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DETERMINANTS OF EURO-AREA BANK LENDING MARGINS: FINANCIAL FRAGMENTATION AND ECB POLICIES

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Abstract

In the present paper we study the determinants of the margins paid by euro-area non-financial corporations (NFCs) for their bank loans on top of the rates they earn for their deposits (bank lending margins). We use panel VAR techniques, in order to test for causality relationships and produce impulse response functions for eleven euro-area countries from 2003:1 to 2014:12. The countries are separated to two groups (distressed and non-distressed), in order to examine for heterogeneities in the relationships between lending margins, the period is also separated with reference to the peak of the global financial crisis (before and after the collapse of Lehman in September 2008). We find that significant heterogeneities existed even before the global financial crisis and remained in its aftermath, although the magnitude and the direction of the effects exercised by the explanatory variables have changed. Furthermore, apart from finding that market concentration and the prudence of banks' management increase the lending margins NFCs pay for their loans, there is evidence of substitution effects between financing obtained from banks and corporate bond markets. The provision of ample liquidity from the ECB, in the aftermath of the global financial crisis was found to be effective only for the core countries, suggesting that further policy actions are needed in order to reduce the fragmentation of bank lending and promote financial integration to the benefit of the euro-area real economy.

Keywords: bank lending margins; euro area; financial fragmentation; global financial crisis; European Central Bank
JEL classification: E44; E51; E58; F36; F42

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1. Introduction

The difference between interest rates charged by banks on loans and those paid by banks on deposits, so called 'bank lending margins', is one of the main sources of the effects exercised by finance on economic activity. This topic is covered in the finance-growth nexus literature (see, for example, Claessens et al., 2012; Borio, 2012), while it is also related to the transmission of monetary policy (see, for example, Bernhofer and van Treeck, 2013; Aristei and Gallo, 2014; Hristov et al., 2014). In this regard, it should be noted that the global financial crisis (2007-2009) constitutes a point of reference in the finance literature due mainly to the changes incurred in the functioning of the financial system, stemming from the needs for deleveraging and prudence, and the numerous reforms it has brought in financial regulation.[1] Thus, the volume of both these strands of literature has grown further since the global financial crisis (hereinafter, 'the GFC') erupted, as the need for highlighting the interconnectedness of financial and economic activity has increased in importance.

Financing economic activity is distinguished, according to the source to 'bank-based' and 'market-based', while its composition has been found to play an important role (see Cambacorta et al., 2014). For example, in euro-area member-states financing comes mainly in the form of bank lending; so, the decline of bank credit in the aftermath of the GFC has had repercussions on economic activity[2]. Thus, the European Central Bank (ECB) has decided to ease liquidity provision rules, while the integrated and efficient financing of the real economy in the euro area is the main target of policy initiatives to increase financing from capital markets in the euro area economy[3].

In this respect, one factor leading to fragmentation within the euro area is the terms and conditions of the funding opportunities for non-financial corporations (NFCs) in different

[1] As a result of the crisis, financial regulation has been strengthened globally with regulation covering various functions of the financial system: for example, we refer to (i) the Dodd-Frank Act, (ii) the ESRB Regulation, (iii) the ESMA Regulation, (iv) the Basel III Accord, (v) the SSM Regulation and (vi) the SRM Regulation. Butiglione, et al. (2014) describe debt-dynamics as a key contributor to the accumulation of imbalances that led, eventually, to the global financial crisis and argue for the crucial need for deleveraging in order to make the global financial system more resilient. Also, see the 'Overview of Progress in Implementing the London Summit Recommendations for Strengthening Financial Stability', Report of the Financial Stability Board to G20 Leaders, September 2009.

[2] According to the International Capital Markets Association (2013), the decline in bank credit by US$1.5 trillion in 2012 as compared to 2007, was partially replaced by a US$1.2 trillion increase in corporate bond issuance during the same period.

[3] See, 'Decisions of the ECB's Governing Council' on 18.7.2013 and 9.9.2013 and European Commission (2015), respectively.

euro area countries. In particular, the cost they face when they increase bank loans may have multiple repercussions for the efficiency of their operations and the size of their profits; as a result, possible divergences in the cost of funding of euro area NFCs across different countries may lead to similar divergences in investment, growth and employment. This has been acknowledged by policy makers, thus specifying the differences in the financing conditions faced by euro-area NFCs as one of the reasons that motivate the European Commission's initiative for establishing a Capital Markets Union (see European Commission, 2015).

The banking sector is the main source of financing economic activity in the euro area, as the use of capital markets has lagged behind that, for example, of the United States. In this regard, an important development to take note of when addressing the issue of financing of the euro area NFCs is that the banking sector in the euro area experienced important structural changes in the aftermath of the global financial crisis. More specifically, at the end of 2013 the total number of credit institutions and foreign branches in the euro area decreased to 5948 from 6690 in 2008, an 11% reduction (ECB, 2014). The reduction was not equally spread among member countries. For instance, in Greece the respective reduction was 38%, while in Austria it was 9% and in Belgium just 2%. According to the literature the increase in concentration may be good for the consumers of banking services if it leads to an increase in efficiency and technological innovation and a reduction in bank risk. On the other hand, it may be bad if it leads to higher prices and reduced services for consumers due to exploitation of increased market power.

Lending rates have often been found to increase with concentration while upward deposit interest rate rigidity has been found to exist and be associated with market power. However, when assessing the cost of funding, the main focus should be on the net cost of financing; i.e. the rates the NFCs pay for their loans, on top of the rates they earn for their deposits. In this context, the aim of the present study is to examine whether bank lending margins for euro-area NFCs are formed heterogeneously and to provide findings of possible use for (pursued or proposed) policies that aim to cure the fragmentation of the bank credit supply in the euro area. For this reason, we (i) specify the effects on euro area bank lending margins of both country-specific and euro-area wide determinants with relation to financial stability conditions; (ii) examine changes brought by the global financial crisis both across time and across countries; and, finally, (iii) investigate whether policy initiatives, related to

ECB monetary policy and the initiative for an integrated corporate bond market, affect bank lending margins.

To the best of our knowledge this is the first paper to report that, among other factors, banks determine their lending margins in close relationship to the ratio of loans to deposits, in the aftermath of the global financial crisis. While standard factors, such as the market concentration ratio are also found to exert significant effects, the former finding highlights the effects of recent regulatory changes[4] that link credit to the liquidity available to banks.

Moreover, the results presented show that NFC bank lending margins in the euro area are determined heterogeneously between distressed and non-distressed euro-area countries, both prior to and in the aftermath of the crisis, thus posing a challenge to policy makers for addressing the origins of the fragmented financing conditions. In particular, our results show that euro-area NFCs face dissimilar costs when acquiring credit from banks, because of country-specific risk-aversion of banks in different euro-area member states. Also, we find that bank lending margins are significantly affected by the costs entailed by euro-area NFCs in tapping the bond market. As a result, broadening the potential sources of funding, may prove to be a significant alternative that could, eventually lower the cost of bank lending to NFCs in distressed countries.

Section 2 reviews the literature on the determinants of the bank lending margins. Section 3 describes the methodological framework and the data used for the empirical analysis. Section 4 presents and discusses the empirical results and section 5 controls the results for ECB's non-standard liquidity provision and performs robustness checks. Finally, section 6 concludes.

2. Literature review

2.1 On the institutions and structure of the banking sector

Banking markets in the euro area have undergone extensive changes in the last 30 years (Vives, 2001). After the 1940s-1970s period distinguished by strong banking regulation, intervention and stability, a period of liberalization and greater instability started in the 1980s. The pressure of globalisation, the establishment of EMU, the ensuing regulatory

[4] Namely the Bank Resolution and Recovery Directive (Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014); also the loans-to-deposits ratio is directly related to the Liquidity Coverage Ratio foreseen by the Basel III.

changes and technological developments affected competition and production efficiency (Berger et al, 2004). European banking markets became increasingly integrated (Goddard et al., 2007). A wave of mergers followed in the 1990s raising concerns about increasing concentration (especially in local markets), sufficient competitiveness and financial stability as well as welfare loss (Bikker and Haaf, 2002; Claessens and Laeven, 2004; Fernandez de Guevara and Maudos, 2004).

To counteract the side-effects and risks of further consolidation the Basel Accord framework advanced its three pillars of minimum risk adjusted capital requirements, tight supervision and market discipline (Cetorelli, 2004). Still, banking is a fragile industry subject to market failure characteristics such as asymmetric information and moral hazard. Even more so, as banking became more involved with the provision of services to investors and firms and proprietary trading and reduced its traditional retail part (taking deposits and granting loans) of its business. Hence, the desirability of competition is not as unambiguous as in other industries, since market power may reduce fragility, improve stability and moderate risk-taking incentives of this new banking product mix (Focarelli and Panetta, 2003; Beck, Demirguc-Kunt and Levine, 2006).

Furthermore, Ratti, Lee and Seol (2008) find that firms in 14 European countries are less financially constrained when they operate in a highly concentrated banking sector. Market power seems to increase banks' incentives to collect/produce information on potential borrowers and hence improves the financing process during the expansions and recessions of the 1992-2005 period. Still, Boyd and de Nicolo (2005) find that risk-incentive mechanisms may operate in the direction of making banks riskier as their markets become more concentrated. This could be explained by the fact that as competition declines banks want to earn higher rents by charging higher loan rates and borrowers respond by adopting riskier projects. Examining the relationship further Fernandez de Guevara and Maudos (2007) estimate an inverted U-effect of concentration on firms' growth suggesting that market power has its highest positive effect at intermediate values of competition/concentration. On the contrary, Claessens and Laeven (2005) using a sample of 42 countries in the 1980s and 1990s, find that greater competition allows financially dependent industries to grow faster, supporting the view that more competition may reduce holdup problems and lower the cost of financial intermediation. In the same vein, van Leuvensteijn et al. (2013) find that competition in the European banking sector is likely to render the monetary policy

transmission mechanism more effective, since stronger competition causes a more effective pass-through of policy rate changes into bank rates.

The 2007-2009 crisis led to bank failures and further consolidation. As Vives (2010, p.3) underlines "the crisis marks a return to traditional banking and has tended to exacerbate the consolidation trend". So bank profits have to focus again on traditional business and interest rate margins. Increased concentration leading to increased market power is helpful in this respect. Neven and Roller (1999) analysing competition in the European banking industry develop and estimate an aggregate model which controls for asymmetries in market structure. Their findings include rejection of non-cooperative Nash behaviour and favour cartel behaviour in both mortgage and corporate loan markets.

2.2 On the determinants of lending margins and spreads on bank rates

The structure of the banking sector and in particular its monopolistic power is seen as a key factor for the determination of interest rates by banks for deposits, loans and the difference between the two. The central concept is that, assuming that banks are risk-averse agents intermediating between suppliers and demanders of funds that reach them in asymmetric times, they set their optimal rates so as to minimize (interest rate and credit) risks. Thus, the relationship between the lending margins charged by banks and the changing structural conditions in banking markets is at the epicentre of investigation of a large number of papers.

The strand of the literature that associates market power with interest rate setting by banks mainly argues that increased competition in the banking sector contributes to lowering interest rates (see, for example Corvoisier and Gropp, 2002; Rughoo and Sarantis, 2014) or margins of interest rates (among others, Saunders and Schumacher, 2000; Maudos and Fernandez de Guevara, 2004; Demirguc-Kunt, leaven and Levine, 2004; van Leuvensteijn et al, 2013). Interestingly, in several cases heterogeneity is found to characterize these effects across countries, which in some cases is linked to the degree of financial integration (e.g. Rughoo and Sarantis, 2014) or to the method of measurement of market power (e.g. Carbo et al., 2009). Also, deviations from the standard case exist; Fernandez de Guevara et al. (2005) argue that in case other explanatory factors (e.g. bank size and efficiency, default risk and the economic cycle) are also accounted for, market power does not have significant effects on interest rate margins.

As a result, bank lending margins are likely to be related to several determinants, including the market power of banks. Based on previous literature, the factors that may exert significant effects are: (i) the cost of funding; (ii) credit risk conditions; (iii) overall financial markets conditions; (iv) bank lending relative to economic activity; and (v) the adequacy of banks' capital for their lending activities.

2.3 Monetary policy transmission and the ECB's non-standard measures

Furthermore, the monetary policy setting of interest rates has also been a central point of investigation in the literature on the specification of the bank lending margins. Particular attention has been given to the monetary policy of the ECB, even from the period when the euro area was launched (see, among others, Peersman and Smets, 2001; Angeloni et al., 2002). The theory underlying the monetary policy transmission mechanism is that monetary policy, channeled through interest rates or banks' balance sheets, is transmitted to the rest of the economy and drives the cost of funding for NFCs and households. Moreover, the effects of a credible monetary authority arguably (see, for example, Kashyap et al., 1993) influence not only bank lending towards NFCs but the conditions the latter face in their access to financial market financing as well.

The functioning of the monetary policy transmission mechanism is of particular interest to our paper, as it relates to the degree to which monetary policy decisions (mainly the central bank's benchmark rates), affect (or not) the interest rates set by commercial banks for their deposit and lending operations. The way the policy rates as set by the central bank pass through to the economy has been the focus of several research papers, resulting in the development of a strand of financial literature that emphasizes interest-rate pass through. One way of transmitting movements of the monetary policy rate to the economy is through the yield curve of sovereign bonds (see, among others, Cook and Hahn, 1989; Gurkaynak et al., 2005) and, as a consequence, to the rest of the financial markets' instruments. De Bondt et al. (2005) show that the pass-through of short-term to long-term rates in the euro area plays a key role in the determination of bank lending rates and their sluggishness.

Also, ever since the GFC erupted the attention on interest rate pass-through has increased and the literature, which is currently developing, highlights several interesting aspects of the way banks set their interest rates. Hristov et al., (2014) find that the interest rate pass-through to retail banks margins has been hampered after the GFC and attribute the widening of the spreads across euro area countries to the different structures of these

economies. Also, Belke et al. (2013) highlight that heterogeneities in the interest rate pass-through already existed both across different interest rates and across member-states in the period before the crisis. Aristei and Gallo (2014), also give support to the heterogeneity of monetary policy transmission, while rates on loans to NFCs are found to be more affected by changes in the short-term rates. The question of the reaction by the ECB to the global financial crisis, is addressed in Reichlin (2014) who argues that, while the non-standard monetary policy measures succeeded in stabilizing the relationship between bank lending and economic activity in the period after the 2008 global recession and recovery, this has not been the case for the euro area recession of 2011.

The question of whether ECB's non-standard measures have had an effect on the spreads of bank lending and deposit rates for NFCs remains unanswered, to the best of our knowledge, and, thus, we attempt to address it also in this paper.

3. The framework for the empirical analysis

3.1 Discussion of the data and the model specification

In the present analysis we use a panel of country-specific data, that covers eleven member-states of the euro area (namely, Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain), together with euro-area wide variables. The data set covers the period from 2003:1 to 2014:12, in monthly frequency, while quarterly data series have been transformed to monthly by linear interpolation across the months of the quarter. Sources of the data are the Statistical Data Warehouse of the European Central Bank[5] and Datastream[6].

Country-specific variables are: (i) the margin between lending and deposits rates to NFCs; (ii) sovereign bond spreads; (iii) the sector's concentration ratio (i.e. the Herfindahl ratio); (iv) loans-to-deposits ratio; and (v) total loans-to-gdp. We also incorporate euro area-wide variables, which enable us to reveal the similarities or the differences of the responses across countries. Such variables are: (vi) the spread of bond yields of euro-area NFCs against

[5] For 'bank lending margins', 'Total loans to non-financial corporations', 'Total Deposits from the private sector', 'GDP', the 'Composite Indicator of Systemic Stress' and the 'Herfindahl ratios'; loans-to-deposits and loans-to-gdp have been calculated by dividing 'Total loans' to 'Deposits' and 'GDP', respectively.

[6] For Corporate bond spreads and sovereign bond spreads; both variables are constructed by taking the difference from the yield of the German ten-year Bund of (a) the yield of the 'iBoxx EA non-fin. Corp' index and (b) the ten-year bond yields of each EA country, respectively.

the German Bund; (vii) ECB's base money (monetary base)[7]; and (viii) the ECB's composite indicator of systemic stress (CISS).

As we have already argued previous research provides support for the inclusion in the analysis of the bank lending margins of bank market power variables, such as the Herfindahl ratio. Also, while previous analyses have examined the effects of the provision of bank credit to bank lending margins, this paper is the first, to the best of our knowledge, to assess the effects of the provision of bank loans relative to the banks' liquidity (i.e. the loan-to-deposit ratio), as foreseen in the newly established regulatory framework (i.e. BRRD and Basel III, see footnote 6), and relative to economic activity (i.e. the loan-to-gdp ratio).

On the other hand, (a) sovereign and (b) corporate bond spreads are examined here, again for the first time, to the best of our knowledge. In the case of sovereign spreads the aim is to reflect possible tensions on bank lending margins stemming from the sovereign debt crisis as mentioned in the literature on the feedback between bank and sovereign risks. Still, apart from the tensions in the aftermath of the GFC, sovereign bond spreads may have the opposite effects if banks substituted sovereign holdings for more loans, especially before the GFC. Similarly, the corporate bond spreads may have either substitution or spillover effects. This examination is of particular interest as it reflects the effects that may stem from alternative sources of financing for euro-area corporates and, as a result, provide input to recent policy initiatives.

Finally, we also examine the effects of the liquidity and stress conditions on the determination of bank lending margins. In the first case, the liquidity conditions are captured by ECB's monetary base, which in the aftermath of the GFC reflects the provision of ample liquidity through the ECB's non-standard monetary policy operations; as a result including this measure may shed light on the significance of the non-standard monetary policies for one of their main targets, i.e. the decrease in the fragmentation of lending conditions in the euro-area economy. In the second case, the inclusion of the composite indicator for systemic stress (CISS) reflects the changes in the systemic risk conditions that occurred in the euro area before and after the eruption of the GFC. Also the inclusion of the CISS variable serves the

[7] Definition of base money: "Currency (banknotes and coins) in circulation plus the minimum reserves credit institutions are required to hold with the Eurosystem and any excess reserves they may voluntarily hold in the Eurosystem's deposit facility, all of which are liabilities on the Eurosystem's balance sheet. Base money is sometimes also referred to as the "monetary base"." (source: ECB's monetary policy glossary, https://www.ecb.europa.eu/home/glossary/html/act4b.en.html)

purpose of accounting for exogenous factors that may have affected systemic risk conditions in the euro area as a whole; for this purpose, while all the former variables (numbered (i) to (vii)) are considered as endogenous to the VAR setup, the CISS enters in the system's equations as an exogenous variable.

3.2 The panel VAR setup

The present empirical analysis is set up so as to address challenges stemming from both the time and the cross-section dimensions of the sample. Since possible heterogeneities have been reported elsewhere in relation to euro-area banking markets (see, for example, Mayordomo et al., 2015), we form two different (distressed and non-distressed) panels of countries: Austria (AT), Belgium (BE), Finland (FI), France (FR), Germany (DE) and the Netherlands (NL) form the latter and Spain (ES), Greece (GR), Ireland (IE), Italy (IT) and Portugal (PT) the former. The criterion for this classification is the dispersion of the spreads of (loan and deposit) interest rates paid by NFCs (see Chart 1, in the Appendix).[8]

Note that the perspective we adopt allows us to draw conclusions related to economic policy and the finance-growth nexus. Consequently, the country-wide data suffice to capture developments affecting the entire banking system of each country and the euro area as a whole, while we do not aim to reflect on bank-specific developments. Thus, we focus on country-specific instead of bank-specific data and relate the results of our analysis to macro-economic and financial conditions.

Also, we analyse the rate setting by euro-area banks separately for the periods before and after the GFC, with reference to its peak, i.e. the collapse of Lehman in September 2008. Also, the GFC is seen as a potential source of non-linear features in the underlying relationships, as (a) it produced a shock in the financial system that led to significant changes in the regulatory framework ever since and (b) it has been a significant source of fragmentation in the financing conditions of euro-area banking sectors. In this way, we combine the examination of asymmetries of the responses of different euro-area countries' bank lending margins to the same determinants with possible regime shifts. As a result, another contribution of the present analysis is that, in this way, we address simultaneously possible non-linear patterns that would otherwise drive our results in a panel setup for the entire data sample. Our aim is to find causal relationships that explain bank lending margins,

[8] Source of the data is ECB's Statistical Data Warehouse.

taking into account possible changes during the sub-periods, as well as differences in these effects across the countries of our sample. For this reason we employ panel vector auto-regression (panel VAR) techniques, enriched with country-specific dummies, in order to estimate fixed effects for our panel of countries.

One important advantage of the panel VAR methodology, compared to single-equation methods, is that it enables the researcher to isolate co-variations of the data, by estimating the variance-covariance relationship of all equations simultaneously. Thus, the econometric specification we employ is suitable to overcome the problem of endogeneity between the bank lending margins and their determinants, by treating all the variables of the system as endogenous.

On the other hand, it is for the researcher to follow theoretical considerations when setting up a VAR. As a result, we form a panel vector autoregressive model (VAR); the general form of this model is denoted by equation (1), below.

$$\begin{aligned} &Y_{jt} = A_{j0} + A_j(L)\cdot Y_{jt} + B\cdot[CISS_{t-1} - \overline{CISS}] + u_{jt} \\ &with \quad u_{jt} \sim iid(0, \Sigma_j) \end{aligned} \tag{1}$$

Y_j (Y_{ji}= y_{j1}, y_{j2}, …, y_{jk}) stands for the vector of the endogenous variables with the subscript $j=\{1, 2, ..., 6\}$ denoting each of the dependent variables (i.e. bank lending margins, NFC bond spreads, sovereign bond spreads, the Herfindahl ratio, loans-to-deposits and loans-to-gdp) and Σ_i is the variance-covariance matrix. The subscript $i=\{1, 2, 3, ..., k\}$ stands for the countries in each group, $t=\{1, 2, 3, ..., n\}$ denotes time and A(L) are the vectors of the coefficients of the autoregressive and explanatory variables. Also, as noted above, based on previous findings, we introduce country-specific dummies, that take the value of 1 for every point in time for the entire period, in order to bring the panel VAR setup closer to that of panel regressions with fixed effects (A_0=a_{ij}={a_{j1}, a_{j2}, …, a_{jk}}). Finally, lagged positive (negative) differences of the CISS from its mean, are introduced as an exogenous explanatory variable, in order to capture rises (falls) of systemic stress in the euro-area's financial system. Note, that the latter variable is thus set to reflect euro-area wide systemic risk conditions and we may compare for its effects across the different equations (i.e. $B= b_j =\{b_i, b_2,\ldots, b_6\}$).

As already discussed, we estimate separately the coefficients of the equations for the two panels of euro area countries (*p=1*, for the first panel, *p=2*, for the second) and for the periods prior to and after the collapse of Lehman, which took place in September 2008. On the choice of this event as the turning point in our examination, we note that there are two main reasons: (a) the fact that the collapse of Lehman is widely considered the peak of the global financial crisis and (b) that the regime switching methodologies have not yet evolved for panel VAR.

As a result of (b), above, the task of specifying the exact time of a regime shift in panel VAR setups is not as straightforward as in time series models; thus, instead of estimating the turning point of different regimes, e.g. as in Markov switching VAR models, in the panel VAR this has to be based on the researcher's choice. So, we choose to separate the period of the sample into two parts, i.e. before and after the collapse of Lehman and the subsequent market turbulence. The first sub-period extends from 2003:1 to 2008:8, i.e. before the Lehman collapse, and the second sub-period begins from 2009:1 to 2014:12. The reasons for excluding observations around the events immediately after the collapse of Lehman is that: (a) we intend to capture deterministic relationships before and after this event and (b) we do not want the inference of our estimators to be affected by event-specific increased volatility, such as that which occurred immediately after the collapse of Lehman; for these two reasons we exclude the period of 2008:9-2008:12 from our sample.

From the setup described above we examine the causal relationships between the bank lending margins along with the explanatory variables classified as country-specific or euro area-wide. Specifically, if we expand equation (1) to its vector form we take:

$$
\begin{aligned}
y(p)_{1t} &= a(p)_{10} + \sum_{j=1}^{6}\sum_{l=1}^{\lambda} a(p)_{ik}\, y(i)_{it-l} + u(i)_{it} \\
y(p)_{2t} &= a(p)_{20} + \sum_{j=1}^{6}\sum_{l=1}^{\lambda} a(p)_{ik}\, y_{it-l} + u(p)_{it} \\
&\ldots \\
y(p)_{jt} &= a(p)_{j0} + \sum_{j=1}^{6}\sum_{l=1}^{\lambda} a(p)_{jk}\, y_{jt-l} + u(p)_{jt}
\end{aligned}
\qquad (2)
$$

So, for any given y_j, we can examine whether it is caused, in the sense of Granger (1969), by other variables participating in the VAR, by employing a X^2-test for the H_0:

$$\sum_{l=1}^{\lambda} a_{jh}^{h} y_{jt-l} = 0, \quad with \quad h \in j \quad and \quad h \neq m$$

Finally, based on the panel VAR models we generate the responses of the bank lending margins to NFCs to shocks occurring in the rest of the system variables. So, we may simulate the behaviour of the series for a given development in the explanatory variables. Trying to focus on our paper's main target, i.e. the determinants of bank lending margins, we minimize the discussion of the results related to the rest of the explanatory variables. Apart from falling outside the scope of the present paper, specific investigation of each of these variables is either done elsewhere (e.g. the sovereign spreads) or is left for future research.

Several alternative setups have been estimated to check for robustness[9]. So, while initially we do not account for the liquidity provision by the ECB, as this is reflected by base money, we include it as a form of robustness check. In particular, we incorporate in the panel VAR a variable that captures the changes in the base money of the ECB and estimate the relationship for the post-crisis period, in order to answer the question of the significance of ECB's non-standard monetary policy on lending margins. Finally, we examine whether the results are driven by specific countries included in our sample.

4. The empirical analysis

4.1 The first sub-period

Our empirical investigation begins by, first, specifying the number of lags that must be included in the VAR, for the first sub-period (2003:1-2008:8) in order to fully capture the dynamics of the system of autoregressive equations. For this reason, we use the standard likelihood-based information criteria; the Akaike information criterion (AIC), the Bayesian, or Schwartz, information criterion (SIC) and the Hannan-Quinn criterion (HQ). Table 2 presents the results of the information criteria for the lag structure.

[Insert Table 2 around here]

[9] For example, we examined inclusion of more variables, such as credit, deposits, the indices for credit standards by ECB's Bank Lending Survey and others. Results are available upon request.

Lags are specified separately for each group of countries examined; we find that in both panels of countries, for the period before the GFC, the inclusion of four lags in the system is indicated. So, we next estimate the interdependencies of the variables of the system, in the form of a system of autoregressive equations. Tables 3 and 4 present the full VAR results, together with the diagnostic tests and statistics.

[Insert Tables 3 and 4, around here]

First, the diagnostics indicate the good performance of the system; the adjusted R-squareds indicate that the deterministic part of each of the variables is significantly captured by the present setup. The estimated coefficients of the VAR, indicate that the bank lending margins are found to have significant autoregressive effects, both in the first and in the second panel of countries. Accordingly, the constant term is also found to be significant and positive while the inclusion of country-specific dummies enables the revelation of significant fixed effects in several countries; for the first panel the significance of the positive fixed coefficients for Belgium and Finland is confirmed and in the second panel the fixed coefficient for Portugal is found to be positive and significant, whereas the fixed coefficient for Spain is found to be negative and significant.

Also, we find that for both panels of countries the Herfindahl ratio has a significant effect on bank lending margins, although for the second panel the significance is marginal; the relationship between bank lending margins and the banking market concentration has been well documented in previous literature and could reflect either a risk-incentive mechanism, such as the one described in Boyd and Nicolo (2008) or an even more complicated form of effects, such as the one found in de Guevara *et al.* (2007). It seems, though, that the two panels of countries differ in the form of the effects exercised by banking concentration; in particular, for the first panel a possible U-shape, such as the one of de Guevara *et al.* (2007), which indicates possible existence of synergies in the medium term exists, while a change in sign, that would justify such a shape, does not exist in the second panel of countries. Also, in both cases the negative sign may reflect the fact that, during this period, banks expanded their balance sheets (see, Buttiglione *et al.*, 2014) and, thus they may have been providing easier terms for credit to NFCs, the more concentrated the bank sector became, i.e. in line with strengthening their position.

Although the results of the relationship of the banking market concentration ratios to the bank lending margins are found to be similar across distressed and non-distressed

countries, this is not the case for other explanatory variables. Specifically, in the first panel of countries the bank lending margin is found to be affected, positively, by the sovereign bond spreads against the German ten-year bond, while this is not the case for the second panel of countries.

[Insert Table 5 around here]

From the Granger causality tests (see Table 5) it is shown that heterogeneity is present even in the case of the Herfindahl ratio; in particular, this variable is not found to exercise significant causal effects on the bank lending margins of the distressed countries. Similarly the causal effects of the sovereign bond spreads are found to be only marginally significant, for non-distressed countries.

[Insert Table 6 around here]

The results of simulated effects on bank lending margins, based on the estimated impulse response functions (IRFs), are reported in Table 6 above. The IRFs illustrate the effects that a shock equal to one standard deviation of the explanatory variables has on the dependent variable, i.e. on the bank lending margins. As expected the sovereign bond spreads and the Herfindahl ratio are the only sources of significant responses of the bank lending margin for non-distressed countries, whereas distressed countries do not significantly respond to shocks by any other variable of the system. Also, we find that an increase in the sovereign cost of funding, for these countries relative to Germany, increased the bank lending margin, in the period before the collapse of Lehman, while synergies from higher bank market concentration exercised negative effects.

Finally, the bottom lines of Tables 4 and 5, report diagnostics for the system and for each equation separately. First, the coefficients of determination for the bank lending margins are high enough (adj. R-squared is 0.85 for the first panel of countries and 0.93 for the second) to indicate that the deterministic components of these variables are efficiently captured by the econometric setup we have used. Moreover, the reported values of the Im *et al.* (2003) tests, indicate that in both panels of countries and for all the dependent variables of the system, the residuals are stationary, which indicates that their variances are bounded and the system's estimators are unbiased. Naturally, next comes the issue of independence of the results; for this reason, we estimated the cross sectional covariance of the residuals of the system and the resulting figure is very small, while the autocorrelation decays in a fairly fast

pace, i.e. at a maximum of five lags. Also, cross-correlations of the residuals indicate that the residuals of the bank lending margins are not highly correlated with any other residuals of the deterministic variables in their equation, indicating independence of the estimators from any non-included deterministic terms of the rest of the system. As a result, in both distressed and non-distressed country panels, the in-sample performance of the system provides a satisfactory degree of confidence to the estimations.

4.2 The second sub-period

Next, we turn to the results of the panel VAR estimation for the same two country panels for the second period, i.e. the period following the peak of the GFC in the last quarter of 2008. Again, we first specify the number of lags that must be included in the panel VAR; Table 7 presents the respective information criteria statistics.

[Insert Table 7, around here]

So, based on these results, we formulate a panel VAR, for each of the two groups of countries for the period 2009:1 to 2014:12, with four lags. The inspection of the results, contained in Tables 8 and 9, indicates that the autoregressive effects of the bank lending margins are not found to have changed substantially between the two periods.

[Insert Tables 8 and 9, around here]

On the other hand, significant changes are found to exist in the relationships of the bank lending margins to the explanatory variables, when compared to the previous sub-period, for both groups of countries. In particular, the Herfindahl ratio is not found to exercise any significant lagged effects on the bank lending margins in the first panel of countries (i.e. AT, BE, DE, FI, FR and NL), while its significance has obviously increased post-Lehman for the second group.

Also, another interesting finding is that sovereign spreads and corporate bond spreads are shown to have significant effects, on bank lending margins, while they are not shown to exert similarly significant effects in the first period; interestingly, the loans-to-gdp ratio is also found to have some, albeit marginal, significance for the bank lending margins of the second group of countries during this period. These findings combined together may indicate that credit relative to the economic cycle (loans-to-gdp) and the bond yields from the

corporate and sovereign bond markets have increased in significance, in line with the increased significance of credit for the distressed economies. In particular, the decrease in the provision and the cost of bank credit to the real sector in the second group of countries was probably linked to the increased tensions, in the aftermath of the GFC, and the economic downturn of these economies, as described in several decisions of the ECB[10]. Finally the loans-to-deposits variable is found to have significant effects on bank lending margins for both groups of countries.

[Insert Table 10, around here]

Investigating formally the overall significance of the lagged explanatory effects for bank lending margins, by means of Granger causality tests, largely confirms the overall results described above. Specifically, the loans-to-deposits variable is found to be significant in both panels; a finding that seems to indicate similarities between the two groups. Also, euro-area corporate bond spreads are found to have causal effects on bank lending margins for the second group; for distressed countries, while the immediate responses of bank lending margins to corporate bond spreads are negative they reverse to being positive after a significant period of time, indicating a substitution mechanism between bank lending and the corporate bond market (see Table 11, below). On the other hand, as expected by their marginal significance, the effects of sovereign bond spreads and the loans-to-gdp for the bank lending margins of distressed countries are found not to exercise any causal effects. As a result, one could read these findings as indicating that heterogeneities of bank lending margins have subsided across the two groups in the second sub-period. However as interesting as the result of the significance of the causal effects is, similarly interesting is the their direction; for this reason we now turn to the results from the impulse response function, presented in Table 11 below.

[Insert Table 11, around here]

The impulse response functions contribute to the arguments for the existence of heterogeneities in the way bank lending margins are determined across the two groups of countries. In particular, the loans-to-deposits ratio, even if it is found to exercise significant causal effects in both groups, its direction is opposite when one compares these effects in the

[10] See, ECB's Press Release, "ECB announces monetary policy measures to enhance the functioning of the monetary policy transmission mechanism" 5 June 2014.

two groups. In the first group the loans-to-deposits ratio is found to increase the bank lending margins; this finding may be seen as indicating prudence from the banks of the first group of countries. Specifically it is indicated that these banks tend to increase the cost of lending to NFCs, the more loans they have provided relative to their deposit base.

On the other hand, the negative sign of the responses of bank lending margins to a shock in the loans-to-deposits variable in the second group of countries may be the result of the same factors lying behind the decreased credit provision and the increased cost of credit to NFCs in these countries, but under different conditions of economic activity and financial stability. Namely, these factors may be either the problems with increased delinquencies on the banks' balance sheets and the new regulatory limitations to the banks' leverage. As a result, these findings may be taken to indicate the importance of the conditions forming the response of bank lending margins to the new regulatory restrictions that may be related to economic activity for the system to become more homogenous.

Finally, for the distressed countries (i.e. ES, GR, IE, IT and PT) the Herfindahl ratio, indicating market concentration, is found to have significant positive effects although responses occur with a relatively large lag of 18 to 24 months, after the shock in the ratio has happened. As noted previously, this finding is anticipated if one considers that the banking market concentration has not developed similarly across the euro-area and that previous literature (e.g. Hristov *et al.*, 2014) attributes the larger spreads in periphery countries to changes in the relative importance of structural shocks. As a result, the bank market concentration, falling into the definition of a structural shock with particular relevance for this group, is found to be a significant driving factor for the increased bank lending margins in these countries, in the post-Lehman period.

Finally, again the system of equations is deemed to perform with particular efficiency. Specifically, the equations of the bank lending margins are found to capture a large part of their deterministic component (adj. R-squared is 0.83 for the first panel of countries and 0.92 for the second), while the remaining part, i.e. the stochastic component, is found to confirm their definite characteristics. In particular, the panel unit root tests indicate that the residuals of the system are stationary, whereas again autocorrelation does not persist and cross-section correlation of the residuals is small enough so that we may suggest lack of cross-section dependence that could drive the resulting estimators. As a result, for the second period similarly to the first one, the in-sample performance of the system provides a satisfactory degree of confidence to the estimations for both panels of countries.

5. Controlling for ECB's non-standard liquidity provision and robustness checks

5.1 Stylized facts

In the aftermath of the GFC, the ECB expanded its balance sheet several times; this expansion was mainly accomplished by providing ample liquidity to eligible monetary operations counterparties. Reichlin (2014) describes the non-standard measures adopted by the ECB; these ranged from the expansion of the list of eligible collateral to new types of refinancing operations (e.g. targeted longer term refinancing operations, very long-term refinancing operations), with only limited recourse to asset purchasing programmes. In this regard, Reichlin (2014) highlights the existence of important differences between the liquidity provision by ECB's non-standard measures from the asset-buying operations adopted by the Fed or the Bank of England. Thus, the liquidity provision by the ECB, is distinguished from alternative non-standard monetary policies, which have, as a result, expanded the asset side of the balance sheet of central banks elsewhere (e.g. the Fed or the Bank of England).

At this point, it is important to recall that Goodhart (2010) argues that using measures of 'high-powered' money, is inadequate for the purposes of reflecting monetary developments driven by policies similar the ones the ECB followed during the crisis. As a result, the ECB formally has argued (see, ECB 2012) that the non-standard monetary policy measures are better reflected in the developments of the monetary base of the Eurosystem (i.e. 'base money'). In this regard, Giannone et al. (2012) argue that the developments in ECB's base money adequately reflect non-standard monetary policy measures' effects.

In September 2008 the sum of the various liquidity providing monetary policy operations was around 460 billion euros and peaked just before the OMT announcement by ECB's president Mario Draghi, on July 2012, to more than 1.5 trillion euro, falling ever since but stabilizing, by the last quarter of 2014 to around 700 billion euro. These developments are reflected in the evolution of base money; in particular, we introduce the monthly changes of ECB's base money, in order to account for all possible effects from these types of non-standard measures.[11]

[11] We have also, examined the level and the annual changes of this variable; results are available to the interested reader(s) upon request.

5.2 Incorporating the non-standard increase of liquidity by the ECB in the second sub-period

In order to formulate a new setup of the panel VAR model, we enrich the setup found to affect the bank lending margins during the period 2009:1 to 2014:12, by introducing a variable that reflects the changes in ECB's base money compared to its value a year ago. In particular, we formulate a panel VAR model that contains only the variables that have been found to exercise significant causal effects in the period after the eruption of the global financial crisis, together with the monthly changes of base money.

Thus, apart from examining the effects from ECB's non-standard monetary policy for bank lending margins, this analysis also serves as a robustness check for the significance of the results presented in the previous section, with the presence of base money as a control variable. Tables 12 and 13, below present the Granger causality tests and the impulse response functions estimated by this panel VAR setup, respectively.

[Insert Table 12, around here]

[Insert Table 13, around here]

First, the Granger causality tests indicate that, even in the presence of the annual changes in base money the significance of the causality relationships between the variables found to exercise significant effects on bank lending margins are not affected. As a result, this finding confirms that the earlier findings with reference to causality relationships are robust even if the increase in the provision of liquidity by the ECB, as a response to the GFC and the episodes of the euro-area crisis, are taken into account. Similarly, the responses of bank lending margins to impulses of the explanatory variables remain in the same direction as in section 4.2.

The main differences are found to exist in the significance of the specific points in time of the responses, i.e. of the 'term structure' of the responses. In particular, with the inclusion of changes in ECB's base money, the euro-area corporate bond spreads are found to have a causal impact with a larger delay, compared to the findings of the previous section. As a result, the positive sign of the responses, to a permanent increase in NFC bond spreads is not observed after 24 months, as it was in section 4.2, but much earlier. The positive responses of the bank lending margin of the distressed countries to a positive shock in the NFC bond

spreads, indicates the role of bank lending and corporate bonds as substitute sources of funding for NFCs in distressed countries. Also, in this section we find that when the increase in the provision of money from the ECB is taken into account policy initiatives aiming to (a) activate the capital markets as a source of funding for the real economy and (b) decrease the cost of funding for periphery countries' NFCs may also lead to decreases in the cost of bank financing.

It is equally important to pay attention to the effects exercised by the changes in the base money on bank lending margins for the two groups of countries. We find that in the non-distressed countries the panel VAR results to significant and negative causal effects; i.e. this finding indicates that an increase in the money base in the euro-area results in decreasing the bank lending margins in euro-area core. On the other hand, the relationship between changes in ECB's base money and bank lending margins, for distressed countries, is not found to be significant. As a result, an important heterogeneity exists between the two groups. This finding sits well with the heterogeneous transmission of ECB's monetary policy, as highlighted in ECB (2015, p. 27-28) and Hristov *et al.* (2014), who attribute heterogeneities in the transmission of monetary policy to changes in response to structural shocks or increased volatility across the euro-area countries (see, page 109).

5.3 Robustness of the findings to country-specific effects

In order to clarify whether the reported findings are not driven by country-specific properties of the variables, but reflect system-wide relationships, as is our aim, we have performed some additional robustness checks designed *ad-hoc* for the purposes of the present paper. In particular we repeat the panel VAR setup for the second and most crucial period by excluding each time one of the countries that participate in each of the panels. Table 14 presents the Granger causality results.

[Insert Table 14, around here]

Table 14 confirms the significance of the loans-to-deposits variable that has been found to exercise causal effects on bank lending margins of non-distressed countries, in every case of country excluded. Another interesting finding is that when Finland is excluded from the panel, the corporate bond spreads and the Herfindahl ratio gain significance; although this does not change the results reported previously, as the loans-to-deposits remains a significant driver of bank lending margins, it is interesting to note that corporate bond spreads and

market concentration are significant in the first panel of countries. This finding may indicate the probable broader scope of the current policy initiatives for a unified capital market for non-distressed countries as well.

On the other hand, the exclusion of Greece from the second panel of countries lifts the significance of the Herfindahl ratio. This finding may be justified if we take into account that the Greek banking market experienced the most profound changes during the crisis period, resulting in wide and deep changes of its structure. Thus, the market concentration may have only country-specific causal effects for bank lending margins. Similarly, from this examination we find that the loans-to-deposits ratio has country-specific causal effects on bank lending margins, with reference to Ireland.

6. Concluding remarks

In the present paper the bank lending margins for euro-area NFCs have been examined, with particular focus on two panels of euro-area (distressed and non-distressed) countries and two periods of time pre- and post-Lehman. For this purpose, we have employed panel VAR techniques in which the bank lending margins, together with other variables either related to banks' credit policies or to the cost of funding in other segments of the financial system, have been examined as endogenous variables. In this context, the finding, well-documented in previous literature, that banking market power exerts a significant positive effect on the cost of financing the economy finds support in our analysis.

On the other hand, our results indicate that bank lending margins to euro-area NFCs are determined heterogeneously across different euro-area countries. While this finding, again, has been reported elsewhere in the literature, our findings go a step further by suggesting that possibly successful advancement of European policy initiatives, aiming to enable and ease market funding for NFCs, may affect the cost of bank lending, thus potentially contributing to decreasing the heterogeneities across the euro-area countries.

Finally, asking whether the ECB's provision of liquidity, under the non-standard monetary policy measures applied post-Lehman has played its foreseen role, the answer is positive but only partially. Again finding heterogeneous responses to provision of liquidity by the ECB, strengthens the argument that further policy initiatives are important for homogenizing financial conditions and, as a result, deepening economic integration of the euro area.

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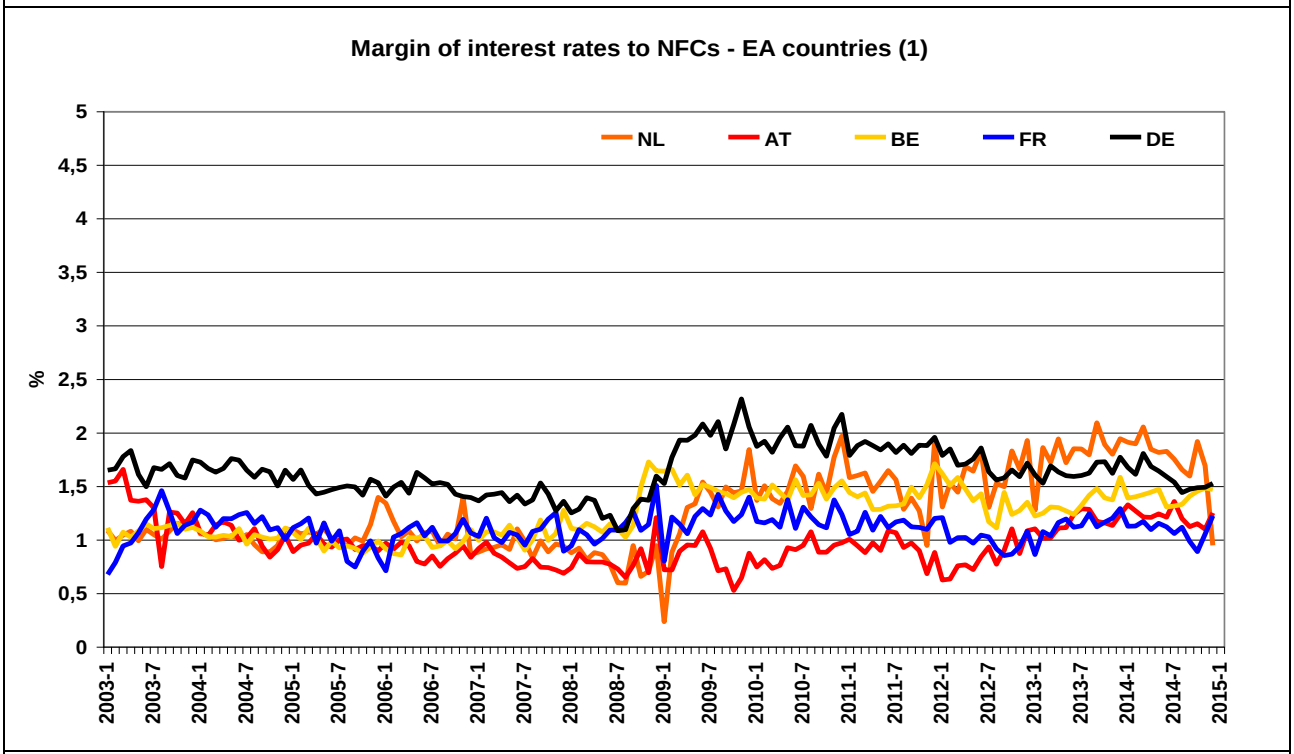
Appendix

Chart 1: Bank lending margins for non-financial corporations in EA countries (2003:1-2014:12)



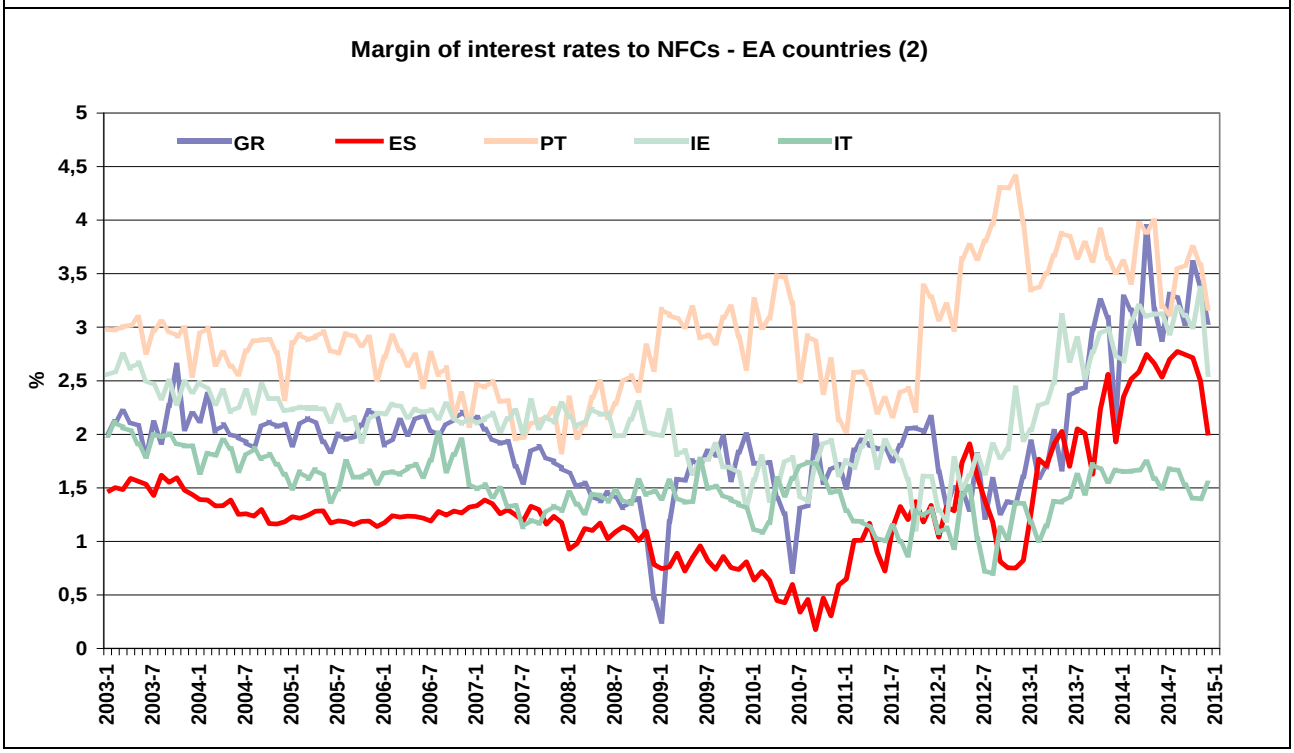


Table 1: Descriptive statistics

	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain
2003:1 – 2008:9											
Bank lending margins	0.967 *0.218*	1.038 *0.085*	1.137 *0.202*	1.074 *0.145*	1.505 *0.160*	1.953 *0.257*	2.254 *0.166*	1.638 *0.244*	1.007 *0.137*	2.614 *0.330*	1.273 *0.145*
Herfindahl ratio	5.217 *0.439*	20.188 *1.188*	27.254 *2.259*	6.727 *0.430*	1.816 *0.082*	11.142 *0.337*	6.340 *0.405*	2.628 *0.397*	18.820 *1.474*	11.127 *0.290*	4.789 *0.196*
Loans-to-gdp	1.957 *0.248*	0.692 *0.093*	0.601 *0.079*	0.860 *0.146*	1.025 *0.028*	0.832 *0.252*	1.592 *0.463*	1.108 *0.196*	1.336 *0.117*	0.553 *0.057*	0.619 *0.145*
Loans-to-deposits	1.194 *0.044*	0.841 *0.043*	1.519 *0.096*	1.237 *0.098*	1.367 *0.044*	0.787 *0.021*	1.619 *0.179*	1.488 *0.083*	1.346 *0.037*	1.542 *0.089*	1.690 *0.316*
NFC bond spread	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*	0.732 *0.649*
Sovereign spreads	0.043 *0.061*	0.092 *0.093*	0.003 *0.079*	0.045 *0.047*	0.000 *0.000*	0.245 *0.127*	0.000 *0.125*	0.228 *0.103*	0.048 *0.057*	0.132 *0.109*	0.048 *0.074*
CISS	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*	0.159 *0.151*
Y-o-Y Δ(Base money)	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*	714.5 *159.1*
2008:10 – 2014:12											
Bank lending margins	0.974 *0.197*	1.427 *0.121*	1.808 *0.189*	1.135 *0.132*	1.772 *0.197*	1.959 *0.741*	2.090 *0.591*	1.369 *0.252*	1.545 *0.344*	3.207 *0.571*	1.326 *0.734*
Herfindahl ratio	4.042 *0.088*	11.904 *2.245*	32.770 *2.267*	5.770 *0.254*	2.847 *0.277*	16.280 *4.085*	6.707 *0.241*	3.982 *0.299*	19.692 *2.350*	12.912 *2.490*	6.557 *1.078*
Loans-to-gdp	2.486 *0.037*	0.771 *0.033*	0.953 *0.101*	1.186 *0.081*	1.090 *0.075*	1.305 *0.094*	2.146 *0.328*	1.560 *0.038*	1.623 *0.054*	0.679 *0.063*	0.759 *0.121*
Loans-to-deposits	1.240 *0.017*	0.647 *0.044*	1.541 *0.078*	1.343 *0.117*	1.121 *0.071*	1.040 *0.160*	1.566 *0.209*	1.335 *0.077*	1.239 *0.038*	1.505 *0.151*	1.644 *0.209*
NFC bond spread	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*	1.067 *0.605*
Sovereign spreads	0.512 *0.263*	0.926 *0.537*	0.300 *0.137*	0.554 *0.273*	0.000 *0.000*	10.286 *8.741*	3.247 *2.062*	2.186 *1.178*	0.321 *0.133*	4.524 *3.274*	2.287 *1.313*
CISS	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*	0.278 *0.195*
Y-o-Y Δ(Base money)	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*	1268.3 *220.8*

Note: The table reports means and standard deviations (denoted in italics) of the series for the periods 2003:1 to 2008:9 (pre-crisis period) and 2008:10 to 2014:12 (post-crisis period).

Table 2: Lag selection (2003:1-2008:8)

Lags	AIC	SIC	HQ
First panel of countries (AT, BE, DE, FI, FR, NL)			
1	-11.159	-10.271	-10.804
2	-11.149	-9.815	-10.615
3	-11.193	-9.415	-10.481
4	-11.999	-9.776	-11.109**
5	-12.045	-9.378	-10.978
6	-12.111	-8.999	-10.865
7	-12.108	-8.553	-10.685
8	-12.101	-8.101	-10.500
Second panel of countries (ES, GR, IE, IT, PT)			
1	-10.721	-9.833	-10.366
2	-10.783	-9.444	-10.244
3	-10.742	-8.966	-10.032
4	-11.393	-9.169	-10.502**
5	-11.433	-8.765	-10.364
6	-11.394	-8.285	-10.151
7	-11.421	-7.869	-10.002
8	-11.362	-7.358	-9.757

Table 3: VAR – first panel (AT, BE, DE, FI, FR, NL), pre-Lehman collapse (2003:1 to 2008:8)

	Bank lending margins	NFC bond spreads	Sovereign bond spreads	Herfindahl ratio	Loans to Deposits ratio	Loans to GDP ratio
Lend. margins t-1	0.457 (0.059)	-	-	-	-2.599 (0.881)	-
Lend. margins t-2	-	-	-	-0.169 (0.090)	2.255 (0.957)	-
Lend. margins t-3	0.163 (0.062)	-0.114 (0.058)	0.029 (0.017)	-	-	-
Lend. margins t-4	-	-	-	-	-	-
NFC spreads t-1	-	0.742 (0.059)	-0.031 (0.018)	-	-	-
NFC spreads t-2	-	0.148 (0.076)	-	-	-	0.020 (0.009)
NFC spreads t-3	-	-	-	-	2.136 (1.759)	-0.025 (0.009)
NFC spreads t-4	-	-	-	-	-	-
Sov. spreads t-1	0.327 (0.208)	-	-	-	-	0.053 (0.026)
Sov. spreads t-2	-	-	-	-	-	-0.065 (0.033)
Sov. spreads t-3	-	-0.425 (0.251)	-	-	-	-
Sov. spreads t-4		0.638 (0.195)	-	-	-	-
Herfindahl t-1	-	-	-	0.974 (0.038)	-	-
Herfindahl t-2	-0.084 (0.036)	-	-	-	-	-
Herfindahl t-3	0.074 (0.036)	-	-	0.766 (0.052)	-	-
Herfindahl t-4	-	-	-	-0.798 (0.040)	-	-
Loans/Deposits t-1	-	-	-	-	0.949 (0.058)	-
Loans/Deposits t-2	-	-	-	-	-	0.001 ($0.6*10^{-4}$)
Loans/Deposits t-3	-	-	-	-	-	-
Loans/Deposits t-4	-	-	-	0.011 (0.005)	0.116 (0.058)	-0.001 ($0.4*10^{-4}$)
Loans/GDP t-1	-	-	-	-	-	0.812 (0.059)
Loans/GDP t-2	-	-	-	-	-	-
Loans/GDP t-3	-	-	-0.343 (0.182)	-	-	-
Loans/GDP t-4	-	-	-	-	-	-
Dummy AT	-	-0.331 (0.082)	-	0.324 (0.123)	-2.714 (1.309)	-
Dummy BE	0.212 (0.167)	-	-	0.617 (0.176)	-	-
Dummy DE	-	0.316 (0.078)	-	-0.318 (0.123)	2.703 (1.311)	-
Dummy FI	0.413 0.167)	-	-	0.958 (0.236)	-	-
Dummy FR	-	-	-	-	-	-
Constant	0.682 (0.142)	-	-	0.515 (0.201)	-	-
Δ(CISS) t-1	-	0.783 (0.119)	0.095 (0.036)	-	-	-
Diagnostics-equation specific						
Adj. R-squared	0.847	0.957	0.865	0.999	0.978	0.999
Log Likelihood	313.805	332.968	719.29	202.875	553.585	995.521
Im, Pesaran and Shin (2003) test	-7.719 [0.000]	-8.056 [0.000]	-7.393 [0.000]	-7.296 [0.000]	-7.747 [0.000]	-8.315 [0.000]
Diagnostics-system						
Log likelihood	AIC	SIC	Cov(r_i , r_j)	LM (1)	LM (3)	LM (5)
2045.464	-11.659	-9.539	$2.04*10^{-13}$	33.795 [0.574]	79.791 [0.241]	41.931 [0.229]
Correlation of the residuals						
	NFC margins	NFC spreads	Sov. spreads	Herfindahl	Loans/Deposits	Loans/GDP
Lend. margins	1					
NFC spreads	0.190	1				
Sov. spreads	0.103	0.312	1			
Herfindahl	-0.021	-0.164	-0.075	1		
Loans/Deposits	-0.037	0.134	-0.051	0.036	1	
Loans/GDP	-0.068	0.038	0.012	-0.011	-0.075	1

Note: Only significant estimators are reported; figures in parenthesis are standard errors, while figures in brackets report p-values AIC is the Akaike Information Criterion, SIC is the Schwartz IC, Cov(r_i , r_j) represents the cross-section covariance of the residuals and LM stands for the maximum likelihood test for serial correlation.

Table 4: VAR – second panel (ES, GR, IE, IT, PT pre-Lehman collapse (2003:1 to 2008:8)

	Bank lending margins	NFC bond spreads	Sovereign bond spreads	Herfindahl ratio	Loans to Deposits ratio	Loans to GDP ratio
Lend. margins t-1	0.394 (0.059)	-	-	-0.027 (0.018)	-2.268 (1.202)	-
Lend. margins t-2	0.223 (0.064)	-	-0.029 (0.018)	-	-	
Lend. margins t-3	0.134 (0.064)	-	-	-	-	-
Lend. margins t-4	-	-	-	-	-	-
NFC spreads t-1	-	0.687 (0.061)	-	0.055 (0.029)	-	-
NFC spreads t-2	-	0.122 (0.076)	-	-	-	-
NFC spreads t-3	-	-	-	-	-	-
NFC spreads t-4	-	0.105 (0.060)	-	-	-	-
Sov. spreads t-1	-	-	0.678 (0.066)	-	-	
Sov. spreads t-2	-	-	-	-	-	-
Sov. spreads t-3	-	-	-	-	12.504 (2.138)	-
Sov. spreads t-4	-	-	-	-	-	-
Herfindahl t-1	-	-	-	0.929 (0.040)	-0.136 (0.085)	-
Herfindahl t-2	-0.337 (0.180)	-	-	-	-	-
Herfindahl t-3	-	-	-	0.692 (0.055)	-	-0.033 (0.019)
Herfindahl t-4	-	-	-	-0.697 (0.039)	-	-
Loans/Deposits t-1	-	-	-	-	0.928 (0.063)	-
Loans/Deposits t-2	-	-	-	-	-	0.001 ($0.4*10^{-4}$)
Loans/Deposits t-3	-	-	-	-	-	-
Loans/Deposits t-4	-	-	-	-	-	-0.001 ($0.3*10^{-4}$)
Loans/GDP t-1	-	-	-	-	-	0.874 (0.063)
Loans/GDP t-2	-	-	-	-	-	-
Loans/GDP t-3	-	-	-	-	-	-
Loans/GDP t-4	-	-	-	-	-	-
Dummy ES	-0.442 (0.249)	-	-0.168 (0.070)	-0.363 (0.076)	-	-
Dummy GR	-	-	0.166 (0.061)	0.332 (0.068)	-	-
Dummy IE	-	-	-0.163 (0.062)	-0.332 (0.068)	-	-
Dummy IT	-	-	-0.156 (0.093)	-0.542 (0.101)	-	-
Dummy PT	0.119 (0.048)	0.159 (0.032)	-	-	-	-0.008 (0.004)
Constant	0.895 (0.426)	-	0.241 (0.119)	0.599 (0.129)	-	-
Δ(CISS) t-1	-	0.687 (0.117)	0.167 (0.051)	-	-	-
Diagnostics-equation specific						
Adj. R-squared	0.933	0.957	0.929	0.999	0.975	0.999
Log Likelihood	206.117	346.656	612.834	586.564	759.124	932.424
Im, Pesaran and Shin (2003) test	-8.098 [0.000]	-7.628 [0.000]	-7.872 [0.000]	-8.097 [0.000]	-7.899 [0.000]	-7.709 [0.000]
Diagnostics-system						
Log likelihood	AIC	SIC	Cov(r_i , r_j)	LM (1)	LM (3)	LM (5)
1992.111	-11.326	-9.206	$1.58*10^{-13}$	68.552 [0.000]	60.013 [0.007]	40.398 [0.282]
Correlation of the residuals						
	NFC margins	NFC spreads	Sov. spreads	Herfindahl	Loans/Deposits	Loans/GDP
Lend. margins	1					
NFC spreads	0.055	1				
Sov. spreads	0.011	0.428	1			
Herfindahl	-0.007	-0.037	0.023	1		
Loans/Deposits	0.061	0.054	-0.044	-0.098	1	
Loans/GDP	-0.083	-0.111	-0.080	0.003	0.391	1

Note: Only significant estimators are reported; figures in parenthesis are standard errors, while figures in brackets report p-values AIC is the Akaike Information Criterion, SIC is the Schwartz IC, Cov(r_i , r_j) represents the cross-section covariance of the residuals and LM stands for the maximum likelihood test for serial correlation.

Table 5: Granger causality tests: Lending rates margins (2003:1-2008:8)

Explanatory variable	**X^2 stat.**	**p-value**
First panel of countries (AT, BE, DE, FI, FR, NL)		
NFC bond spreads	5.118	0.275
Sovereign bond spreads	8.145	0.086
Herfindahl	**18.836**	**0.001**
Loans-to-deposits	2.376	0.667
Loans-to-gdp	5.911	0.206
Second panel of countries (ES, GR, IE, IT, PT)		
NFC bond spreads	4.443	0.349
Sovereign bond spreads	1.464	0.833
Herfindahl	5.821	0.212
Loans-to-deposits	3.326	0.505
Loans-to-gdp	1.712	0.789

Note: The table reports the results of Chi-square (X2) tests of the null of exclusion of the explanatory variable from the equation of the bank lending margins dependent variable. Figures in bold letters denote rejection of the null.

Table 6: Impulse responses of bank lending margins, pre-Lehman collapse (2003:1 – 2008:8)

First panel (AT, BE, DE, FI, FR, NL)					
Months	NFC bond spreads	Sovereign spreads	Herfindahl	Loans/Deposits	Loans/GDP
1	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
2	2.9*10-4 (0.005)	0.008 (0.005)	0.002 (0.004)	0.006 (0.005)	-0.001 (0.006)
3	0.002 (0.009)	0.011 (0.009)	-0.007 (0.006)	0.010 (0.009)	-0.005 (0.009)
4	0.001 (0.012)	**0.022 (0.013)**	-0.011 (0.009)	0.009 (0.013)	-0.005 (0.013)
5	-0.001 (0.014)	**0.036 (0.016)**	-0.014 (0.013)	0.011 (0.016)	-0.008 (0.016)
10	-0.004 (0.029)	**0.099 (0.040)**	**-0.078 (0.035)**	0.038 (0.030)	-0.024 (0.028)
12	-0.001 (0.037)	**0.123 (0.053)**	**-0.113 (0.044)**	0.049 (0.038)	-0.031 (0.033)
18	0.019 (0.066)	**0.189 (0.092)**	**-0.234 (0.076)**	0.075 (0.064)	-0.045 (0.049)
24	0.001 (0.003)	0.079 (0.073)	**-0.192 (0.095)**	0.007 (0.054)	-0.011 (0.041)
Second panel (ES, GR, IE, IT, PT)					
Months	NFC bond spreads	Sovereign spreads	Herfindahl	Loans/Deposits	Loans/GDP
1	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
2	0.008 (0.007)	-0.003 (0.008)	0.007 (0.005)	-0.004 (0.008)	-0.007 (0.008)
3	0.001 (0.001)	0.001 (0.014)	0.001 (0.009)	0.001 (0.013)	-0.011 (0.013)
4	0.003 (0.017)	-0.003 (0.019)	-0.004 (0.013)	-0.008 (0.019)	-0.006 (0.019)
5	-0.002 (0.020)	-0.009 (0.025)	-0.002 (0.019)	-0.012 (0.025)	-0.007 (0.022)
10	-0.023 (0.041)	-0.041 (0.059)	-0.039 (0.053)	-0.037 (0.052)	-0.007 (0.041)
12	-0.037 (0.050)	-0.056 (0.070)	-0.053 (0.066)	-0.048 (0.062)	-0.008 (0.048)
18	-0.091 (0.082)	-0.100 (0.103)	-0.091 (0.103)	-0.078 (0.091)	-0.21 (0.067)
24	-0.149 (0.119)	-0.139 (0.129)	-0.107 (0.129)	-0.107 (0.122)	-0.045 (0.087)

Note: The table reports the bank lending margins' accumulated impulse responses to a shock equal to one standard deviation of the explanatory variables, in the next months. Figures in bold letters denote significant responses in a 5% confidence interval, while parentheses are standard errors.

Table 7: Lag selection (2009:1-2014:12)

Lags	AIC	SIC	HQ
First panel of countries (AT, BE, DE, FI, FR, NL)			
1	8.970	9.358	9.124
2	-3.146	-2.368	-2.837
3	-3.143	-1.977	-2.680
4	-3.124	-1.570	-3.229**
5	-4.001	-2.058	-2.506
6	-3.904	-1.573	-2.977
7	-3.886	-1.166	-2.804
8	-4.103	-0.994	-2.867
Second panel of countries (ES, GR, IE, IT, PT)			
1	19.892	20.281	20.047
2	3.326	4.104	3.635
3	3.254	4.419	3.718
4	3.184	4.739	3.802
5	2.023	3.966	2.796**
6	2.121	4.452	3.048
7	2.134	4.854	3.215
8	2.148	5.257	3.384

Table 8: VAR – first panel (AT, BE, DE, FI, FR, NL), post-Lehman collapse (2009:1 to 2014:12)

	Bank lending margins	NFC bond spreads	Sovereign bond spreads	Herfindahl ratio	Loans to Deposits ratio	Loans to GDP ratio
Lend. margins t-1	0.439 (0.053)	-	-	-	2.071 (1.268)	-
Lend. margins t-2	-	-0.155 (0.059)	-0.105 (0.051)	-0.169 (0.090)	2.255 (0.957)	-
Lend. margins t-3	0.236 (0.056)	-	0.089 (0.051)	-	-	-
Lend. margins t-4	-0.108 (0.053)	-	-	-	-	-
NFC spreads t-1	-	0.927 (0.051)	0.096 (0.043)	-	-	-
NFC spreads t-2	-	-	-0.129 (0.058)	-	-	0.018 (0.009)
NFC spreads t-3	-	0.139 (0.063)	0.167 (0.054)	0.132 (0.071)	-	-0.022 (0.009)
NFC spreads t-4	-	-0.136 (0.037)	-0.122 (0.031)	-	-	-
Sov. spreads t-1	-	0.236 (0.065)	0.791 (0.056)	-	-	-0.019 (0.009)
Sov. spreads t-2	-	-	0.137 (0.071)	-	-	0.019 (0.012)
Sov. spreads t-3	-	-0.268 (0.082)	-	-	-	-
Sov. spreads t-4	-	0.142 (0.065)	-0.090 (0.056)	-0.116 (0.073)	-	-
Herfindahl t-1	-	-	-	0.950 (0.036)	-	-
Herfindahl t-2	-	-0.102 (0.043)	-	-	-	-
Herfindahl t-3	-	-	-	0.753 (0.048)	-	-
Herfindahl t-4	-	0.107 (0.031)	-	-0.741 (0.035)	1.287 (0.702)	-
Loans/Deposits t-1	-	-	-	-	0.918 (0.055)	-
Loans/Deposits t-2	-0.007 (0.003)	-	-	-	-	-
Loans/Deposits t-3	-	-	-	-	-	-
Loans/Deposits t-4	0.006 (0.003)	-	-	0.005 (0.003)	-	-
Loans/GDP t-1	-	-	-	-	-	0.896 (0.055)
Loans/GDP t-2	-	-	-	-	-	-
Loans/GDP t-3	-	-	-	-	-	-
Loans/GDP t-4	-	-0.644 (0.375)	-	-	-13.886 (8.372)	-0.089 (0.055)
Dummy AT	-0.336 (0.182)	-	-	-	18.125 (4.300)	0.045 (0.028)
Dummy BE	-	-0.165 (0.079)	-	0.216 (0.088)	-	-
Dummy DE	0.322 (0.180)	-	-	-	-18.533 (4.384)	-
Dummy FI	-	-	-	0.848 (0.199)	-	-
Dummy FR	-0.254 (0.063)	-0.135 (0.067)	-	-	4.644 (1.492)	-
Constant	0.675 (0.168)	-	-	0.324 (0.198)	8.959 (3.961)	0.057 (0.026)
Δ(CISS) t-1	-	1.175 (0.158)	0.233 (0.135)	-	-	-
Diagnostics-equation specific						
Adj. R-squared	0.833	0.946	0.921	0.999	0.903	0.999
Log Likelihood	232.709	212.183	268.554	171.065	905.885	906.446
Im, Pesaran and Shin (2003) test	-8.731 [0.000]	-10.473 [0.000]	-8.788 [0.000]	-7.562 [0.000]	-7.898 [0.000]	-8.315 [0.000]
Diagnostics-system						
Log likelihood	AIC	SIC	$Cov(r_i , r_j)$	LM (1)	LM (3)	LM (5)
900.216	-4.001	-2.058	$2.71*10^{-10}$	138.032 [0.000]	73.058 [0.001]	38.643 [0.351]
Correlation of the residuals						
	NFC margins	NFC spreads	Sov. spreads	Herfindahl	Loans/Deposits	Loans/GDP
Lend. margins	1					
NFC spreads	0.050	1				
Sov. spreads	0.042	0.205	1			
Herfindahl	0.023	-0.038	0.012	1		
Loans/Deposits	0.038	-0.055	0.026	-0.002	1	
Loans/GDP	0.060	0.138	0.050	-0.075	-0.008	1

Note: Only significant estimators are reported; figures in parenthesis are standard errors, while figures in brackets report p-values AIC is the Akaike Information Criterion, SIC is the Schwartz IC, $Cov(r_i , r_j)$ represents the cross-section covariance of the residuals and LM stands for the maximum likelihood test for serial correlation.

Table 9: VAR – second panel (ES, GR, IE, IT, PT), post-Lehman collapse (2009:1 to 2014:12)

	Bank lending margins	NFC bond spreads	Sovereign bond spreads	Herfindahl ratio	Loans to Deposits ratio	Loans to GDP ratio
Lend. margins t-1	0.584 (0.056)	0.069 (0.030)	-	-0.027 (0.018)	-2.268 (1.202)	-
Lend. margins t-2	0.130 (0.063)	-	-0.029 (0.018)	-	-	
Lend. margins t-3	0.123 (0.063)	-0.059 (0.034)	-	-	-	-
Lend. margins t-4	-	-	-0.510 (0.296)	-	-	-
NFC spreads t-1	-0.227 (0.091)	0.978 (0.049)	0.984 (0.498)	0.055 (0.029)	-	0.013 (0.008)
NFC spreads t-2	0.320 (0.127)	-0.119 (0.069)	-	-	-	-
NFC spreads t-3	-	0.135 (0.066)	-	-	-	-0.016 (0.009)
NFC spreads t-4	-	-0.151 (0.039)	-	-	-	-
Sov. spreads t-1	-0.018 (0.010)	-0.009 (0.006)	0.886 (0.056)	0.015 (0.006)	-	
Sov. spreads t-2	-	-	-	-0.015 (0.008)	-	-
Sov. spreads t-3	-	-	0.155 (0.078)	-	12.504 (2.138)	-
Sov. spreads t-4	-	-	-0.114 (0.057)	-	-0.180 (0.101)	-
Herfindahl t-1	-0.106 (0.055)	-	-	0.985 (0.033)	-0.136 (0.085)	-
Herfindahl t-2	-	-	-	-	-	-
Herfindahl t-3	0.119 (0.075)	-	-1.111 (0.411)	0.952 (0.044)	-1.393 (0.735)	
Herfindahl t-4	-	-	-	-0.913 (0.037)	1.673 (0.610)	-
Loans/Deposits t-1	-0.014 (0.005)	0.005 (0.002)	-	-	0.914 (0.054)	-
Loans/Deposits t-2	0.015 (0.007)	-	-	-	-	0.001 ($0.6*10^{-4}$)
Loans/Deposits t-3	-	-	-	-	0.245 (0.072)	-0.002 ($0.6*10^{-4}$)
Loans/Deposits t-4	-	-	-	-	-	0.001 ($0.5*10^{-4}$)
Loans/GDP t-1	-	-0.602 (0.361)	-	-	-	0.949 (0.055)
Loans/GDP t-2	-1.469 (0.903)	0.886 (0.491)	-	-	-	-
Loans/GDP t-3	-	0.787 (0.446)	-	-	-	-
Loans/GDP t-4	-	-1.117 (0.332)	-	-	-	-
Dummy ES	-0.442 (0.249)	-	-0.168 (0.070)	-0.363 (0.076)	-	-
Dummy GR			1.472 (0.607)	-	1.718 (1.098)	0.024 (0.009)
Dummy IE	-	-	-0.163 (0.062)	-0.332 (0.068)	-	-
Dummy IT	-	-	-0.156 (0.093)	-0.542 (0.101)	-	-
Dummy PT	0.119 (0.048)	0.159 (0.032)	-	-	-	-0.008 (0.004)
Constant	0.895 (0.426)	-	0.241 (0.119)	0.599 (0.129)	-	-
Δ(CISS) t-1	-	0.687 (0.117)	0.167 (0.051)	-	-	-
Diagnostics-equation specific						
Adj. R-squared	0.918	0.944	0.925	0.999	0.979	0.999
Log Likelihood	13.348	205.305	626.462	176.165	835.685	884.549
Im, Pesaran and Shin (2003) test	-8.205 [0.000]	-10.289 [0.000]	-7.908 [0.000]	-8.399 [0.000]	-8.056 [0.000]	-8.425 [0.000]

Diagnostics-system

Log likelihood	AIC	SIC	Cov(r_i , r_j)	LM (1)	LM (3)	LM (5)
184.211	2.023	3.966	$1.12*10^{-7}$	142.282 [0.000]	101.067 [0.007]	46.079 [0.121]

Correlation of the residuals

	NFC margins	NFC spreads	Sov. spreads	Herfindahl	Loans/Deposits	Loans/GDP
Lend. margins	1					
NFC spreads	0.067	1				
Sov. spreads	0.075	0.184	1			
Herfindahl	-0.054	-0.012	-0.230	1		
Loans/Deposits	0.028	-0.026	0.075	0.052	1	
Loans/GDP	0.041	0.105	-0.064	-0.029	0.074	1

Note: Only significant estimators are reported; figures in parenthesis are standard errors, while figures in brackets report p-values AIC is the Akaike Information Criterion, SIC is the Schwartz IC, Cov(r_i , r_j) represents the cross-section covariance of the residuals and LM stands for the maximum likelihood test for serial correlation.

Table 10: Granger causality tests: Lending rates margins (2009:1-2014:12)

Explanatory variable	X^2 stat.	p-value
First panel of countries (AT, BE, DE, FI, FR, NL)		
NFC bond spreads	2.062	0.724
Sovereign bond spreads	2.541	0.634
Herfindahl	1.364	0.851
Loans-to-deposits	**15.489**	0.004
Loans-to-gdp	0.228	0.994
Second panel of countries (ES, GR, IE, IT, PT)		
NFC bond spreads	**10.664**	0.031
Sovereign bond spreads	5.375	0.251
Herfindahl	**14.295**	0.006
Loans-to-deposits	**14.797**	0.005
Loans-to-gdp	4.836	0.305

Note: The table reports the results of Chi-square (X^2) tests of the null of exclusion of the explanatory variable from the equation of the bank lending margins dependent variable. Figures in bold letters denote rejection of the null.

Table 11: Impulse responses of bank lending margins, post-Lehman collapse (2009:1 – 2014:12)

First panel (AT, BE, DE, FI, FR, NL)					
Months	NFC bond spreads	Sovereign spreads	Herfindahl	Loans/Deposits	Loans/GDP
1	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
2	-0.005 (0.007)	0.007 (0.007)	-0.001 (0.005)	0.007 (0.007)	-0.002 (0.007)
3	-0.010 (0.010)	0.007 (0.012)	-0.001 (0.009)	-0.006 (0.013)	-0.005 (0.013)
4	-0.015 (0.012)	0.009 (0.017)	-0.004 (0.018)	-0.018 (0.018)	-0.006 (0.017)
5	-0.018 (0.016)	0.009 (0.022)	-0.005 (0.018)	-0.009 (0.023)	-0.007 (0.022)
10	-0.042 (0.029)	-0.021 (0.045)	-0.021 (0.044)	0.073 (0.053)	-0.009 (0.041)
12	-0.053 (0.036)	-0.038 (0.055)	-0.033 (0.053)	**0.113 (0.066)**	-0.013 (0.049)
18	-0.084 (0.055)	-0.083 (0.083)	-0.083 (0.079)	**0.218 (0105)**	-0.051 (0.087)
24	-0.109 (0.072)	-0.110 (0.108)	-0.131 (0.106)	**0.279 (0.139)**	-0.119 (0.119)
Second panel (ES, GR, IE, IT, PT)					
Months	NFC bond spreads	Sovereign spreads	Herfindahl	Loans/Deposits	Loans/GDP
1	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
2	**-0.035 (0.013)**	-0.023 (0.014)	-0.012 (0.009)	**-0.034 (0.014)**	0.007 (0.014)
3	**-0.048 0.018)**	**-0.056 (0.026)**	-0.034 (0.018)	-0.049 (0.027)	-0.010 (0.026)
4	**-0.054 (0.027)**	-0.072 (0.057)	-0.052 (0.030)	-0.084 (0.054)	-0.025 (0.039)
5	-0.067 (0.037)	-0.092 (0.050)	-0.072 (0.041)	-0.084 (0.053)	-0.044 (0.049)
10	-0.060 (0.075)	-0.149 (0.097)	-0.147 (0.115)	**-0.235 (0.106)**	-0.148 (0.093)
12	-0.049 (0.089)	-0.149 (0.115)	-0.132 (0.145)	**0.312 (0.123)**	-0.199 (0.108)
18	-0.021 (0.125)	-0.059 (0.167)	**0.103 (0.052)**	**-0.565 (0.176)**	**-0.382 (0.159)**
24	0.005 (0.101)	0.222 (0.232)	**0.683 (0.301)**	**-0.898 (0.243)**	**-0.898 (0.258)**

Note: The table reports the bank lending margins' accumulated impulse responses to a shock equal to one standard deviation of the explanatory variables, in the next months. Figures in bold letters denote significant responses in a 5% confidence interval, while parentheses are standard errors.

Table 12: Granger causality tests: Lending rates margins (2009:1-2014:12)

Explanatory variable	X^2 stat.	p-value
First panel of countries (AT, BE, DE, FI, FR, NL)		
Loans-to-deposits	**14.065**	0.007
Y-o-y Δ(ECB's Base money)	**22.775**	0.000
Second panel of countries (ES, GR, IE, IT, PT)		
NFC bond spreads	**8.810**	0.066
Herfindahl	**16.347**	0.003
Loans-to-deposits	**25.098**	0.000
Y-o-y Δ(ECB's Base money)	2.948	0.567

Note: The table reports the results of Chi-square (X^2) tests of the null of exclusion of the explanatory variable from the equation of the bank lending margins dependent variable. Figures in bold letters denote rejection of the null.

Table 13: Impulse responses of bank lending margins, post-Lehman collapse (2009:1 – 2014:12)

First panel (AT, BE, DE, FI, FR, NL)		
Months	Loans/Deposits	Y-o-y Δ(ECB's Base money)
1	0.000 (0.000)	0.000 (0.000)
2	0.008 (0.008)	**-0.018 (0.008)**
3	-0.005 (0.013)	**-0.037 (0.013)**
4	-0.020 (0.018)	**-0.071 (0.018)**
5	-0.020 (0.023)	**-0.097 (0.024)**
10	0.015 (0.055)	**-0.169 (0.044)**
12	0.044 (0.071)	**-0.184 (0.049)**
18	0.138 (0.117)	**-0.209 (0.056)**
24	0.217 (0.157)	**-0.217 (0.066)**

Second panel (ES, GR, IE, IT, PT)				
Months	NFC bond spreads	Herfindahl	Loans/Deposits	Y-o-y Δ(ECB's Base money)
1	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
2	**-0.028 (0.013)**	-0.016 (0.009)	**-0.038 (0.014)**	-0.018 (0.014)
3	-0.028 (0.022)	-0.016 (0.009)	**-0.059 (0.027)**	-0.038 (0.028)
4	-0.021 (0.028)	-0.059 (0.027)	**-0.073 (0.041)**	-0.057 (0.039)
5	-0.020 (0.039)	-0.075 (0.040)	**-0.112 (0.054)**	-0.073 (0.054)
10	0.032 (0.077)	-0.139 (0.118)	**-0.325 (0.108)**	-0.113 (0.108)
12	0.057 (0.090)	-0.107 (0.152)	**-0.428 (0.125)**	-0.125 (0.122)
18	0.119 (0.121)	0.233 (0.265)	**-0.755 (0.177)**	-0.139 (0.154)
24	**0.162 (0.155)**	**0.911 (0.406)**	**-1.098 (0.252)**	-0.111 (0.196)

Note: The table reports the bank lending margins' accumulated impulse responses to a shock equal to one standard deviation of the explanatory variables, in the next months. Figures in bold letters denote significant responses in a 5% confidence interval, while parentheses are standard errors.

Table 14: Significance of explanatory var's when excluding countries from the panel (2009:1-2014:12, Granger causality tests)

First panel of countries (AT, BE, DE, FI, FR, NL)					
Countries	NFC bonds	Sov. bonds	Herfindahl	L-t-D	L-t-G
All	2.062 [0.724]	2.541 [0.634]	1.364 [0.851]	15.489 [0.004]	0.228 [0.994]
Excl. AT	2.069 [0.723]	2.857 [0.582]	0847 [0.931]	19.225 [0.001]	1.561 [0.816]
Excl. BE	4.203 [0.379]	6.436 [0.169]	1.869 [0.759]	14.619 [0.006]	0.733 [0.947]
Excl. DE	3.936 [0.415]	4.414 [0.353]	1.502 [0.826]	14.099 [0.007]	1.361 [0.851]
Excl. FI	8.715 [0.071]	5.874 [0.209]	13.297 [0.009]	19.246 [0.001]	5.132 [0.274]
Excl. FR	0.761 [0.943]	2.531 [0.639]	1.679 [0.795]	17.799 [0.001]	0.312 [0.989]
Excl. NL	2.061 [0.724]	2.541 [0.637]	1.364 [0.851]	15.488 [0.004]	0.228 [0.994]
Second panel of countries (ES, GR, IE, IT, PT)					
All	10.664 [0.031]	5.375 [0.251]	14.295 [0.006]	14.797 [0.005]	4.836 [0.305]
Excl. ES	10.976 [0.027]	7.351 [0.119]	9.443 [0.051]	14.582 [0.006]	4.939 [0.294]
Excl. GR	10.838 [0.034]	7.043 [0.134]	5.736 [0.219]	21.582 [0.000]	4.525 [0.339]
Excl. IE	8.875 [0.064]	5.245 [0.263]	9.728 [0.045]	6.939 [0.139]	4.469 [0.347]
Excl. IT	11.348 [0.023]	5.371 [0.251]	14.219 [0.007]	14.114 [0.007]	7.135 [0.129]
Excl. PT	12.316 [0.015]	4.400 [0.355]	21.148 [0.000]	14.218 [0.007]	6.857 [0.143]

Note: The table reports the results of Chi-square (X^2) tests of the null of exclusion of the explanatory variable from the equation of the bank lending margins dependent variable. Figures in bold letters denote rejection of the null and brackets report p-values.

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