Keeping Funding Costs under Control: Evidence from Bank Bond Issues

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Abstract

This paper analyses the development of bank long-term funding at an international level. We consider about 16,000 debt issuances in the period 2006-2012 in Europe and US. We investigate the driving forces that helped banks to weather the storm during the financial crisis with a relatively stable cost of long term funding. Through the use of a Principal Component Analysis we represent bank business model and we show that different orientation towards the Originate-To-Hold (OTH) or the Originate-To-Distribute (OTD) business models had subsequently, during crisis times, diverse impact on the variability or stability of the cost of long-term funds.
We document the relevance of the OTH bank business model in keeping these costs under control and to be a sustainable business model in crisis times

***Keywords**:* long-term funding; bank balance sheet; bank business models; financial crises, funding cost

1. Introduction

Banks finance themselves with a variety of sources, with different maturities and credit risk characteristics. Recent developments have led to important changes in bank funding models and patterns. In particular, these developments include the financial market turmoil that emerged in the second half of 2007, the severe global financial crisis subsequent to the collapse of Lehman Brothers in September 2008 and finally the unfolding of the financial crisis in the Euro area into a sovereign debt crisis. Heavy reliance on short-term wholesale funding in the years preceding the financial crisis, a distinctive characteristic of the Originate-to-Distribute (OTD) business model in banking, turned out to be a source of subsequent problems. In fact, despite adequate capital ratios, many banks were faced with funding difficulties; moreover, strains in funding markets led to massive interventions by national and supranational authorities as liquidity providers. Two main trends were visible in the years following the subprime crisis: a higher cost of funding (both short- and long-term); a different structure of liabilities, characterized by a sensible reduction of senior unsecured debt issuance and wholesale funding; and an increasing portion of secured funding. Overreliance on certain types of wholesale funding was a contributing factor to the global financial crisis: currently, banks have a lower dependence on wholesale markets and are increasingly dependent on customer deposits. This is a clear-cut and global change in funding patterns with respect to the pre-crisis period, though some geographical differences are notable. Indeed, Euro-area banks were less able to attract new customer deposits because their economies were hit to a greater extent by financial, real and sovereign debt crises; their recourse to central bank funding increased considerably to replace their higher pre-crisis dependency on wholesale funding.

Such changes have inspired an increasing array of academic and institutional studies, mainly empirical, highlighting the relevance of liability-side issues, beyond bank capital concerns (CGFS, 2011; ECB, 2012; Cardillo and Zaghini, 2012; Le Leslè, 2012; Bongini and Patarnello, 2013; IMF, 2013; Bongini et al., 2015). Thus, not only has capital adequacy come under scrutiny, but the whole structure of bank liabilities has also been analysed and assessed as a key component of a sustainable business model. In this paper, we investigate the driving forces that helped banks to weather the storm during the financial crisis with a relatively stable cost of long term funding. We relate bank characteristics at the onset of the crisis to crises-related changes in bank debt issuance and issuance practices. Although systemic crises, by their nature, affect the whole banking system, we conjecture that the very specific characteristics of a bank are relevant factors to explain the diverse resilience of each bank to the approaching storm. We postulate that the relative stability or, in contrast, the variability of the cost of bond issues over the crisis years reflects the characteristics of the issuing bank: size, capital adequacy, systemic relevance or type of business model chosen for its intermediation activity. In order to answer to our research question, i.e. which characteristics made banks more robust in dealing with the market turbulence of the years 2008-2012, we collected information on banks' long-term debt issuance for the years 2006-2012. The analysis is based on a database created using DCM Analytics by Dealogic. Our dataset includes detailed information on approximately 16,000 debt issuances by banks headquartered in France, Germany, Italy, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States during 2006–2012. The dataset represents 80% of all issues in the above-mentioned countries.

Our contribution to the literature is twofold.

First, as we are aware of, we are the first to link bank business models to long term funding patterns. A vast literature on bank business models has emerged in recent years: since the start of the subprime crisis, analysing business models has become relevant in the eyes of investors, analysts as well as of supervisors, in order to get a deeper understanding of the sustainability of bank profits and stability. Studies are typically focused on analysing the impact of a specific income-generating model on bank risk and return (Demiruç-Kunt and Huizinga, 2010; Ayadi et al, 2011; Altunbas et al., 2011; Aracne et al, 2013). Among these studies, Altunbas et al. (2011) show that those banks, which were more reliant on wholesale funding, were significantly more likely to fail during the crisis. We go further and show that different orientation towards the Originate-To-Hold (OTH) or the Originate-To-Distribute (OTD) business models had subsequently, during crisis times, diverse impact on the variability or stability of the cost of long-term funds.

Second, we contribute to the studies concerned with the issue of representing with a single measure a bank business model. In general, business models describe how banks generate profits, what customers they serve and which distribution channels they use (Köhler, 2015). Bank business models are evaluated considering an array of financial ratios, describing either income and funding structure or asset and liability structure. In the majority of cases, banks are classified as investment banks, retail banks or universal banks according to the degree of income diversification (Stiroh, 2010;Masciantonio and Tiseno, 2013; Khöler, 2015).In few cases, banks are classified distinguishing between their key banking activities, funding strategies, financial exposures, risks and geographic orientation: Ayadi et al. (2011) lever on six different instruments – related to asset and liability structure – to form clusters of bank business models. In this paper, we represent the bank business model through the first two principal components (Jollifee, 2002) extracted from a pool of variables analysed in previous literature representing income and Asset &Liability ratios. Our measure of business model captures the effect of the different orientation of the bank towards the OTH or OTD business models, considering at one time the whole structure of bank financial statement. We show that bank business models matter. Banks with an OTD business model had more variable long-term funding costs than OTH banks. On the contrary, size and systemic relevance are not statistically relevant in determining the cost of bank bonds, although the sign of the regressions is coherent with the too-big-to-fail hypothesis, upon which larger and systemically relevant banks are supposed to enjoy a lower cost of debt (implicit subsidy), given their special status—the expectation of non-failure. Profitability and capital adequacy are not relevant factors in explaining the stability or variability of the cost of bonds during crisis times. The remainder of the paper is organised as follow. After a review of the relevant literature (Section 2), Section 3 describes the sample and the methodology used. Section 4 investigates which bank characteristics were relevant to keep funding costs under control in turbulent times and Section 5 concludes.

2. Review of literature

The subprime crisis, the collapse of the OTD business model and the ensuing regulatory reforms (Basel III) have highlighted the growing importance for banks to rely more on stable, long-term funding sources and to concentrate on business models more focussed on traditional credit intermediation. Since the start of the financial crisis a large number of studies have analysed, on the one side, the impact of business models on bank risk and return, and on the other side, have emphasised the relevance of funding models in ensuing financial stability, both at micro and at macro level. Our paper is related to both streams of literature and aims to fill a gap by analysing the impact of bank business models and other banks' characteristics, at the onset of the crisis, on crises-related changes in bank long-term debt issuance and issuance practices. Research on bank business models have focused on the relationship between existing models and bank's characteristics, such as capital (Wheelock and Wilson , 2000), operating efficiency (Kwan and Eisenbeis , 1997), funding sources (Schaeck, 2008; Demirgüc-Kunt and Huizinga, 2010), securitization (Keys et al., 2008; Mian and Sufi, 2009; Boot and Thakor, 2010), corporate governance (Laeven and Levine, 2009) and diversification (Stiroh, 2004, 2010). If prior to the crisis a general consensus was generally in favour of income diversification by banks and a strong move from an OTH business model towards an OTD business model (Llewellyn, 2013), after 2007 the empirical evidence is more in favour of banks performing traditional intermediation activities, that are either perceived as being less risky or presenting lower levels of risk-taking (Ayadi et al, 2011; Altunbas et al., 2011; Aracne et al, 2012, Köhler, 2015) or being in general more sustainable banking models in the long run.

This stream of literature faces the challenge of representing or measuring a bank business model. In general, business models describe how banks generate profits, what customers they serve and which distribution channels they use (Köhler, 2015). In other words, a business model is a simplified representation of the activities that a bank performs to make money (Cavelaars and Passenier, 2012).Bank business models are therefore evaluated considering a collection of financial ratios, describing either income and funding structure or asset and liability structure. In the majority of cases, banks are classified as investment banks, retail banks or universal banks according to degree of income diversification (Stiroh, 2010, ECB, 2010; Masciantonio and Tiseno, 2013; Khöler, 2015). In few cases, banks are classified distinguishing between their key activities, funding strategies, financial exposures, risks and geographic orientation: Ayadi et al. (2011) and Aracne et al. (2012) lever on different instruments – related to asset and liability structure- to form clusters of bank business models. Our measure of business model captures the effect of the different orientation of the bank towards an OTH or OTD business models, considering at one time the whole structure of bank financial statement. With respect to the literature on bank funding models, studies concentrate on four main themes:

i. the relationship between bank funding patterns and financial stability/financial integration (EC, 2012; IMF, 2013; Le Leslè, 2012; Yorulmzer, 2014; ECB, 2011; 2012);
ii. the likely effect of key regulatory initiatives on bank funding structures (IMF, 2013; Le Leslè, 2012);
iii. the impact of the crisis on bank funding costs (CGFS 2011; Cardillo and Zaghini, 2012; Bongini and Patarnello, 2012); and
iv. the analysis of funding cost advantage deriving to (some) banks benefiting from implicit, yet valuable, government guarantees (Schich and Lindh, 2012; Schich and Aydin, 2014; Cariboni et al., 2013; Zaghini, 2013).

The studies are mainly focused on European banking systems, as funding risk has been one of the main problems of Euro area banks since the beginning of the sovereign debt crisis. Are bank funding structures relevant to financial stability? The answer is positive, according to a study by the IMF (2013) that examined the relationship between bank funding characteristics and bank distress for broad range of emerging and advanced economies from 1990 through 2012. Lower levels of leverage, greater diversification of funding sources, lower reliance on wholesale funding, contribute to bank stability. However, policy concerns arise because of the increasing reliance on secured lending, which in turn increases the level of asset encumbrance. A predominance of secured or collateralized funding may put limits on bank lending activity and have an impact on the composition of assets on banks' balance sheets going forward (ECB, 2012).

Recent regulatory reforms prompted by the crisis and aimed directly at changing bank-funding structures and loss-sharing rules across funding instruments[1] tend to reinforce a preference for liquid assets and a reinforcement of asset encumbrance that would persistently affect banks' asset holdings and their funding strategies (IMF, 2013; ECB, 2012).These reforms are also likely to impact the future cost of bank funding, which has already been hit hard by the financial crisis and the spillover of the sovereign debt crisis. As a matter of fact, banks funding costs have faced a steady and substantial rise since 2009. Not only has the secured and unsecured debt spread increased, but due to the higher perceived probability of bank default and ensuing losses, the price of retail deposits has also been driven up by increased competition in the household segment of retail deposit markets, which has made this source of funding more expensive than before. In addition, the linkages between sovereigns and home-banking systems significantly affect the cost of bank funding. Cardillo and Zaghini (2012) and Zaghini (2014), analysing the cost of bank bonds at issuance over the years 2006-2011 for a sample of US, Euro area and UK banks, show that in crisis periods, the effects of a deterioration in (perceived) sovereign creditworthiness spill over to home banks. In a similar vein, the CGFS paper (2011) analysed the impact of sovereign risk on the cost of bank funding for a sample of 534 unsecured fixed-rate senior bonds from 114 banks in 14 advanced economies, for the years 2006 and 2010. The main insight of the study is that in normal times, the characteristics of the sovereign have virtually no effect on the cost of funding, which instead is closely related to issue-specific and bank-specific factors. During a crisis, however, a large part of the spread at launch on bank bonds—nearly 30%—reflects the conditions of the sovereign. This percentage increases to 50% for countries for which concerns over public finance conditions are most pronounced. Such results imply a significant funding cost advantage for those banks residing in countries with sovereigns of high creditworthiness. The interconnection between sovereigns and domestic banks is supported also by Correa et al. (2014). They demonstrate the negative effect that sovereign credit rating downgrading has on bank stock returns. This effect is greater for those banks that are expected to receive stronger support from their government.

Indeed, the issue of implicit guarantees for bank debt has received much attention since the onset of the global financial crisis. An implicit guarantee represents the expectation by market participants of future bailouts upon failure of the beneficiary institution and imply a funding cost advantage for beneficiary banks: this guarantee, in turn, is conducive to competitive distortions and can have important consequences for firms' risk-taking decisions because beneficiary banks could be induced to take on too much risk (which makes the use of the guarantee, and taxpayers money, more likely). Implicit guarantees also imply an undesirably close link between the value of bank debt and sovereign debt, including potential negative feedback effects from the value of sovereign debt to the value of bank debt and viceversa (Schich and Lindh, 2012).Another important aspect concerns the effect of bank size on the cost of funding and on the risk perceived by the market. Volz and Wedow (2011) demonstrate that when a bank is considered too-big-to fail the price of its CDS is distorted. A 1% increase in the bank size generates a decrease of 2% in its CDS spread. However, this effect disappears when the bank becomes too large and consequently too-big-to save with respect to the dimension and soundness of own country's public finance (Demirgüç-Kunt and Huizinga 2013; Bertay et al. 2013).

3. Data and Methodology

3.1 Data

The analysis is based on a database created using DCM Analytics by Dealogic. We collected information on about 16,000 fixed-rate bonds issued by banks headquartered in France, Germany, Italy, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States during 2006-2012. We aggregated the issues on the basis of the issuer parent: the analysis of bank business models is carried out at the holding company level, since the issuer is frequently a financial company only committed to the placement activity. We analyse 16,061 fixed-rate bonds by 1,310 financial institutions pertaining to 66 bank holding companies (parents).[2]All bank-specific balance sheet data were obtained from Bank scope and referred to the holding company.

[1]See, for instance, some aspects of the Basel III liquidity regulations,the contents of EMIR, or the OTC derivatives reform, which encourages participants of OTC markets to place collateral either with derivatives counterparties or with a formal CCP, both of which will receive preferential treatment in the event of resolution.

[2] We have discarded the issues made by the US Federal Home Loan Banks, given the specific characteristics of such a government-sponsored banking system.

Table 1 presents the mean value for bond and country specific variables, whereas table 2 presents mean value for bank specific variables relative to the pre-crisis period (2006).

Table1Sample means of bond and country specific variables

		Pre-crisis (2006-2007)	Subprime crisis (2008-2009)	Sovereign crisis (2010-2012)
Geo-area (number of issues)	Europe	2,606	2,620	5,163
	United States	2,779	1,492	1,401
	Total	5,385	4,112	6,564
Years to maturity		11.80	6.49	8.50
Issued by Sifis (percentage)		76.92	78.91	79
Mean coupon value (percentage)		4.01	3.47	3.38
Issue rating (mean category)		AA	A+	AA-
Parent rating (mean category)		AA	A+	AA
Presence of guarantee (percentage)		10.21	14.26	10.20
Type of guarantee	Public	0.54	26.64	3.23
	Private	99.46	73.36	96.77
Deal Value - average size (EUR)		320,339,186	227,810,419	189,263,646

Table2Sample means of holding company balance sheet specific variables relative to the pre-crisis period (2006)

	Mean	**Std. Err.**
ROAA	0.9782	0.0095
ROAE	16.7802	0.0927
Cost Income	56.2633	0.1659
Net Loans over Total Assets	40.4736	0.3277
Net Loans over Deposit and Short-Term Funding	70.1586	0.6679
Net Loans over Deposit and Borrow	48.1010	0.4090
Liquid Assets over Deposit and Short-Term Funding	57.4198	0.6186
Liquid Assets over Deposit and Borrow	36.9277	0.2985
Net Interest Income over Operating Income	0.4392	0.0028
Securities over Total Assets	0.3655	0.0032

3.2Methodology

To investigate the driving forces that helped banks to weather the storm during the financial crisis with a relatively stable cost of long term funding we first consider the micro and macro factors that could explain the cost of bank bonds at issuance. First, these factors are connected to the characteristics of the issue itself, namely, issuance maturity and size as well as accompanying guarantees, either private (from the parent bank, for instance) or public (typically from the sovereign). In addition, the cost could be influenced by the strength and soundness of the sovereign (CGFS, 2012). To evaluate the contribution of these variables during the years under investigation (2006-2012), we run an ordinary least squares regression with country dummies included to take into consideration in homogeneity in baseline risk-free assets[3], where the dependent variable is the bond coupon rate (Eq. 1). The explanatory variables are: GUARANTEE a dummy variable which takes the value 1 in presence of a guarantee, YEARS TO MATURITY a measure of the maturity of the issue; LOG DEAL VALUE is a measure of the size of the issue expressed in terms of natural logarithm of the deal value; COUNTRY RATING is a measure of the rating assigned by S&P rating agency (with a scale from AAA to C); and several country dummies[4]:

[3]In the case of fixed-rate issues, the market measure of the risk of bank debt should be extrapolated from the bond yield at issuance. This can be done subtracting from the value of the coupon the fixed rate of the asset swap contract with same maturity and currency. However, the variability induced by such a procedure in our data prevented us from using such a clean variable. Therefore, we used the coupons and introduced country dummies (fixed effects).

[4] At this stage we did not consider the issue rating since our aim is to detect how each variable of interest (namely guarantee, year to maturity, log deal value, country rating) influences our target variable (cost of bond). The rating of the issue is in fact a synthesis of all the issue characteristics that instead we want to consider separately.

$$BondCouponRate_i = \beta_0 + \beta_1 Guarantee + \beta_2 YearsToMaturity + \beta_3 \log(DealValue) + \sum_{j \in Countries} \gamma_j \mathbb{I}[Country_i = j] + \sum_{k \in Ratings} \delta_k \mathbb{I}[Rating_i = k] + \epsilon_i \quad \text{(Eq. 1)},$$

where$\mathbb{I}[condition]$ is an indicator function that takes the value 1 when *condition* holds and zero otherwise, $\beta_l, \gamma_j, \delta_k$ are coefficients to be estimated by least-squares and ϵ_i is a mean-zero random component that captures all the movements of *Bond Corporat eRate* not (linearly) explained by the set of regressors. In order to avoid collinearity, one country (France) and one rating class (A) have been omitted from the dummy variables, thus, the coefficient β_0 is to be interpreted as the intercept of a French bond with rating A, the γ_j coefficients as increments of the intercept of country *j* with respect to France and the δ_k coefficients as increments of the intercept of rating class *k* with respect to A. For example, in Table 4 the AAA coefficient (-0.221) is to be read as: "on the average and *ceteris paribus*, the rating AAA reduces the bond rate by 0.2% with respect to a bond rated A"; the Germany coefficient (-0.8125) is to be interpreted as: "a bond issued in Germany has an average rate that is 0.8% lower with respect to the same bond issued in France, *ceteris paribus*".Next, we take the residuals of the regression: for each year and each issuing bank, the residuals represent that part of the funding costs that is not explained by the bond issue or country characteristics. We then compute the algebraic increments of the residuals for each crisis year — from 2008 to 2012 — with respect to the residuals in the non-crisis years, 2006 or 2005 (depending on whether the bank had issues in one of the two years) and regress them on a set of explanatory variables in order to assess which were the relevant factors in determining an (algebraic) increase of the cost of financing during the crisis, again, *ceteris paribus*.Finding the causes of the variability of the cost of bank bonds during the crisis is the last step of our analysis. We postulate that the variability of the cost of bond issues over the crisis years reflects the characteristics of the issuing bank: size, capital adequacy, systemic relevance or type of business model chosen for its intermediation activity.

We run two regressions, separately considering the two phases of the financial crisis: the subprime crisis (2008-2009) and the sovereign debt crisis (2010-2012). The dependent variable is the (algebraic) increment of the bond yield net of the variables in eq. 1 , the explanatory variables are parent bank characteristics relevant in influencing the market favour: capitalization (equity over total assets), size (log of total assets), systemic relevance (proxied by belonging to the SIFIs list provided by the Financial Stability Board since November 2011)[5], bank business model and bank profitability(to identify the bank business model we run a Principal Component Analysis as described in paragraph 3.2.1). The characteristics above are considered as of the end of 2006, the year preceding the crisis; these data represent the financial statement information available to market participants in 2007. We are interested in investigating the specific bank business model that was less penalized by the markets in the form of higher funding costs in subsequent crisis periods. Because the level of bank capitalization has been deeply influenced by state aid, which mainly took the form of capital injections, both regressions are augmented by a dummy variable that takes the value 1 if the bank received state aid and zero if it did not. In addition, the sovereign debt crisis did not affect our sample countries in the same way; therefore, we added a dummy to characterize distressed countries (Italy and Spain).Summarizing, the explanatory variables are: YEAR a dummy variable for the years (the omitted variable is 2008); BANK CAPITALIZATION (the ratio of equity over total assets); BANK SIZE (the natural logarithm of total assets); BANK BUSINESS MODEL (measured by the first principal component); BANK PROFITABILITY (measured by the second principal component); SIFI a dummy variable equal to 1 for systemically important institutions and 0 otherwise.

STATE AID a variable measuring the ratio of state aid over the bank's equity; US BANK, a dummy variable equal to 1 for US banks, and 0 for European banks. In the regression, relative to the sovereign crisis, we add also a variable DISTRESSED COUNTRIES a dummy variable equal to 1 for distressed countries (Italy and Spain) and 0 otherwise.

[5]SIFIs are financial institutions that the Financial Stability Board (FSB) recognized as systemically important after applying the criteria set out by the Basel Committee on Banking Supervision (BCBS) to detect such institutions.This information is available from 2011 and has been attributed to back also for the years prior to the publication of the list of G-SIBS (global systemically important banks) in November 2011.

3.2.1 Bank Business Model via Principal Component Analysis (PCA)

To identify the prevailing business model of each bank we run a PCA on the typical ratios that are analysed in the growing body of literature that, since the onset of the subprime crisis, focuses on the main characteristics of the OTD and OTH models in banking (Ayadi et al., 2011; Altunbas, 2011; Aracne et al., 2013). In particular, we considered the following characteristics of the holding company: profitability (ROA and ROE); liquidity (liquid assets over deposits; liquid assets over total borrowings); efficiency (cost to income ratio); funding gap (loans over deposits; loans over total borrowings); and relevance of traditional intermediation activity (loans over total assets; net interest margin over total operating income) (see Table 3).Principal components (PCs) are new variables built as linear combination of the original variables that enjoy the following two properties:

1. *PCs are mutually uncorrelated,*
2. *The first PC is the linear combination that explains the greatest part of the sum of the variances of the original variables, the second PC is the linear combination that explains the greatest part of the sum of the variances of the original variables not already explained by the previous components and so on.*

The advantage of principal component analysis is threefold: *i*) it reduces the number of regressors in the model, and thus, the number of coefficients estimated, given the not-so-large number of observations in the sample; *ii*) it eliminates collinearity problems among our financial ratios, being PCs uncorrelated and, in this case, well interpretable; *iii)* it enhances the signal and reduces the noise in the data, since the new variables are weighted averages of many other variables.The following equation is used to construct our PC variables:

$$Comp_{ji} = \sum_{k=1}^{12} \lambda_{jk} x_{ki}$$

where$j = \{1,2\}$ is the component, λ_{jk} represent the loading that the *j*-th component assigns to the *k*-th variable (the values are reported in Table 3). As it appears clear from the last two columns of Table 3, the first component is highly correlated with the last seven variables, while the second component is strongly correlated with the first two variables. The third variable (CostIncome) is correlated with both components.Table 3 reports the results of the principal components analysis run for the year 2006. We indicate in bold the more representative variables in each principal component and the relative sign. The first component is clearly related to the "old" model of bank intermediation known as the "originate-to-hold" business model, characterized by a higher incidence of loans and a lower incidence of liquid assets and securities over total assets. OTH banks were less inclined to intensify processes of securitization, which provided OTD banks the needed liquidity and reduced their need to raise new deposits and/or new borrowings. The revenue structure of such a model is also characterized by a higher relevance of net interest margin over total operating income. The second component concerns bank profitability: it describes banks with higher ROA and ROE and higher efficiency.

Table 3 Principal component analysis and bank business models

The table shows the results of the principal component analysis on the main variables used to explain and characterize bank business models. In bold are the more representative variables in each principal component and their relative sign. The two components presented explain 78% of the sum of variance of the ten original variables. The correlation of the PCs with the original variables guides the interpretation of the new variables: the first PC is mainly related to the business model while the second one accounts for a significant part of the variability of profitability.

	Loadings			Correlations	
Variable	Comp.1	Comp.2		Comp.1	Comp.2
ROAA	0.08	0.61		0.20	**0.81**
ROAE	-0.12	0.62		-0.31	**0.82**
CostIncome	-0.22	-0.40		-0.53	-0.52
NetLoansOverTotal Assets	0.40	0.00		**0.98**	0.00
NetLoansOverDepositAndShort term Funding	0.34	0.02		**0.84**	0.03
NetLoansOverDepositAndBorrowing	0.39	0.03		**0.96**	0.04
LiquidAssets OverDepositAndShort term Funding	-0.35	-0.04		**-0.85**	-0.06
LiquidAssets OverDeposits AndBorrowing	-0.36	-0.03		**-0.89**	-0.04
NetInterestIncomeOverOperatingIncome	0.34	-0.27		**0.84**	-0.36
SecuritiesOverTotal Assets	-0.37	0.03		**-0.90**	0.04

4. The cost of funding through the crises: volatile or stable?

Systemic crises deeply affect the cost of bank long-term funding: due to a perceived higher probability of default and ensuing losses, banks face mounting difficulties in raising money in the bond markets. This turns into a harsher competition in the household segment of retail deposit markets, and this source of funding also becomes more expensive. Although systemic crises, by their nature, affect the whole banking system, the very specific characteristics of a bank—capitalization or business model, for example—are relevant factors to explain the diverse resilience of each bank to the approaching storm. Indeed, successful funding relies on a set of "best practices" that can mitigate the risks of a withdrawal of funding, either at the bank or system level. Some key balance sheet characteristics may help banks withstand adverse and prolonged shocks (Le Leslé, 2012). In this section, we report which driving forces helped banks to weather the storm during the financial crisis with a relatively stable cost of long term funding. As described in Section 3.1 we first consider the micro and macro factors that could explain the cost of bank bonds at issuance (Table 4).

Table 4 Micro and macro determinants of the cost of bank bonds

This table reports the OLS result of a regression of the cost of bond at issuance with respect to bond characteristics and macro factors. The dependent variable is the bond coupon rate. The explanatory variables are: a dummy variable, which takes the value 1 in presence of a guarantee; the maturity of the issue; its deal value; the country rating (the omitted variable is Rating A); and the deal nationality (the omitted variable is France, and Norway is not defined because of collinearity). ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	Estimate	Std. Error	T value	Pr (>|t|)	
Intercept	4.1937	0.3685	11.380	0.0000	***
Guarantee	0.3300	0.1302	2.536	0.0112	**
Years to Maturity	0.0822	0.0108	7.598	0.0000	***
Years to Maturity^2	-0.0011	0.0004	-2.645	0.0081	***
Log Deal Value	-0.0391	0.0109	-3.566	0.0003	***
Country Rating AAA	-0.2112	0.2913	-0.725	0.4685	
Country Rating AA+	-1.0630	0.3041	-3.495	0.0005	***
Country Rating AA	-0.7023	0.3667	-1.915	0.0555	*
Country Rating AA-	0.1244	0.2918	0.426	0.6698	
Country Rating A+	0.4706	0.3433	1.371	0.1705	
Country Rating BBB+	0.6417	0.3779	1.698	0.0895	*
Nationality Germany	-0.8125	0.0651	12.463	0.0000	***
Nationality Italy	-0.6901	0.2660	-2.594	0.0095	**
Nationality Spain	0.2455	0.1266	1.940	0.0524	*
Nationality Sweden	-0.7419	0.1104	-6.720	0.0000	***
Nationality Switzerland	-0.5131	0.1111	-4.615	0.0000	***
Nationality UK	0.1838	0.0808	2.275	0.0229	**
Nationality US	0.6499	0.0916	7.094	0.0000	***

Residual standard error: 1.558 on 6,012 degrees of freedom.
Multiple R-squared: 0.1314, Adjusted R-squared: 0.1289,
F-statistic: 53.48 on 17 and 6012 degrees of freedom, p-value: < 2.2e-16.

As expected, bond coupons increase as maturity increases and the macroeconomic environment in which the bank operates becomes riskier (country dummies and country ratings). The presence of a guarantee seems to increase the bond coupon rate; this effect can be motivated by the presence in more than 90% cases of a private guarantee frequently granted by the same parent company.Tables5and 6 report regression results for the variability/stability of the cost of bank bonds, separately considering the two phases of the financial crisis, the subprime crisis (2008-2009) and the sovereign debt crisis (2010-2012).There are two main results of our analysis: First, the change in the cost of funding decreases in 2009 relative to the worst year of the subprime crisis. This downward trend seems to be interrupted in the first phase of the sovereign crisis. The first glimpse of light appears in 2012, when the cost variability begins to decrease—being0.50% lower than it was in previous years. Second, bank business models matter. Our measure of business model captures the effect of the different orientation of the bank towards the OTH business model.

For our sample of fixed-rate issues, it shows a negative and statistically significant sign for the whole period under investigation: banks with an OTD business model had more variable long-term funding costs than OTH banks. This result is in accordance with several studies that after 2007 are in favour of the traditional intermediation activities (Ayadi et al, 2011; Altunbas et al., 2011; Aracne et al, 2012, Köhler, 2015). Size and systemic relevance are not statistically relevant in determining the cost of bank bonds, although the sign of the regressions is coherent with the too-big-to-fail hypothesis, upon which larger and systemically relevant banks are supposed to enjoy a lower cost of debt (implicit subsidy), given their special status—the expectation of non-failure. Profitability is not a relevant factor in explaining the stability or variability of the cost of bonds. Similarly, capital adequacy does not exert its positive effects on the cost of borrowing; highly capitalized banks (as of year end2006) are penalized to a greater extent by the market when they issue bonds. There are two possible explanations. First, the subprime crisis revealed that the level of bank capital was not a true and reliable indication of a bank's strength, and this led to the introduction of new capital adequacy rules known as Basel 3. Second, capital adequacy during crisis years was massively influenced by capital injections, especially by the public sector. Markets reacted negatively to these interventions in the first phase of the crisis. Indeed, we document that US banks experiencing intervention were punished with higher funding costs in the bond market. During the sovereign debt crisis, however, banks experiencing intervention enjoyed a decrease in the cost of their long-term borrowing, unless they had headquarters in crisis-affected countries.

Table 5 Analysis of cost variability during the subprime crisis period

The dependent variable is the mean rate algebraic increase in residuals for each crisis year and compared to the pre-crisis year (2006), for each issuer. The explanatory variables are: a dummy variable for the years (the omitted variable is 2008); bank capitalization (the ratio of equity over total assets); bank size (log of total assets); bank business model (principal component n.1); bank profitability (principal component n.2); a dummy variable equal to 1 for systemically important institutions and 0 otherwise; a variable measuring the ratio of state aid over the bank's equity; and a dummy variable equal to 1 for US banks, and 0 for European banks.

***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. The regression is run for the period 2008-2009.

	Estimate	Std. Error	T value	Pr (>|t|)	
Intercept	-2.5100	3.9354	-0.638	0.5257	
Year 2009	-0.8164	0.2436	-3.352	0.00131	**
Equity / Total Assets	0.1024	0.0566	1.808	0.0751	*
Log Total Assets	0.3768	0.4638	0.812	0.4194	
Comp. 1	-0.1529	0.0718	-2.128	0.0370	**
Comp. 2	-0.0111	0.1140	0.097	0.9226	
Sifi (dummy)	-0.2863	0.4577	-0.626	0.5337	
State Aid / Equity	3.9205	2.4895	1.575	0.1199	
US Bank (dummy)	-1.7702	1.1678	-1.516	0.1342	

Residual standard error: 1.058 on 68 degrees of freedom.
Multiple R-squared: 0.2353, Adjusted R-squared: 0.1453.
F-statistic: 2.615 on 8 and 68 degrees of freedom, p-value: 0.0147

Table 6 Analysis of cost variability during the sovereign debt crisis period

The dependent variable is the mean rate algebraic increase in residuals for each crisis year and compared to the pre-crisis year (2006), for each issuers. The explanatory variables are: a dummy variable for the years (the omitted variable is 2008); bank capitalization (the ratio of equity over total assets); bank size (log of total assets); bank business model (principal component n.1); bank profitability (principal component n.2); a dummy variable equal to 1 for systemically important institutions and 0 otherwise; a variable measuring the ratio of state aid over the bank's equity, a dummy variable equal to 1 for distressed countries (Italy and Spain) and 0 otherwise; a dummy variable equal to 1 for US banks, and 0 for European banks. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. The regression is run for the period 2010-2012

	Estimate	Std. Error	T value	Pr (>|t|)	
Intercept	0.9619	3.9451	0.244	0.8079	
Year 2011	0.2043	0.2425	0.842	0.4017	
Year 2012	-0.5053	0.2441	-2.070	0.0410	**
Equity / Total Assets	0.0110	0.1062	0.103	0.9180	
Log Total Assets	-0.1491	0.4680	-0.319	0.7508	
Comp. 1	-0.2341	0.0817	-2.864	0.0051	***
Comp. 2	0.1210	0.1021	1.185	0.2387	
Distressed Country	0.3966	0.8728	0.454	0.6505	
(Equity / Total Assets) X Distressed Country	0.0668	0.1388	0.481	0.6316	
Sifi (dummy)	-0.0863	0.4550	-0.190	0.8499	
State Aid / Equity	-0.2702	0.5148	-0.525	0.6009	
US Bank (dummy)	1.1910	0.4651	2.561	0.0120	**

Residual standard error: 1.049 on 100 degrees of freedom.
Multiple R-squared: 0.3867, Adjusted R-squared: 0.3192.
F-statistic: 5.732 on 11 and 100 degrees of freedom, p-value: 4.179e-07

5. Conclusions

This paper investigated the driving forces that helped banks facing financial market turbulence in the years 2008-2012 with limited effects on the costs of their long-term funds. In particular, we collected information on banks' long-term debt issuance for the years 2006-2012 and we correlated bank long term funding patterns to bank business models. Our sample includes fixed-rate bonds issued by banks headquartered in Europe and the United States. We first represented bank business models via a principal component analysis, so as to capture the effect of the different orientations towards the Originate-To-Hold or the Originate-To-Distribute business models, considering at one time the whole structure of bank financial statement. Then we linked bank business models to long term funding patterns. We showed that different orientations towards the OTH or the OTD business models had subsequently, during crisis times, diverse impact on the variability or stability of the cost of long-term funds.
Our analysis proved that OTH banks benefited from more stable long-term funding costs during the crises.
In light of these results, we postulate different future behaviour in approaching bank bonds markets according to the business model adopted. The regulatory framework (i.e., the new Basel liquidity rules) is likely to put additional burdens on banks' funding policies, requiring them to hold higher amounts of long-term resources to fund the illiquid portion of their assets. The higher this share, the more urgent the need to tap financial markets.
In turn, as documented in Bongini et al. (2015), financial markets show some resistance to investing in longer maturities and increasingly ask for plain vanilla issues or for some form of mitigation of the credit risk. The risk aversion of bank bondholders is likely to be emphasised by the approval of the new European rules concerning the bail-in mechanism stated in the BRRD (Bank Recovery and Resolution Directive) which entered into force in 2016. The new directive modified the default risk exposure of the different forms of bank issues. We may expect that investing in bank bonds will be initially affected by uncertainty depending on the effective implementation of the bail-in mechanism in a situation of bank distress. The market of bank bonds will be characterized by a generalized increase in risk premium, especially in Europe after the enactment of the Bank Recovery and Resolution Directive (BRRD) and its bail-in requirements.

Poorly capitalised banks could face additional difficulties even in tapping the market. Two further elements are expected to influence the fund-raising behaviour of banks, regardless of the business model adopted. As an effect of recent systemic crises, markets are less inclined to accept the assessment of credit risk provided by rating agencies and to set prices purely reflecting the rating classification of the bond issuance. Ratings are no longer expected to explain the cost of bank long-term debt (Bongini et al., 2015).Furthermore, also for the effect of the BRRD, investors will be increasingly worried about the quality of banks' assets and will tend to consider not only the quality of the loan portfolio but also that of the trading book in order to assess the borrower's credit worthiness: the experience of the EU banking market proves that when sovereign debt represents a significant asset class in the bank's portfolio mix, the bank's credit risk and the sovereign risk are closely tied in the perception of the market.

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