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Lending relationships and credit rationing: The impact of securitization

Santiago Carbó-Valverde (University of Granada)
Hans Degryse (Tilburg University)
Francisco Rodriguez-Fernandez (University of Granada)

Summary

1. Introduction and motivation

• The global financial crisis of 2008/9 and the ensuing flight away from risk have affected credit flows towards various groups of firms to different degrees. **Firms relying heavily on bank credit such as small and medium sized enterprises (SMEs) are particularly vulnerable to the credit crunch.**

• **SMEs typically benefit from intense bank-firm relationships,** which may help mitigate supply side effects stemming from shocks to the banking system.

• **We study whether intense bank-firm relationships help reduce credit rationing. Furthermore, we investigate how securitization and shocks to the issuance of securitization affect firms' financing constraints during normal periods and during crisis periods.**

• Why linking securitization and SME financing?

• Securitization has been the main alternative funding mechanisms for banks when deposit funding has fallen over the last decade.

• Not all banks have the same access to securitization markets and not all the securitization instruments are the same.

• Relationship banking is based on a traditional view of banks while securitization is one of the main ways this traditional view banking has been changing in recent years.

• There are future prospects in securitization that may be of interest for SME funding (SME-linked mutual funds may be used as collateral in ECB funding transactions).

- **ABS vs. Covered Bonds:**

- **ABS:** Asset-backed securities (ABS) are the securities whose value and income payments are derived from and collateralized (or "backed") by a specified pool of underlying assets. The pool of assets is typically a group of small and illiquid assets that are unable to be sold individually.

- **COVERED BONDS:** Covered bonds are debt securities backed by cash flows from mortgages or public sector loans.

- **We focus on MBS as the main ABS distributed in Spain but the Spanish case permits us to compare MBS with covered bonds since both have been distributed to a large extent by Spanish banks.**

- **Currently, we are also exploring the effects of other types of ABS.**

•Why comparing mortgaged-back securities (MBS) and covered bonds (CB)?

- They are similar because both MBS and CB:
  - Provide external (specifically, non-deposit) financing for mortgages.
  - Can be used for forms of regulatory arbitrage (specifically, reducing needed equity capital).

- They are different because:
  - There is different accounting and regulatory treatment (although the differences are not consistent across countries).
  - Risk transfer differs. When mortgages default or prepay, CB pools replenish but MBS pools do not.

• The 2008/9 worldwide financial crisis provides an opportunity to study the role of lending relationships and these banks' involvedness in securitization activities on the degree of credit rationing. We test **three different hypotheses** using several unique data sets on Spanish firms:

•These questions are of great concern to governments as **SMEs are the backbone of OECD economies accounting for up to 97% of all firms**, between 40 and 60% of GDP, and up to 70% of employment (and even higher percentages in non OECD countries).

• Our results are relevant for both practitioners and policy makers. For example, our insights may help design financial regulation on bank liquidity in order to dampen the impact on firm credit rationing.

• PREVIEW OF RESULTS:

• First, **firms with a more intense lending relationship** as measured through its length and lower number of banks they are dealing with, **enjoy a greater credit supply and lower degree of credit rationing**. These results are in line with previous findings (e.g., Petersen and Rajan (1994)) but we are employing a disequilibrium model.

• Second, **firms whose main bank is more involved into securitization enjoy lower credit constraints in normal periods; however, they also face increased credit rationing during crisis periods.** This shows that **securitization generates supply effects** which depend on whether we are in normal or crisis periods.

• Finally, we study heterogeneity within securitization activity by investigating the impact of different types of securitization – covered bonds and mortgage-backed securities (MBS) – on credit rationing. While both types of securitization reduce credit rationing in normal periods, **a firm's main bank issuing MBS aggravates credit rationing in crisis periods.**

Related literature

Securitization in normal times and crisis periods (I)

• Wagner and Marsh (2007) or Duffie (2007): **Securitization may stimulate loan supply** by increasing the liquidity of bank's balance sheets or improving a bank's risk absorption capacity.

• During **stress periods** however banks relying on **securitization** may face additional liquidity or capital constraints **reducing their willingness to provide loans**.

•Initial empirical work on how loan sales impact lending relationships show that **selling of loans does not hamper the bank-firm relationship** (e.g. Drucker and Puri (2009)). Hirtle (2007) studies the use of **credit derivatives** and finds that these **enhance a bank's loan supply.**

• **Goderis et al. (2007):** Investigate the impact of **banks being active in securitization** on aggregate loan growth of a bank's portfolio and find that those banks **exhibit a larger loan growth than banks not being active in securitization.**

• We **improve** upon their work as we employ bank-firm level lending relationship information and the main bank's activity in securitization to study **how securitization affects credit constraints at the firm level**.

Related literature

Securitization in normal times and crisis periods (II)

• Jiménez et al. (2010) employ detailed bank-firm level data from the Spanish credit registry. They find that **banks with more securitizable assets make more loans available to firms.** However, **there is a substantial crowding out effect taking place as this expansion crowds out bank loans from other banks within the same firm.** They conclude that in general equilibrium, the impact of securitization is close to zero due to the crowding out of existing bank credit. They develop **a clever identification strategy to pin down the supply effect of securitization. Their identification strategy relies on employing firm fixed effects to absorb credit demand shocks, allowing comparing within the same firm the impact of bank credit supply shocks. This implies that they consider only firms with at least two bank relationships.** This may be a restriction as many firms have one bank only and exactly those single relationship firms may be the ones where shocks to the bank relationship are most cumbersome (Degryse et al. (2011)).

• **Our approach is to estimate a disequilibrium model containing a loan demand, loan supply and transaction equation. This allows studying how securitization activity of the firm's main bank impacts credit supply and credit rationing.** We estimate the level of firm financing constraints and we find that a greater intensity of securitization by a firm's main bank reduces credit constraints to a greater extent.

Related literature

Relationship banking and credit availability in normal times and in crisis periods

•Most studies find that **relationship borrowers (longer duration, wider scope, fewer banks, geographically close banks) have better access to credit.** Petersen and Rajan (1994), for example, find that firms with stronger relationships have a higher debt to assets ratio, and resort less often to trade credit. Cole (1998) reports that bank-firm relationships of more than 3 years already have a large impact on credit availability. Agarwal and Hauswald (2010) find that relationship banking enhances credit availability when bank and borrowers interact in person but not in case of e-loans.

• **Puri, Rocholl and Steffen (2009):** Look into the question whether the U.S financial crisis spurred a supply side effect. They **find evidence for a supply side effect in that the affected banks reject substantially more loan applications than non-affected banks**. Bank relationships help in mitigating the supply side effects as firms with longer relationships are less likely to be rejected even when their savings bank is exposed to a financial shock.

• We **contribute** to this literature by investigating **how a firm's main bank previous access to additional liquidity impacts credit supply when the securitization market dries up**.

Summary

2. Data and methodology

2.1. Data

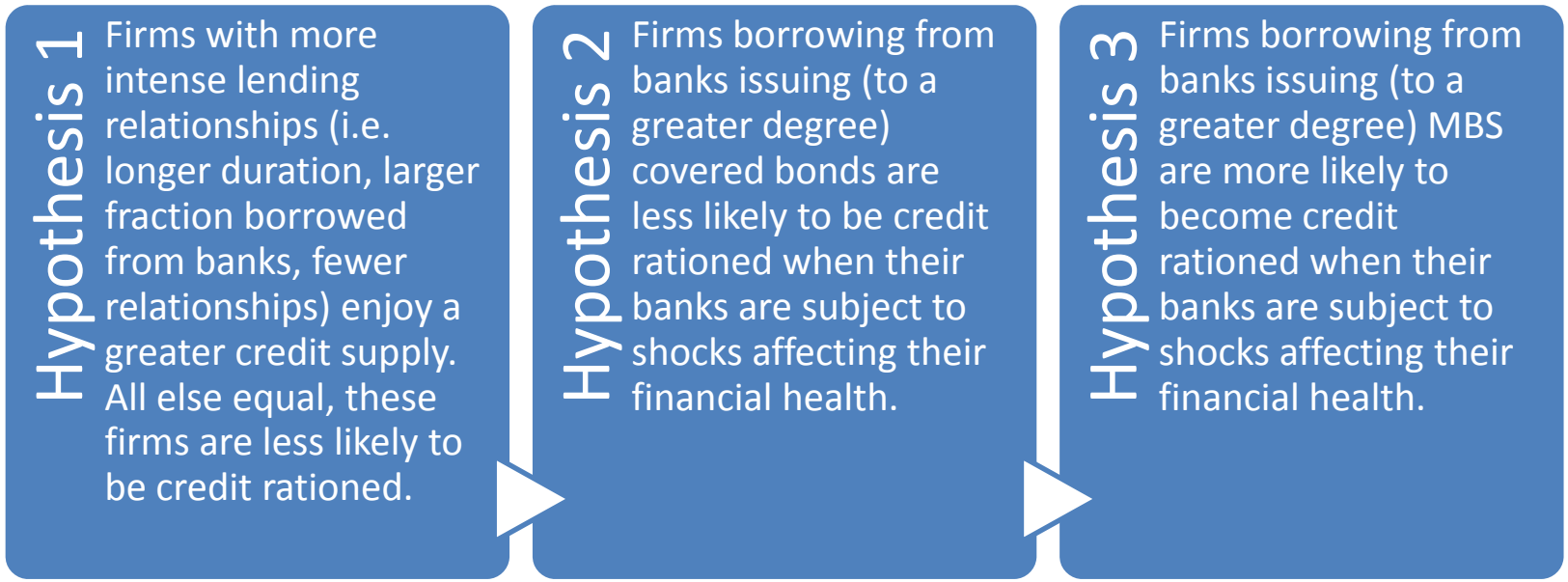
- We combine different data sources for our empirical analysis. **The primary source of firm-level information is the SABI (Sistema de Análisis de Balances Ibéricos) database by Bureau Van Dijk.** SABI includes accounting and financial information on more than 700,000 Spanish firms since 1990. Firms are included in the database when they have at least one employee.

- **SABI includes information on** headquarters' location, date of constitution, firm industry, number of employees, legal form of the business, whether the firm is quoted on a stock exchange and, most importantly for our purposes, the name of the bank(s) with whom the firm operates. **The information on bank-firm relationships and other key variables is only available for a smaller set of firms.**

- Furthermore, **the SABI database is updated regularly such that some information such as the one on bank-firm relationships is overwritten.**
- **We resolve this issue by retrieving information on bank-firm relationships from previous versions of the database. Our final sample covers 56,752 firms over the period 1993-2008, which represents around 7% of total firms in Spain** on average over the sample period . Due to entry and exit of the firms, **the panel is unbalanced and the number of firm-year observations is 326,332.**
- If both consolidated and non-consolidated accounts are available, we choose the consolidated ones.
- **Other data sources: Dealogic, AEB-CECA bank data.**

2.2. Hypotheses and empirical methodology

- To structure our analysis, we develop a number of hypotheses to explore (i) how the intensity of lending relationships affect firm's credit rationing before and during the crisis, and (ii) to study the role of different types of securitization (covered bonds versus MBS) on firms with intense lending relationships before and during the crisis.



• Our first hypothesis stems from the literature on relationship banking arguing that firms with intense lending relationships face lower credit constraints (e.g. Petersen and Rajan (1994)). The second and third hypotheses are based on the differential characteristics of MBS and covered bonds – **MBS allow issuers to transfer risk whereas covered bonds largely remain on the bank's balance sheet** (see also Carbó et al. (2011).

• The test of the three hypotheses requires identifying constrained firms. In a seminal credit rationing paper, Stiglitz and Weiss (1981) show that loan markets in the presence of asymmetric information can be frequently characterized by a disequilibrium status.

• Although some accounting ratios can be relevant indicators of firm financing constraints, it is also possible to infer lending demand and availability and to estimate the probability of credit rationing from a disequilibrium model.

• We set up a model of bank loan demand by individual firms, **allowing for the possibility that the firms cannot borrow as much as they would like.**

• We follow Carbó et al. (2009, RoF) to measure constrained versus unconstrained firms; however, we augment their model to **incorporate the role of lending relationships and the securitization activity of the main bank holding a relationship with the firm.**

• A disequilibrium model with unknown sample separation, as described by Maddala (1980), is employed. **The basic structure of the model consists of two reduced-form equations:** a desired demand equation for bank loans and an availability equation that reflects the maximum amount of loans that banks are willing to lend on a collateral basis. A third equation is a transaction equation. In this model, the realized loan outstanding is determined by the minimum of desired level and ceiling.

$$Loan_{it}^{d} = \beta_0^d + \beta_1^d Activity_{it}^{d} + \beta_2^d Size_{it} + \beta_3^d Substitutes_{it} + \beta_4^d Cost_{it} + u_{it}^{d} \quad (1)$$

$$Loan_{it}^{s} = \beta_0^s + \beta_1^s Collateral_{it} + \beta_2^s Default\ risk_{it} + u_{it}^{s} \quad (2)$$

$$Loan_{it} = Min(Loan_{it}^{d}, Loan_{it}^{s}) \quad (3)$$

Firm activity is represented by the level of sales over the one-year lagged total assets. Both firm production capacity (total assets) and sales are expected to increase (the level of) loan demand.

Cash flow as a ratio of lagged total assets is used to control for the effect of substitute funds on the demand for bank loans and, therefore, the expected sign of this variable is negative.

The cost of bank credit is expressed as the percentage point spread between the interest rate paid by the firm and short-term prime rate and it is also expected to affect loan demand negatively .

Firm's "collateral" is proxied by the ratio of tangible fixed assets to lagged total assets and the expected sign is positive since the maximum amount supplied by a bank will increase with the level of collateral. We assume here that tangible assets are taken as collateral or, if not, are potentially attachable as collateral by the bank.

Firms' default risk is measured by the ability to pay interest (proxied by the operating profit/interest ratio) and the ability to pay short-term debt (proxied by the current assets/current liabilities ratio). A high operating profit/interest ratio or a high current assets/current liabilities ratio indicates that the default risk is low. Therefore, the expected signs of the collateral variable and the variables that indicate the ability to pay interest and short term debt are all expected to be positive.

The age of the firm is included a proxy of reputation and information availability on the firm.

The Lerner index – the difference between banks' prices and marginal costs divided by prices– is included as an indicator of bank market power in the regions where the firm operates.

Both demand and availability equations contain regional GDP (log(GDP)) to control for macroeconomic conditions across regional markets.

TABLE 2. DESCRIPTIVE STATISTICS (1993-2008)

	1993-1996	1997-2000	2001-2004	2005-2006	2007-2008	1993-2008	Std. dev.
Sales	13953,2	16632,5	17267,3	19718.4	16121.0	16287.3	5230.1
Cash flow	1326.3	1532.2	1639.6	1824.1	1653.4	1590.5	698.3
Loan interest spread	0.0168	0.0159	0.0141	0.0127	0.0125	0.0131	0.0089
GDP	45258	49223	53524	59599	57412	52228	14431.6
Tangible assets	1395.5	1458.4	1606.1	1892.5	1694.2	1539.6	394.7
Age of the firm	10.12	10.26	10.54	11.31	10.88	10.53	6.3
Lerner index	0.2102	0.2304	0.2403	0.2419	0.2412	0.2488	0.1721
Default risk	3.14	3.84	3.04	5.42	5.23	4.12	2.1
Length (n. years relationship)	6.25	6.43	6.59	6.87	6.71	6.60	3.44
Single vs. multiple bank relationships	0.53	0.51	0.50	0.48	0.44	0.49	0.48
Main bank issue MBS (% loans)	0.0	0.06	0.11	0.14	0.11	0.13	0.05
Main bank issue covered bonds (% loans)	0.0	0.05	0.14	0.17	0.21	0.17	0.04
Main bank size /(log total assets)	8.14	8.46	8.88	9.03	8.89	8.63	1.59
Main bank cost-to-income-ratio	0.70	0.68	0.64	0.60	0.68	0.66	0,28

•**Testing Hypothesis 1** implies adding bank-firm lending relationship variables to the Bank Loan supply equation (2). We include three indicators capturing the strength of a bank-firm relationship:

- The **length of the relationship** –measured as the number of years of the relationship between the firm and its main bank (we assume the main bank is either the only bank working with the firm or the bank with the longest relationship).

- A dummy variable showing whether the firm has a **single (0) or multiple (1) bank relationships.**

- An **interaction term of the lagged collateral variable (tangible fixed assets/total assets) times the length of the relationship trying to capture the impact of the length of the bank-firm relationship on the value of asset tangibility as collateral.**

• Testing Hypotheses 2 and 3 also requires **adding variables regarding different types of securitization to the loan supply equation**. In particular, we include for each firm:

- •The main bank's issuance of MBS in a given year as a ratio of this bank's total loans at the beginning of that period
- • The main bank issuance of covered bonds in a given year as a ratio of total loans at the beginning of the period.
- • The main bank size (as a proxy for the presence of that bank in debt and capital markets)
- • The main bank cost-to-income ratio (as a proxy for the efficiency of the bank that may also influence its ability to lend at a lower cost).

• In order to capture whether the relationship between MBS and covered bonds issuance and loan supply varied during the crisis years, we also include an **interaction term between each one of the securitization issuance variables and a time dummy taking the value 1 for 2007 and 2008 and zero otherwise.**

•An additional specification also considers a **dummy which takes the value 1 for 2008 (when the crisis was more developed) and zero otherwise.**

2.3. Spain as an empirical laboratory

- Spain has a banking-oriented financial system with a large fraction of its economic activity driven by the small and medium-sized firms which are highly dependent on bank credit and the most likely to be credit rationed. In 2008 SMEs represent 99.6% of the total number of firms and 53% of total employment in Spain.

- Spain is also a relatively attractive environment to study relationship lending because Spanish banks may focus more on relationship lending than in some other countries, particularly the U.S. For example, in the U.S. lenders historically had more transactions-based lending technologies such as small business credit scoring that can also be used in lending to opaque firms.

- Another important feature that makes the Spanish case a particularly interesting one is that securitization activity grew spectacularly in this country in parallel with large increases in bank credit to the private sector.

- Securitization activity grew from being almost insignificant in the late 1990's to finance a large portion of bank lending to the private sector in the years running up to the crisis..

- Yearly lending growth rates at the beginning of our sample period in 1996 were 4.9%. Lending to firms increased significantly in the years prior to the crisis reaching 30.1% in November 2006 and falling sharply afterwards to 6.8% in December 2008.

FIGURE 1. LENDING TO FIRMS IN SPAIN (yearly growth rates)

Source: Bank of Spain

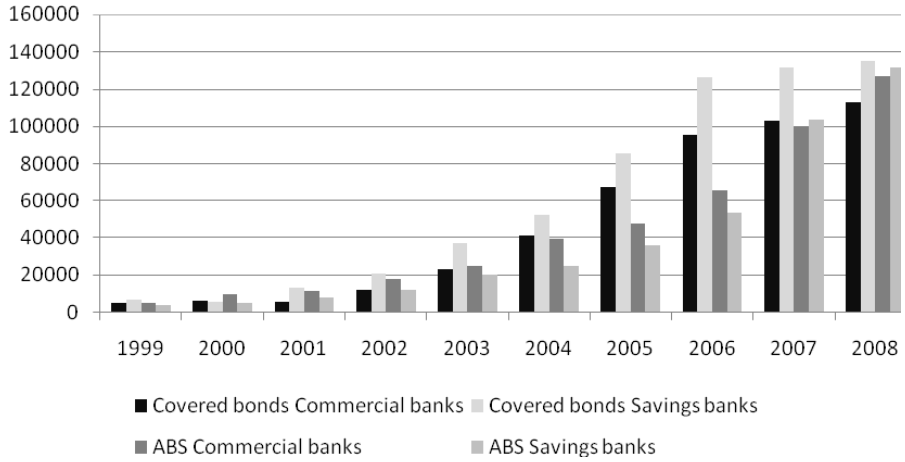
- Little has been said or explored on a possible role for securitization in triggering lending in countries that experienced a lending and housing bubble in the years before the crisis. On the latter, housing prices in the years prior to the crisis have been particularly noticeable in some European countries, the UK, Ireland and Spain -where housing prices have increased by more than 180% only between 1997 and 2007- the largest growth among major industrialized countries.

- According to the Securitization Industry and Financial Market Association (SIFMA) Spain was the third largest country in Europe in terms of outstanding MBS securitization with € 163.8 bln. Only the UK (€ 530.3 bln) and Netherlands (€188.9 bln) exhibit higher outstanding MBS values. As for covered bonds, the European Covered Bond Council (ECBC) reports that Spain was the second largest market of covered bonds in Europe with an outstanding amount of Eur 352 bln, after Germany (Eur 719.4 bln).

• Using Dealogic and AIAF data Figure 2 shows the stock of covered bonds and ABS issued by Spanish commercial and savings banks from 1999 to 2008. Covered bond issuance by commercial banks increased from € 0.5 bln to € 112 bln in that period while in the case of savings banks the stock of covered bonds grew from € 0.7 bln to € 135 bln. As for ABS, the stock at commercial banks was € 0.5 in 1999 and it continuously increased to € 126 bln in 2008 while the change at commercial banks during the same period was from € 0.4 to € 134 bln.

FIGURE 2. COVERED BONDS AND ABS SECURITIZATION IN SPAIN (1996-2008)

Stock data. Euro million.



Source: Dealogic and AIAF (Asociación de Intermediarios de Activos Financieros)

Summary

3. Results

3.1. Baseline model

• The estimated parameters of the baseline disequilibrium model (equations (1)-(3)) are reported in column I of Table 3. The top panel displays the result for the "demand for bank loans". All the variables have the expected signs. As shown by the demand equation parameters, **a 1% increase in sales over total assets augments the desired demand of bank loans by 0.35% while a 1% increase in cash flow reduces loan demand by 0.98%. Additionally, a 1% increase in the cost of funds (loan interest spread) is found to reduce the desired demand of bank loans by 1.16%.**

•The middle panel of Table 3 displays the results for the "supply of bank loans". As for the credit availability function, **a 1% increase in collateral (measured by tangible fixed assets over total assets) increases the availability of loans by 1.32%.** The age of the firm has a positive and significant impact on the supply of loans (the coefficient being 0.32) while a **1% increase in bank market power (Lerner index) has a negative impact on loan supply of 0.75%.** The log(GDP) has a positive and significant impact in both the loan demand and loan supply equations.

• The estimation of the baseline model also reveals that **30.3% of the firms were constrained within our sample.**

TABLE 3. ESTIMATED PARAMETERS OF THE DISEQUILIBRIUM MODEL. ALTERNATIVE SPECIFICATIONS: BASELINE MODEL AND RELATIONSHIP LENDING (1993-2008)

Switching regression model estimated by full information maximum likelihood (FIML) with firm fixed effects
p-values in parenthesis
Standard errors are clustered at the regional level

	(I)		(II)		(III)	
Demand for bank loans	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Sales/total assets(t-1)	0.3526*** (0.000)	0.01	0.3728*** (0.000)	0.01	0.3243*** (0.000)	0.01
Cash-flow/total assets(t-1)	-0.9861*** (0.000)	0.06	-1.1106*** (0.000)	0.06	-0.8435*** (0.000)	0.07
Loan interest spread	-1.1640*** (0.000)	0.03	-1.0563*** (0.000)	0.03	-1.0388*** (0.000)	0.03
Log(GDP)	0.0147* (0.042)	0.01	0.0128** (0.015)	0.01	0.0131** (0.018)	0.01
Supply of bank loans						
Tangible fixed assets/total assets(t-1)	1.3285*** (0.000)	0.01	1.1728*** (0.000)	0.01	-	-
Age of the firm	0.3226*** (0.000)	0.01	0.2989*** (0.000)	0.01	0.3125*** (0.000)	0.01
Banks' market power (Lerner index)	-0.7523** (0.023)	0.01	-0.7088*** (0.03)	0.01	-0.7112** (0.007)	0..01
Loan interest spread	1.2860*** (0.000)	0.05	1.1363*** (0.000)	0.04	1.0780*** (0.000)	0.05
Default risk	0.0012 (0.752)	0.02	0.0010 (0.805)	0.01	0.0008 (0.721)	0.01
Log(GDP)	0.0662*** (0.002)	0.01	0.0798** (0.006)	0.01	-0.0693** (0.007)	0.01

3.2. Relationship lending and credit rationing

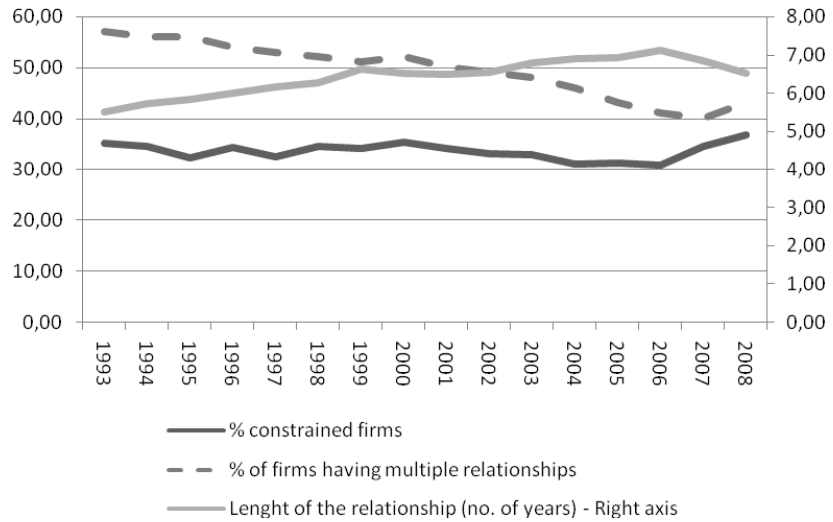
- Column II of Table 3 reveals that firms with a longer relationship with the main bank obtain a larger loan supply from their banks. In particular **a 1% increase in the length of the relationship increases the loan supply by 0.14%.** Additionally, it is shown that those firms having multiple bank relationships are less likely to obtain bank loans, a result that suggests that the link between the bank and the firm weakens with multiple bank relationships.
- Column III in Table 3 investigates whether observed collateral values mitigate or strengthen the effects of the length of the relationship on loan supply. We add an interaction term between the asset tangibility variable and the length of the relationship variable. **Both the length variable and the interaction terms are significant and positive at the 1% level which suggests that both collateral value and the length of the relationship are positive drivers of loan supply.**

Extended supply: relationship lending						
Length (n. years relationship)	-	-	0.1480*** (0.001)	0.01	0.1374*** (0.001)	0.01
Single vs. multiple bank relationships	-	-	-0.6928*** (0.001)	0.01	-0.6055*** (0.001)	0.01
Tangible fixed assets/total assets(t-1) X Length	-	-	-	-	1.2230*** (0.001)	0.01

• Taking the estimates of column III in Table 3 as a reference, Figure 3 depicts the estimated evolution of firm financing constraints within our sample, along with the average length of the relationships and the average percentage of firms having multiple vs. single relationships with banks. All the variables are adjusted to their mean in each year.

• Figure 3 shows that the percentage of constrained firms increased from 30.83% in 2006 to 36.80% in 2008. During the same time period, the average length of lending relationships within our sample decreased from 7.12 to 6.53 years and the percentage of firms having relationships with multiple banks increased from 41.2% to 43.3%.

FIGURE 3. CONSTRAINED FIRMS AND RELATIONSHIP LENDING



Source: Own estimations from SABI and Bankscope data

3.3. The role of securitization

• Table 4 investigates the impact of banks' activities in MBS and covered bonds on financing constraints.

• Column I in table 4 shows that **both the issuance of MBS and covered bonds (as a percent of total assets) at the beginning of the period has a positive impact on current lending to firms.** T**he economic impact of a 1 percentage point change in the covered bonds issuance is significantly higher than the impact of MBS** (coefficients being 0.74 and 0.14 respectively). This result suggest that covered bonds, which theoretically are meant to be liquidity generation devices, have a higher impact on lending to firms than MBS securitization, which theoretically are meant to be risk transferring devices. Additionally, **we find that the size of the main bank does not seem to have an impact on loan supply to firms while efficiency does have a positive impact** (lower cost-to-income ratio) on loan supply, suggesting that reducing operating costs affects loan supply positively.

TABLE 4. ESTIMATED PARAMETERS OF THE DISEQUILIBRIUM MODEL. ALTERNATIVE SPECIFICATIONS: RELATIONSHIP LENDING AND SECURITIZATION (1993-2008)

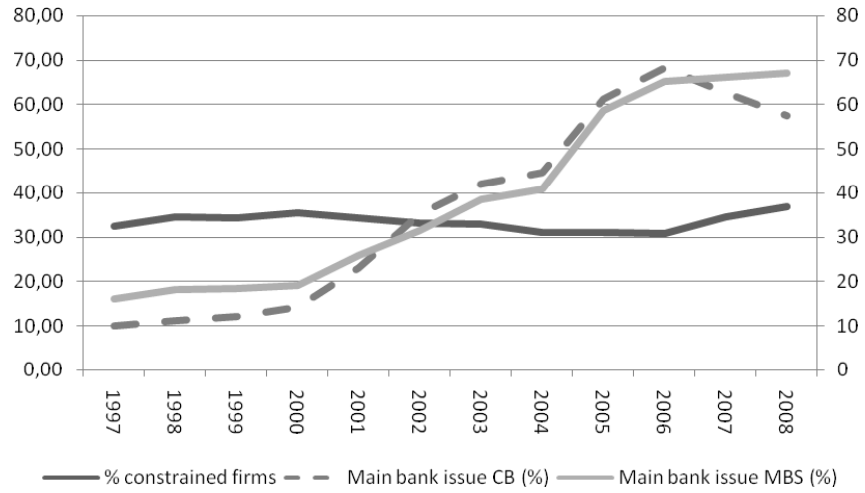
Switching regression model estimated by full information maximum likelihood (FIML) with firm fixed effects
p-values in parenthesis (Standard errors are clustered at the regional level)

	(I)		(II)		(III)	
Demand for bank loans	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Sales/total assets(t-1)	0.3157*** (0.000)	0.01	0.3326*** (0.000)	0.01	0.3014*** (0.000)	0.01
Cash-flow/total assets(t-1)	-0.9632*** (0.000)	0.03	-0.9203*** (0.000)	0.06	-0.9046*** (0.000)	0.04
Loan interest spread	-1.1408*** (0.000)	0.04	-1.1524*** (0.000)	0.03	-1.1237*** (0.000)	0.03
Log(GDP)	0.0137** (0.044)	0.01	0.0120** (0.021)	0.01	0.0110** (0.031)	0.01
Supply of bank loans						
Tangible fixed assets/total assets(t-1)	1.4435*** (0.000)	0.01	1.3269*** (0.000)	0.01	1.3418*** (0.000)	0.01
Age of the firm	0.3299*** (0.000)	0.01	0.3683*** (0.000)	0.01	0.3533** (0.000)	0.01
Banks' market power (Lerner index)	-0.7461** (0.027)	0.04	-0.7010*** (0.021)	0.01	-0.7146*** (0.023)	0.01
Loan interest spread	1.0604*** (0.000)	0.05	1.4782*** (0.000)	0.04	1.4333*** (0.000)	0.04
Default risk	0.0012 (0.895)	0.00	0.0010 (0.831)	0.00	0.0011 (0.814)	0.00
Log(GDP)	0.0723*** (0.001)	0.02	0.0802*** (0.001)	0.02	0.0865*** (0.001)	0.02
Extended supply (I): relationship lending						
Length (n. years relationship)	0.1231*** (0.001)	0.01	0.1126*** (0.001)	0.01	0.1135*** (0.001)	0.01
Single vs. multiple bank relationships	-0.6424*** (0.001)	0.01	-0.6908*** (0.001)	0.01	-0.7032*** (0.001)	0.01
Tangible fixed assets/total assets(t-1) X Length	1.2350*** (0.001)	0.01	1.2122*** (0.001)	0.01	1.1255*** (0.001)	0.01
Extended supply (II): Main bank characteristics and securitization issues						
Main bank issuance of MBS (MBS issuance/total loans)t-1	0.1423** (0.001)	0.01	0.1398** (0.001)	0.01	0.1185** (0.001)	0.01
Main bank issuance of covered bonds (covered bonds issuance over total loans)t-1	0.7394*** (0.001)	0.01	0.7115*** (0.001)	0.01	0.6374*** (0.001)	0.01

• Figure 4 compares the percentage of constrained firms with the percentage of firms whose main banks issues MBS and covered bonds.

• While both MBS and covered bond issuance increase in the years before the crisis –in parallel to a decrease in firm financing constraints, the percentage of firms whose main banks was issuing MBS increased from 65.27% to 67.12% from 2006 to 2008 while the percentage of firms whose main bank was issuing covered bonds decreased from 68.32% to 57.47% in the same period.

FIGURE 4. CONSTRAINED FIRMS AND SECURITIZATION



Source: Own estimations from SABI and Bankscope data

• In order to investigate whether MBS and covered bond issuance had a differential effect on loan supply during the crisis we interact the issuance variables with a time dummy taking the value 0 up to 2006 and 1 for 2007 and 2008. The results suggest that **the issuance of MBS had a negative impact on loan supply during the crisis (the total impact during the crisis (-0.2317) is the sum of the two coefficients +0.1378 and -0.3717) while covered bonds have a slightly higher positive effect during the crisis (the total impact during the crisis (0.7241) is the sum of the two coefficients 0.7115 and 0.0126).** This result suggests that while **MBS may impact positively in loan supply, this effect may turn negative during the downside of the lending cycle.** These results hold when we restrict our crisis dummy to include 2008 only (see Model III of Table 4)

Extended supply (II): Main bank characteristics and securitization issues						
Main bank issuance of MBS (MBS issuance/total loans)t-1	0.1423** (0.001)	0.01	0.1398** (0.001)	0.01	0.1185** (0.001)	0.01
Main bank issuance of covered bonds (covered bonds issuance over total loans)t-1	0.7394*** (0.001)	0.01	0.7115*** (0.001)	0.01	0.6374*** (0.001)	0.01
Main bank issuance of MBS (MBS issuance/total loans)t-1 X Dummy (1993-2006 vs. 2007-2008)	-	-	-0.3711** (0.013)	0.01	-	-
Main bank issuance of covered bonds (covered bonds issuance over total loans)t-1 X Dummy (1993-2006 vs. 2007-2008)	-	-	0.0126** (0.030)	0.01	-	-
Main bank issuance of MBS (MBS issuance/total loans)t-1 X Dummy (1993-2007 vs. 2008)	-	-	-	-	-0.3460** (0.010)	0.01
Main bank issuance of covered bonds (covered bonds issuance over total loans)t-1 Dummy (1993-2007 vs.2008)	-	-	-	-	0.0128** (0.026)	0.01
Main bank size	0.0132 (0.153)	0.02	0.0152 (0.206)	0.02	0.0149 (0.211)	0.02
Main bank cost-to-income ratio	-0.1937** (0.023)	0.01	-0.1844** (0.030)	0.01	-0.1725** (0.032)	0.01

Summary

4. Conclusions

• The findings in this paper suggest that **firms with a more intense lending relationship** as measured through its length and the lower number of banks they are dealing with, **enjoy a greater credit supply and lower degree of credit rationing.**

• **Securitization activity of the firm's main bank helps in reducing credit constraints**. Indeed, firms having relationships with banks being more involved in securitization activities enjoy lower credit constraints in normal periods; however, they also face increased credit rationing during crisis periods. This shows that securitization generates supply effects which differ in normal and crisis periods.

•Finally, we show that there is heterogeneity within securitization **While both covered bonds and MBS securitization reduce credit rationing in normal periods, the main bank issuance of MBS aggravates credit rationing in crisis periods.**