15	0.17	0.17	0.12	0.16	0.15	0.15	0.14	0.14	0.13	0.13	0.18	0.16	0.16	0.20	0.17	0.18	0.21
Bank fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes	no
Time fixed effets	yes	yes	yes	no	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no	no	no	no	no	no	no
Macro control variables	no	no	no	yes	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Counterparty fixed effects	-	-	-	-	-	-	no	yes	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	yes	no	no	yes	no
Counterparty FE × Time FE	-	-	-	-	-	-	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no	no	no	no	no
Bank fixed effects × Counterparty FE	-	-	-	-	-	-	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	no	yes	no	no	yes	no	no	no

Table 20. Robustness check: Determinants of Total IM positions

Panel FE estimations. Dependent variable: Total interbank Net Positions. Specification 1 includes the same regressors of the basic models. Specification 2 (involving all the following columns) report the results of a panel FE estimation adding at the same time the interactions between each regressor and the variables Rating and Banks without Rating (that is, the variables used as instruments in the IV regressions).

	Total period	Normal times	Global financial crisis	Sovereign debt crisis	Total period	Normal times	Global financial crisis	Sovereign debt crisis	Total period	Normal times	Global financial crisis	Sovereign debt crisis	Total period	Normal times	Global financial crisis	Sovereign debt crisis
Specifications:	(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2) cont.	(2) cont.	(2) cont.	(2) cont.	(2) cont.	(2) cont.	(2) cont.	(2) cont.
									same regressors interacted with the variable "Rating"				*same regressors interacted with the variable "Banks without Rating"*			
Central Bank liquidity (to each bank)	0,684 ***	0,817 **	0,510 ***	0,713 ***	1,933 ***	3,494 ***	0,800 **	0,400 **	-0,370	-0,285	-0,111	-0,645	1,210	1,702	1,021	1,208
	0,230	*0,412*	*0,100*	*0,200*	*0,313*	*0,461*	*0,316*	*0,163*	*0,717*	*0,247*	*0,197*	*0,971*	*1,405*	*1,211*	*1,391*	*1,913*
Domestic Infra-Group *Debts or Credits*	0,082	-0,272 ***	0,039	0,480	0,087	-0,476	0,388	0,350	0,041	0,058	0,091	0,013	-0,608	-0,379	-0,625	-0,820
	0,320	*0,084*	*0,075*	*0,754*	*0,393*	*0,390*	*0,358*	*0,430*	*0,080*	*0,080*	*0,070*	*0,072*	*0,521*	*0,536*	*0,457*	*0,571*
Size	-0,017 **	0,011	-0,016 **	-0,016 **	-0,097 ***	-0,019 **	-0,062 *	-0,072 *	0,004	-0,002	0,007	0,009 *	-0,043	-0,004	-0,057	-0,066 **
	0,007	*0,009*	*0,007*	*0,007*	*0,035*	*0,009*	*0,037*	*0,047*	*0,005*	*0,004*	*0,007*	*0,005*	*0,040*	*0,019*	*0,043*	*0,033*
Retail Loans	-0,815 ***	-0,688 ***	-0,770 ***	-0,987 ***	-0,381 **	-0,691 *	-0,091 *	-0,099 *	-0,084	-0,006	-0,114 *	-0,101	0,339 *	0,019	0,444	0,239
	0,055	*0,031*	*0,045*	*0,089*	*0,160*	*0,365*	*0,054*	*0,060*	*0,079*	*0,068*	*0,062*	*0,073*	*0,201*	*0,411*	*0,394*	*0,398*
Retail Fundraising	0,645 ***	0,441 ***	0,687 ***	0,870 ***	0,931 **	0,684 **	0,923 ***	0,887 **	0,058	-0,021	0,090	0,040 *	-0,338	0,009	-0,501	-0,523 *
	0,055	*0,059*	*0,055*	*0,050*	*0,396*	*0,264*	*0,314*	*0,441*	*0,047*	*0,044*	*0,058*	*0,025*	*0,298*	*0,250*	*0,342*	*0,302*
Bad Loans	0,293 ***	0,099 ***	0,140 ***	0,340 ***	1,284 *	1,793 *	0,723 *	0,792 *	0,063	-0,265 *	0,176	0,132	-0,191	0,812	-0,470	-0,699
	0,054	*0,030*	*0,051*	*0,081*	*0,709*	*0,946*	*0,414*	*0,401*	*0,236*	*0,132*	*0,121*	*0,147*	*0,579*	*0,511*	*0,496*	*0,556*
ROE	0,074	0,029	0,068	0,075	0,299	0,418	0,068	0,080	-0,015	-0,037 **	-0,001	-0,005	0,080 *	0,216 *	0,014	0,010
	0,067	*0,022*	*0,059*	*0,091*	*0,433*	*0,775*	*0,102*	*0,102*	*0,040*	*0,019*	*0,031*	*0,072*	*0,240*	*0,128*	*0,246*	*0,346*
Capital	0,590 ***	0,490 ***	0,398 ***	0,540 ***	0,986 **	0,602 **	1,000 *	0,989 *	-0,266	-0,079	-0,388	-0,331	1,726	0,724	3,321 **	1,321
	0,091	*0,076*	*0,096*	*0,100*	*0,436*	*0,299*	*0,558*	*0,534*	*0,268*	*0,119*	*0,312*	*0,374*	*1,961*	*0,737*	*1,554*	*0,998*
Portfolio of domestic Government Debt Securities	-0,877 ***	-0,787 ***	-0,908 ***	-0,830 ***	-0,954 *	-0,915 *	-0,914 *	-0,989 *	-0,156	0,047	-0,302 **	-0,190	0,469	-0,617	1,084	0,843 *
	0,043	*0,036*	*0,054*	*0,040*	*0,539*	*0,535*	*0,479*	*0,562*	*0,113*	*0,091*	*0,123*	*0,169*	*0,585*	*0,515*	*0,792*	*0,511*
Portfolio of Government Debt Securities of other euro-area countries	-0,790 ***	-1,480 ***	-0,335 ***	-0,481 ***	-2,017 ***	-3,964 ***	-6,007 *	-4,007 *	-1,074 **	-0,820 **	-1,183 *	-1,259	0,750	0,477	0,960	0,588
	0,156	*0,322*	*0,095*	*0,051*	*2,384*	*1,472*	*3,340*	*2,340*	*0,533*	*0,389*	*0,621*	*0,821*	*0,615*	*0,881*	*0,823*	*0,581*
Portfolio of Bank Bonds	-0,767 ***	-0,595 ***	-0,750 ***	-0,850 ***	-0,183	0,738	-0,844 *	-0,441	-0,318 **	-0,159	-0,196 *	-0,298 *	1,487	3,801 *	5,929 *	0,729
	0,076	*0,069*	*0,069*	*0,090*	*0,838*	*1,690*	*0,527*	*0,297*	*0,149*	*0,169*	*0,120*	*0,158*	*0,992*	*2,027*	*3,268*	*0,680*
Rating	0,026 ***	0,082 ***	-0,011 *	0,012 *	0,096 *	0,096 *	-0,099 *	0,092 *								
	0,008	*0,006*	*0,007*	*0,007*	*0,052*	*0,050*	*0,053*	*0,052*								
Banks without Rating	0,018 *	0,045 **	0,109 ***	-0,119 ***	0,699 ***	0,600 *	0,760 ***	0,596 ***								
	0,010	*0,021*	*0,030*	*0,031*	*0,250*	*0,320*	*0,270*	*0,127*								
Constant	0,472 ***	0,504 **	0,356 ***	0,556 ***					*to be continued in the next colums*				0,055	-0,521	0,220	0,496
	0,136	*0,210*	*0,098*	*0,099*									*0,835*	*0,503*	*0,474*	*0,474*
Bank fixed effects	yes	yes	yes	yes									yes	yes	yes	yes
Time fixed effets	yes	yes	yes	yes	*to be continued in the next colums*								yes	yes	yes	yes
rho	0,59	0,57	0,67	0,69									0,61	0,57	0,67	0,69
Number of observations	119.289	67.839	27.210	24.240									119.289	67.839	27.210	24.240