# Underwriting as Certification of Bank Bonds

Santiago Carbo-Valverde*
*Bangor University and Funcas*

Francisco Rodriguez-Fernandez
*University of Granada and Funcas*

Anthony Saunders
*Stern School of Business, NYU*

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**Abstract**

Banks distribute corporate debt by selling their reputation as underwriters to investors in debt markets. Nevertheless, a little explored area is the certification role of banks in placing their own bond debt. In particular, the bank-specific alternative choice of self-underwriting versus the exclusive use of third-party underwriting. Moreover, bank reputation was damaged during the recent crisis and the question of how banks certify their bond debt in such times remains an unresolved issue. We use a sample of bank bond own deals from 24 European countries, that permits a unique identification of banks' underwriting choices: self-underwriting takes place almost entirely in domestic bond markets and it is undertaken by banks in the less reputable underwriting group. Third-party underwriting takes place mostly in Euro-bond markets where both reputable and less reputable underwriters operate. We show that strong underwriter reputation brings significant differences in yield and fee benefits and that these differences are actually larger in crisis years. Over the 2003-2013 period we find that issuer banks could save Eur 11 million per deal when that transaction was placed by a reputable underwriter, while they lost Eur 9 million per deal when the deal was managed by an underwriter in a less reputable group. Despite those benefits, banks may alternatively decide to self-issue if they have disincentives to share information on their financial status with competitors.

JEL Classification: G21, G24
Key words: banks, underwriter, bond, self-issuing, debt certification

* Corresponding author: s.carbo-valverde@bangor.ac.uk, Bangor Business School, Hen Goleg, College Road, Bangor, LL57 2DG, UK.

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## 1. Introduction

Bond markets were highly volatile during the 2007-2010 recession. The European market was particularly turbulent as sovereign bond default risk concerns extended to the private debt market making it difficult for private issuers to distribute their debt. This was important as many banks were capital constrained due to their lack of Tier 1 equity and their increasing reliance on Tier 2 capital such as subordinated debt.

The information asymmetry that typically exists between insiders (issuing firms) and outsiders (investors) in securities markets becomes more acute during a crisis as underwriting banks and issuing banks are affected by reputational problems. Indeed, banks not only sell and market securities as underwriters[1], they also act as issuers themselves. Unlike non-financial firms, banks can either choose to self-underwrite or use a third-party underwriter. This introduces significant complexity regarding the extent banks need certification from their competitors and/or are willing to share material information with rival banks. This is particularly relevant when the bonds are privately placed as underwriters in the banking industry may obtain significant information from issuers and both may operate as banks in the same markets. Information on reputational problems of issuers may arise when a third-party bank places the bond and when many of the potential buyers are informed institutional investors. However, prior studies have paid little or no attention to these novel issues.[2]

Underwriters are supposed to offer certification benefits to issuers and investors. Underwriters seek to lower an issuers' transactional costs of borrowing and cost of capital by building "reputation capital" as a repeated player in debt markets (Booth and

[1] Most of the European bank issues that are not self-underwritten, sell on a best efforts basis rather than firm commitment basis.

[2] The only study we are aware of that concerns bank bond self underwriting is a recent study by Becher *et al.* (2016). Unlike their study that focuses only on bank choice of underwriter, our analysis not only considers this issue but in addition estimates the effects on issuer costs (yields plus fees) of underwriter choice. A number of studies has focused on the role of self vs. third-party underwriting in IPOs. A seminal contribution is Muscarella and Vetsuypens (1989) which shows that self-marketed offerings are characterized by statistically significant underpricing comparable to that of other IPOs.

Smith, 1986; Chemmanur and Fulghieri, 1994). The existing literature on bond underwriting has focused on the role of banks as underwriters of non-financial firms' debt (Fang, 2005; Yasuda, 2005). However, an important and unexplored issue relates to the role banks play as underwriters of either their own or other banks' debt securities.

Indeed, allowing a third-party bank to underwrite its debt may place an issuing bank at a competitive disadvantage by disseminating competition-specific private information to a third-party bank in the course of underwriting due diligence. Hence, even if there are benefits from third-party certification, there are also reasons for banks to self-underwrite. Information sharing may work in different directions. On the one hand, some banks may need other (bigger or more reputable players) to place large issues in markets where they face a higher degree of asymmetric information. On the other hand, by sharing information with underwriters, these banks may be revealing material information about their profitability and risk exposures. As shown by Brickley *et al.* (2012) there could be increased costs faced by banks in dealing with other banks that act as both suppliers and potential competitors. For instance, loan participations require sharing proprietary information about major loan customers, something a bank would not want to provide to a potential competitor.

This paper seeks to examine issuer choice between self-underwriting and third-party underwriting and to estimate the effects of this choice in both good and poor market conditions.[3]

The identification strategy in this paper has four dimensions. First, we differentiate bank debt self-underwriting from third-party bank debt underwriting. Secondly, we distinguish reputable versus less reputable underwriters. Third, we

[3] Underwriter reputation is measured using standard indicators based on their market share in underwriter league tables provided by Dealogic. To measure the quality of underwriting services to the issuer, we use both yields and underwriting fees paid as metrics.

account for the non-random matching of underwriters and issuers. Fourth, we investigate the impact on a bank's costs of debt from employing reputable underwriters both before and during the crisis.

To date, there is mixed evidence on the relations between European debt underwriter reputation and security pricing and little is known of the effect of reputation on underwriting fees.[4] This paper offers novel evidence on these issues. Overall, our results show that there are significant certification benefits from third-party underwriting by reputable underwriters. However, some banks may decided to self-underwrite if they are reluctant to share material information with rival banks. Our results show that standard indicators of quality, such as issuer and issue rating, only partially explain bank bond issuance quality (issue yields and fees paid) while underwriter reputation plays an important role in explaining differences in yields and fees. This result suggests that good underwriter reputation acts as "certification" when substantial informational problems about a bank's debt quality emerge. In particular, we find reputation provided by underwriters was particularly important during the crisis. Moreover, reputational-based advantages outweighed the information and competitive costs of using a third-party bank to underwrite an issuing bank's debt.

The structure of the paper is as follows. Section 2 discusses related literature. Our hypotheses, data and methodology are described in Section 3. Section 4 presents our results. Section 5 is a conclusion.

## 2. Prior literature

Explaining the effects of underwriter reputation on debt quality requires addressing a simpler (but fundamental) question as to how underwriters and issuers

[4] The IPO market offer some evidence generally showing that IPOs with more informed investor capital require higher returns (e.g. Carter and Manaster, 1990).

choose each other. Previous studies have almost exclusively dealt with third-party certification by banks of non-financial firms. However, the certification benefits of bond underwriting by banks themselves remain largely unexplored. Unlike non-financial firms, banks may either choose to self-underwrite or to use a third-party bank to underwrite its debt. Practitioners assume third-party underwriting is beneficial as it provides external credibility to the certification function. However, even if we assume these and other potential benefits of certification, some banks still decide to self-underwrite for competitive concern reasons. Thus, the self-underwriting choice reflects a trade-off between the need for certification and the competitive costs or disadvantages of sharing material information.

Several prior studies dealing with underwriting in both debt and equity markets have typically assumed that issuer/underwriter association is a one-sided choice (either issuers choose underwriters or vice versa). However, an institutional facet of these markets is that underwriters care for the quality of the issuers and issuers value the reputation of underwriters. Reflecting this, Fernando *et al.* (2005) empirically test a theory based on a mutual choice of issuers and underwriters debt issuance by non-financial firms and show that the quality of both agents is similar. In the case of banks, another possibility emerges: the possibility for the issuer placing its own debt. Hence, the bank's issuance choice is first whether to self-underwrite or use a third-party and, second, if a third-party is used, explore the determinants of the matching with reputable versus less reputable underwriters.

Given the relevance of quality in underwriter-issuer matching, the so-called "certification hypothesis" suggests underwriters reduce information asymmetries between investors and issuers by using their reputation to certify issuer quality (Booth and Smith, 1986). For example, Chemmanur and Fulghieri (1994) show that reputation

is established by adopting stringent evaluation standards and that reputable underwriters place less risky issues, obtain higher prices for issuers, and receive higher compensation in terms of fees. However, they also show that highly reputable underwriters create a moral hazard problem for investors as they may use their reputation to avoid the costs of strict evaluation. Similar evidence was found earlier for the equity IPO market in Muscarella and Vetsuypens (1989). In a later study on equity IPOs, Chemmanur and Krishnan (2012) demonstrate that reputable underwriters may shift from certifying quality to maximizing an issue's proceeds. Thus, some underwriters may use their market-power to obtain larger gains for themselves and the issuers, the so-called "market power" hypothesis. Andres *et al.* (2014) examine the high-yield bond market and test whether certification via reputable underwriters is beneficial to investors in the corporate bond market. Consistent with the market power hypothesis they find that bonds underwritten by the most reputable underwriters are associated with significantly higher downgrade and default risk.

Studies of the relations between issuance prices and fees of non-financial firms' debt and bank underwriter reputation have been very limited and on European bank debt issues there has been none. Most of the evidence on the effects of underwriter reputation on fees and pricing relates to equity underwriting, such as in IPOs (Chen and Ritter, 2000; Fernando *et al.*, 2005; Abrahamson, 2012). As shown by Datta *et al.* (2000) the lessons from equity IPOs are not valid for debt IPOs as the impact of the former on stock prices is usually positive while negative on the latter. There are also differences in the pricing of debt and equity in IPOs, in particular when banks act as underwriters. Kim *et al.* (2008) document large differences between the effect of commercial bank entry on underwriting spreads for IPOs, secondary equity offerings (SEOs), and debt issues in the US.

In the context of our study, if a bank chooses to self-underwrite, the lack of third-party certification may bring the proceeds (price) of the issuance down and increase the bond yields at offering. It may, however, benefit from lower fees as they would likely be assumed at a (lower) internal cost. If reputable certification provides net pricing benefits --lower gross spreads (sum of yield and fees)-- then self-underwriting or third-party underwriting by less reputable issuers may only occur for other reasons, such as low incentives to share information with rival banks. These problems become more acute when liquidity constraints are widespread.

The closest study to ours is Fang (2005) who examines the relation between bank underwriting reputation and debt issued by non-financial firms. Reputable banks are found to obtain lower yields and charge higher fees, but issuers' net proceeds are higher.

The main contributions of our paper to the existing literature are fourfold. First, we analyze, the role of underwriter reputation on bank bond issuance when both issuing "firms" and underwriters compete in the same industry. This permits us to examine the unique feature of the self-underwriting alternative in bank bonds' placement.[5] Secondly, we examine the impact of underwriter reputation on bank bond underwriting fees and yields in both normal times and in crisis years. Third, unlike most studies we do not assume a random-matching between issuer and underwriters but rather control for endogeneity in both bank and underwriter choice. Fourth, we control for the effects of the crisis on underwriter reputation.

[5] We focus on corporate debt and exclude other forms of debt securitization such as ABS or covered bonds.

## 3. Hypothesis, data and methods

### 3.1. Hypothesis and identification strategy

Given the theoretical predictions and the evidence for non-financial firms in prior studies we formulate the following hypotheses H1 and H2:

*H1. Banks choose to self-underwrite or not if there are costs or market restrictions that overcome the potential benefits of using third-party underwriters.*

*H2: If third-party underwriting is chosen, underwriter reputation acts as certification of the quality of bank bonds by reducing the offering yields (raising the offering price) and increasing fees paid by the issuing bank to the bank underwriting the bond.*

A first identification issue is the distinction between self-underwriting and third-party underwriting as mutually exclusive choices of the issuer. In Europe, self-underwriting takes place almost entirely in domestic markets by banks that belong to the less reputable group. However, third-party underwriting is mostly conducted in the Euro-bond market where both reputable and non-reputable underwriters place bank bonds. Therefore, the choice of underwriter reputation is limited to when there a third-party underwriting.

A second identification issue is how to measure reputation. Previous studies have used both cardinal and ordinal measures of reputation. A cardinal measure is often developed using market share of an underwriter as a continuous variable. Alternatively ordinal measures classify underwriters into categories, considering only a subset of top underwriters as reputable. Earlier studies in the equity IPO market, as Carter and Manaster (1990) used indirect measures as the size of the underwriter name in the IPO's tombstone announcements. Evidence shows the Carter-Manaster measure is highly correlated with the market share of the underwriter (Fang, 2005).

In order to distinguish between reputable and less reputable underwriters we identify reputable underwriters as those in the top-7 of the annual bank European bond underwriting league tables. While the studies referring to the US tend to rely on the top-3 underwriters, we use the top-7 as the equivalent European match given the significantly lower degree of concentration in European debt underwriting markets. Using the information provided by Dealogic as of 2013, we find that the top-3 debt underwriters in the US led 30.5% of the corporate debt underwriting while the top-7 in Europe led 40.5%. The top-3 in the US were JPMorgan (11.7%), Citi (9.6%), and Bank of America Merrill Lynch (9.2%). The top-7 in Europe were Deutsche Bank (7.3%), HSBC (6.3%), BNP Paribas (6.0%), Barclays (5.9%), JPMorgan (5.7%); Goldman Sachs (4.9%) and SG Corporate & Investment Banking (4.4%). As noted by Fang (2005, p. 2734) "economically, the binary classification captures the empirically observed two-tiered power structure in the investment banking industry. On Wall Street, an investment bank either belongs to the "bulge bracket" or it does not."

In computing our bond underwriting reputation variable, we need to take into account that more than one underwriter may take part in a bond underwriting syndicate. Traditionally, a deal has been considered reputably underwritten if at least one of the underwriters is in the top of the ranking selected (i.e. Fang, 2005; Fernando *et al.* 2005; or Andres *et al.*, 2014). A stricter approach is to consider a deal as reputable only if all underwriters in the syndicate belong to the top seven. However, using this approach a syndicated deal would be considered as less reputable even when just one underwriter was not in the top seven. We opt for a more balanced approach. A deal is considered as reputable if the average syndicate-weighted market share is equal or higher than the market share held by the seventh rated underwriter in the annual bank bond league tables. Therefore, underwriter reputation status may vary annually. In several robustness

checks, we also use alternative measures of reputation including a continuous (rather than discrete) one.[6] As shown in Figure I, the top-league of bank debt underwriting in Europe has changed significantly over the sample period.

A further challenge relates to the endogeneity problem that emerges from non-random matching between issuers and underwriters. Related literature, such as that on loan syndication or M&As, uses a lead arranger's market share as a proxy for reputation, and shows that lead arrangers with larger market shares retain smaller loan fractions (Sufi, 2007). Although this evidence is consistent with a reputation story, it is also consistent with alternative explanations based on matching between better quality borrowers and large lead underwriters. We follow Fang (2005) in addressing this endogeneity issue by taking take into account the endogenous nature of the matching between issuers and underwriters.

The final issue relates to the impact of the financial crisis. A priori, we would expect that reputation concerns were more acute during the European crisis years and, therefore, the value of reputation should have been greater during that period.

### 3.2. Methods

#### 3.2.1. Hypotheses

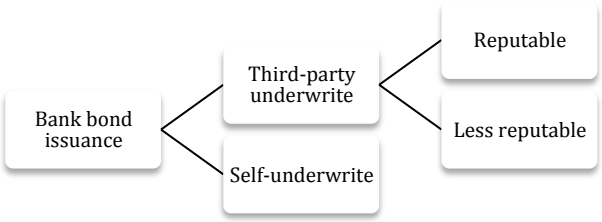
Our identification strategy faces two empirical challenges in testing *H1* and *H2*. For *H1*, the choice of self-underwriting versus third-party underwriting involves a self-

[6] As examples of reputable and less reputable syndicates we can cite the following (note that issue rating and underwriter reputation are not necessarily correlated):
- Unicaja Bank in Spain placed Eur 1.39 billion in a 3-year bond in June 2009. The issue was rated Aaa by Moody's, the annual yield was 3%, the fee was 0.8% and there were six underwriters in the transaction: Barclays; BBVA; BNP Paribas; Bankia; LBBW; and Santander. The issue was placed in the Euro-Bond Market. The combined market share of the underwriters was below the 7th position in the top-7 league and, therefore, the deal is considered as run by less reputable underwriters.
- Unicredit in Italy placed Eur 2 billion in a 5-year bond in February 2012. The issue was rated A2 by Moody's, the annual yield was 4.9%, the fee was 0.5% and there were 5 underwriters in the transaction: Citi; Natixis; SG Corporate & Investment Banking; UniCredit. The combined market share of the underwriters was above the 7th position in the top-7 league and, therefore, the deal is considered as run by reputable underwriters.

selection issue and any analysis of pricing conditions at the time of issuance for self-underwriter versus third-party underwriter would be potentially affected by the self-selection issue. Consequently, we analyze the determinants of bond yields for both the group of banks that choose to self-underwrite and the group of banks that choose to use a third-party underwriter.

In testing *H2*, we are not only modeling a self-selection issue with a second-stage analysis of the determinants of yields but also the non-random matching of issuers with reputable and less reputable underwriters.

For both *H1* and *H2*, a switching regression selection model can address the econometric challenge, but each hypothesis requires a different treatment. As shown below in the schematic, by construction, if the choice is to self-underwrite, the issuer is a less reputable underwriter in a domestic market. If the choice is using a third-party underwriter, then the matching problem, reputable or non-reputable underwriter, needs to be separately addressed.




Specifically:

- If a bank chooses to self-underwrite, the second-stage comparison refers just to the yield benefits of choosing to self-underwrite versus the alternative of choosing third-party underwriting. Fees are not examined in this case, as self-underwriting banks do not pay them (other that some accounting internal cost recognition). This involves transfer pricing issues beyond the scope of this paper.

- If a bank uses a third-party underwriter, then the question is whether the matching is with a reputable underwriter or not. The second-stage regressions will then

show the yield and fee benefits of an issuer matching with a reputable versus a less reputable underwriter.

### 3.2.2. Modeling the self-underwriting choice

Testing the reasons behind self-underwriting in this two-stage context can be achieved using the standard extension of the Heckman (1979) model for switching regression, correcting for the potential selection bias in the first-stage with a probit model for self-underwriting versus third-party underwriting, and an OLS second stage model for the determinants of yields, including the Mills ratio correction estimated from the first-stage. In the second stage, the sample is divided between self-underwriters and third-party underwriters to compare the yield benefits. The model is giving by the mutually exclusive choice ($C$) of self-underwriting ($S$) versus third-party underwriting ($T$), where $Z$ is the set of regressors for bank $i$ and :

$$C = S \qquad Z_i\beta + \eta_i > 0 \tag{1}$$

$$C = T \qquad Z_i\beta + \eta_i \leq 0 \tag{2}$$

$$Y_{S,i} = X_{S,i}\beta_S + \epsilon_{S,i} \tag{3}$$

$$Y_{T,i} = X_{T,i}\beta_T + \epsilon_{T,i} \tag{4}$$

where $C \in \{S|T\}$. $Z_i$ is a vector of observable variables influencing the bank choice, $\beta$ is a vector of probit coefficients, and $\eta_i$ is orthogonal to the variables in $Z_i$. $Y_{S,i}$ and $Y_{T,i}$ are the second-stage regressions of the yield variable for self-underwiters and third-party underwriters corrected by the Mills ratio obtained from the first-stage.

A key advantage of a switching regression framework is that we obtain useful estimates of (unobserved) counterfactual outcomes for self-underwriting versus third-party underwriting. Along with separate outcome regression parameter vectors S and T, there are also two covariance coefficients for the impact of private information on the

issuer choice, i.e. the covariance between private information $\eta$ and $\epsilon_S$ and $\eta$ and $\epsilon_T$. The two-step estimation is implemented assuming that the errors $\{\eta_i, \epsilon_{S,i}, \epsilon_{T,i}\}$ are trivariate normal.

The explanatory factors in the first-stage probit testing for self-underwriting include issuer-level variables, issue-level variables, and controls for a bank's financial condition, market restrictions and past-issuing experience. As for the issuer-level variables, issuer size is the year-end value of total assets in the year before the bond issue. Issuer profitability is net income divided by total assets for the year before the bond issue. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The frequency of issuance indicates the average number of times the deal's issuer has issued a bond over the sample period. As for the issue-level variables, the maturity of the bond (number of years) is included. The dummy for callable bonds is equal to 1 if the bond has a call provision and 0 otherwise.

As for the rest of the controls, they include a crisis dummy that takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The specification also includes a 0-1 dummy to control for domestic (1) versus Euro-bond (0) issues, given that most of the self-underwriting in our sample is conducted in domestic markets. The variable "previous issue undertaken by a reputable underwriter" is a dummy that takes the value 1 if the previous placement of the issuer was conducted by a reputable underwriter, and zero otherwise. This would capture whether a previous reputable matching affects the likelihood of self-underwriting by revealing advantages of third-party underwriting. The dummy "previous self-underwriting experience" takes the value 1 if the issuer has previously self-underwritten, and zero otherwise. Given that self-underwriting takes place in the domestic market, the market share of the issuer in the domestic market is also included. In order to control for restrictions on access to

third-party issuance, such as other banks issuing at the same time and hoarding the market we, include the variable "market issuance" as the amount issued by other banks in a month time window over the total market issuance in the year.

The second stage regression (equations (3) and (4)) splits the sample into self-underwriters and third-party underwriters. The explanatory variables include the deal rating, which is a numerical rank for the Moody's bond rating from 1 to 22 (with 22 being an Aaa rating); issuer volatility, as the standard deviation of the return-on-assets of the issuing bank in the year before the issue; and the maturity of the bond. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation also includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is also added from first-stage probit estimations to control for self-selection.

### 3.2.3. Matching with reputable versus less reputable underwriters: empirical model

In the case of third-party underwriting and matching with reputable versus less reputable underwriters, the two-stage model needs to control for the endogeneity problems that emerge from non-random matching between issuers and underwriters. In this context, equation (5) is the latent issuer–underwriter matching equation:

$$I_i^* = Z_i'\gamma + \varepsilon_i \tag{5}$$

From (5), it is possible to estimate:

$$y_{1i} = x_i'\beta_1 + u_{1i} \tag{6}$$

$$y_{2i} = x_i'\beta_2 + u_{2i} \tag{7}$$

where $y_{ji}$ $(j=1,2)$ is the offering yield at issue (or alternatively, the fee paid to the underwriter) so that $y_{1i}$ is the second-stage equation for reputable underwriters and $y_{2i}$ is

the second-stage equation for less reputable underwriters; $x$ is a vector of controls that includes the lambda (Mills ratio) parameter from equation (5). To reflect binary outcomes, $I_i^*$ is discretized so that $I_i = 1$ iff $I_i^* > 0$, and $I_i = 0$ iff $I_i^* \leq 0$. This means $I_i$ equals one if and only if an issue is underwritten by a reputable bank. The vector $Z_i$ contains variables that matter for either a reputable or a less reputable underwriter.

Our list of variables for equation 7 includes both issuer-level and predetermined (before the issuance) issue-level variables, including issuer size, issuer profitability, issuer volatility, frequency of issuance, and maturity. A number of controls were included to check for potential relationships and/or information-sharing conflicts between issuers and underwriters. In particular, we include the dummy "previous issue undertaken by a reputable underwriter", capturing whether the current choice is influenced by past-experience regarding the benefits of reputation. We also include the dummy "previous issuer-underwriter matching", that takes the value 1 if the same matching has occurred earlier, even if the role of issuer and underwriter is switched, and zero otherwise, thereby controlling for potential underwriting relationships and bilateral pricing agreements. The dummy "shared specialization" takes the value 1 if the issuer and the underwriter share their specialization in the commercial banking business versus investment banking business. The specification also includes a dummy to identify if the bond is callable and a crisis dummy. In particular, in order to check the effect of the crisis we interact the main explanatory variables with a European crisis dummy that takes the value 1 for issues made from August 2007 to December 2012 and 0 before and after that time interval. This extends the crisis period two years further than the conventionally used in US studies, but the longer crisis period aims at catching the

effects of the turbulence in European debt markets on bank debt issuance[7]. This way, we aim to control for potential relationship-building effect between issuers and underwriters in the sample[8].

### 3.2.4. Yield and fee effects predicted by the model

Equation (6) is the yield (or fee) equation for the reputable banks, and (7) is that for the less reputable banks under the conditions that $y_{ji} = y_{1i}$ iff $I_i = 1$, and $y_{ji} = y_{2i}$ iff $I_i = 0$. Endogeneity is addressed by allowing the residual yield (fee) to correlate with the residual in the matching equation, so that unobserved or missing variables in the matching equation are allowed to also affect the yield (fee). A larger fee implies a higher price paid by the issuer for underwriter quality. A lower yield (higher bond price) signals the benefit to the issuer from superior bond underwriting reputation. The explanatory variables for the yield equation are only those that can affect the offering yield. The explanatory variables for the fee equation are those related to issue quality and size. These variables are expected to capture certification of the underwriter and risk-bearing costs by the issuer. Following previous specifications, such as those in Booth and Smith (1986) or Fang (2005), we include issue size, debt rating, maturity, a callable dummy, a crisis dummy and the leverage of the issuer.

This two-stage model has been proposed by Lee (1978) and has been employed to address endogeneity concerns in debt and equity underwriting (see, for example, Dunbar, 1995; Puri, 1999; or Gande *et al.*, 1997, 1999). This model allows for testing a different two-stage equation for each underwriter group (similar to the Maddala (1983) regressions with endogenous switching) instead of testing the effects of reputation using

[7] For example, those driven by Greece, Portugal and other EU countries and the impact of the crisis on European banks.

[8] As shown in the tables, our estimations include fixed time effects as controls. This means we we do not need to control for macro effects or market references such as a risk free rate. In any event, different alternatives were undertake as robustness checks, as discussed in Section 4.7.

a single second-stage regression. A single regression would assume that reputable and non-reputable underwriters share the same pricing strategies and technologies thus making it difficult to disentangle the effects of the characteristics of the deal from those of the reputation of the underwriters. Equation (5) is estimated as a probit model to obtain the Mills ratio. This is a binary outcome equation that reflects the matching between the issuer and the underwriter. Equations (6) and (7) test the variables of interest for the two groups of underwriters (reputable and less reputable) and are augmented with the inverse Mills ratios that correct for selection bias as additional regressors. These terms adjust for the conditional mean of *u*, and allow the equations to be consistently estimated by OLS.

Fang (2005) generalizes the model to allow for a more specific computation of the value of underwriter reputation. In particular, she computes a hypothetical yield (alternatively, fee) that would be obtained by a less reputable underwriter in an issue that has actually been underwritten by a reputable underwriter. The difference between the actual and the hypothetical yield gives the value of underwriter reputation. The difference is expressed as follows:

$$E\left[y_{2i} \mid I_i^* > 0\right] - y_{1i} \tag{8}$$

where $E\left[y_{2i} \mid I_i^* > 0\right]$ is the hypothetical yield and $y_{1i}$ is the actual yield. In our sample , this reputation effect can be also inferred before, during the crisis and after the crisis. The same approach can also be used in the case of fees.

### 3.3. Data and descriptive statistics

The original data sample consists of 3,780 bond deals underwritten by banks in 24 European countries during 2003-2013.[9] The deals were privately placed, a fact that gives particular relevance to the sharing of issuer information within an industry where competitors may act as underwriters of the bank's debt. This period allows us to control for the effects of underwriter reputation on yields and fees before and during the crisis.

The sample covers bank bond deals only. The deal data is extracted from the Dealogic database. In our sample, 1459 deals were self-underwritten and 2321 were underwritten by third-parties. 2941 deals were underwritten by less reputable underwriters (i.e. a weighted syndication underwriting reputation share below the share of the 7$^{th}$ largest underwriter in the ranking) while 839 were underwritten by reputable underwriters (with a weighted syndicate reputation share above the share of the 7$^{th}$ largest bond underwriter). Within the self-underwritten deals, 134 where placed by reputable underwriters and 1325 by less reputable underwriters. In the case of third-party deals, 1616 were issued by non-reputable underwriters/syndicates and 705 by reputable underwriters.

Issuer and underwriter characteristics are obtained from Bankscope while ratings are from Moody's.

Figure II shows the evolution of the two main underwriter quality indicators, yields and fees, for the reputable and the less reputable groups over the 2003-2013 period. Yields achieved by less reputable underwriters increased from 2003 to 2008 (4.17% to 4.98%) and then decreased reaching an average yield of 3.44% in 2013. The average yield is lower for reputable underwritten deals in all years. They increased from

[9] The distribution of the deals by countries is as follows: Austria (308), Belgium (11), Bulgaria (1), Cyprus (3), Czech Republic (2), Denmark (33), Estonia (1), Finland (20), France (314), Germany (987), Hungary (15), Ireland (48), Italy (347), Latvia (3), Lithuania (3), Luxemburg (37), Netherlands (635), Poland (4), Portugal (206), Romania (2), Slovenia (20). Spain (246), Sweden (104), United Kingdom (379).

3.95% in 2003 to 4.70% in 2008 and then fell to 3.12% in 2013. Fees, however, were larger for the issues managed by reputable underwriters in all years. They were 0.98% for reputable underwriters and 0.89% for the less reputable underwriters at the beginning of the period, increasing to 1.18% and 1.04% respectively by 2006. In 2013, fees were substantially lower with an average 0.40% fee for reputable underwriters and 0.31% for the less reputable underwriters.

The main descriptive statistics are shown in Table I, including the percentile distributions of the variables. Average annual yield at offering is 4.04% and fees 0.85%. The typical issuer is a mid-side bank with assets of around Eur 56 billion. The average issue size is Eur 0.65 billion. Average deal rating (in a scale from 1 to 22, with 22 being an Aaa rating) is 18 and maturity is 5.59 years. The mean underwriter market share is 2.83%. The average market share of the 7$^{th}$ largest underwriter is 5.74%.

Differences in the characteristics of self-underwritten versus third-party underwritten deals are shown in Table IIA, including mean difference tests. The average yield for self-underwritten bonds is 4.12% and 4.02% for bonds underwritten by third parties. Self-underwriters tend to be smaller, less profitable, and exhibit higher profit volatility than third-party underwriters. Deal rating and bond maturity are also shown to be lower in the case of self-underwriters.

Differences in the characteristics of the deals issued by reputable and less reputable underwriters are shown in Table IIB, including mean difference tests. The average yield for the reputable group is 3.92% and 4.44% for the less reputable group. Choosing reputation, however, implies an issuer paying a higher fee (0.92% versus 0.74%).

As for the characteristics of the issuer, all are significantly and statistically different for the two groups, although the mean difference for issuer profitability is only

significant at the 10% level. Issuers in deals run by reputable underwriters (as defined above) are for typically larger, less profitable and less volatile banks. The issue size, rating and maturity are also larger for deals conducted by reputable underwriters.

## 4. Results

### 4.1. Self-underwriting versus third-party underwriting: first-stage results

Table III shows the results of the probit selection equation of self-underwriting versus third-party underwriting. Consistent with an unwillingness to share information (*H1*), the likelihood of self-underwriting decreases with issuer size and profitability and increases with issuer volatility (risk). Self-underwriters also underwrite bonds less frequently than third-party issuers, and issue bonds of shorter maturity. The probability of self-underwriting seems to have also been lower during the crisis, when the need for certification by a reputable third party was greater. If a bank has previously used a reputable underwriter, the probability of self-underwriting a bond is lower. The results also suggest that larger issuances in the market by other competitors may also crowd out some banks, forcing them to self-underwrite.

### 4.2. Self-underwriting versus third-party underwriting: second-stage results

Second-stage results on the determinants of self-underwritten bond yields at offering are shown in Table IV. Note that no results are shown for fees, as self-underwriters do not pay them externally. For consistency, we compare the results for self-underwriters and third-party underwriters in order to understand the pricing reasons behind self-underwriting. No distinction is made at this stage on whether third-party deals are underwritten by reputable or less reputable underwriters. The results show that a better bond rating has a negative impact on the yield (making the bond price for the

issuer and the proceeds higher) but this benefit is larger for third-party deal underwriting. However, issuer volatility and deal maturity have a positive effect on the yield (making the bond price lower and issue proceeds smaller) but these effects are larger for self-underwriters than for third-party underwriters. The crisis makes pricing (and issue proceeds) disadvantages for self-underwriters larger when using an interaction of the crisis dummy with the main explanatory variables. The positive and significant coefficient of the Mills ratio for self-underwriters reinforces the view that self-underwriting banks pay higher yields and receive lower prices and issue proceeds for any deal.

### 4.3. Reputable vs. non-reputable matching (measuring the net value of reputation to the bank bond issuer): first-stage results

In this sub-section we focus on the probit selection equation of a bank bond issuer who decided to use an external underwriter but has a chance between reputable and non-reputable underwriters. The results are shown in Table V. The dependent variable is binary and takes the value 1 if the underwriter is reputable and 0 if the underwriter is less reputable.

For the issuer-level variables, the probability of matching with a reputable underwriter increases with issue size and frequency of issuance and decreases with issuer profitability and volatility. At the deal level, issue size, rating and maturity have a positive and significant impact. Interestingly, the dummies "previous issue undertaken by a reputable underwriter" and "previous issuer-underwriter matching" are both positive and significant, suggesting a prior relationship may increase the likelihood of a reputable matching. However, if the issuer and the underwriter have the same business (commercial versus investment banking), as captured by the dummy "Shared

specialization", the likelihood of matching with a reputable underwriter is lower possibly because of enhanced concerns regarding information sharing with a rival in the same financial services activity areas. The matching probability with a reputable underwriter also seems to be larger during the crisis, where reputation may have had a higher value.

### 4.4. Reputable matching (measuring the net value of reputation): second-stage results

Second-stage baseline results for the yield equation are shown in Table VI. The Mills ratio obtained from the first-stage probit has a negative and significant impact on the yield. This suggests that the characteristics that have a positive impact on the likelihood of matching a reputable underwriter with an issuer have a negative impact on the yield.

Some interesting differences are found between the deals underwritten by reputable underwriters and those of less reputable underwriters. In particular, a negative and statistically significant impact of issue size on yields (that is, yield savings) is found only for deals with reputable underwriters. A larger deal rating also implies yield savings (higher issue proceeds) but they are larger for the deals managed by reputable underwriters. Longer maturity and greater issuer volatility (the standard deviation of the return-on-assets of the issuing bank in the year before the issue) are found to increase the issue yield and lower issue proceeds, but this effect is larger for the deals of less reputable underwriters.

The impact of the crisis is captured by the interaction of the main explanatory variables with the crisis dummy. The crisis dummy implies lower yields for reputable-underwritten deals as opposed to less reputable-underwritten deals. Yield savings from

deal size and rating are found to be larger in the case of reputable underwriters during the crisis.

Table VII shows the results of the second-stage baseline fee equation. A positive relation of a variable with the fee is interpreted as a cost for the issuer of buying reputation quality from underwriters. The inverse Mills-ratio has a positive and significant effect on the fee which suggests that the characteristics that favor matching with a reputable underwriter imply paying a larger fee. Issue size also exhibits a positive sign (higher fee paid) and is larger for deals run by reputable underwriters (0.120 vs. 0.092). A better rating permits an issuer to make lower fee payments, although this savings effect is found to be larger for the deals run by reputable underwriters. Issuer profitability is negatively related to fees (the saving effect being larger for the reputable group), and issuer's return volatility also exhibits a negative effect on fees (larger in absolute terms for the non-reputable group). These relations hold during the crisis with one important exception, the fee saving effect of ratings is only found to be statistically significant for the reputable group.

Overall, the baseline results show evidence of benefits to issuers of utilizing reputable underwriters. The Mills ratio suggests that lower yields are achieved, although higher fees are paid, when issues are managed by reputable underwriters. Additionally, the second-stage results show that there are pricing advantages (implying both yield and fee savings) related to variables such as rating or issue size in the deals managed by reputable underwriters.

### 4.5. Economic effects: actual and hypothetical yields

The effects of reputation become more evident if we compare the actual and hypothetical yields and fees of each group of deals (managed by reputable versus less

reputable underwriters) using Fang's (2005) hypothetical computation of reputable versus less reputable yield differences described earlier in section 3.2.4. The results are shown in Table VIII. For the entire sample period, the average yield at offering in deals managed by reputable underwriters is 3.96% and hypothetically would have been 4.14% if the issue had been underwritten by a less reputable underwriter. Similarly, the average fee paid is 0.83% while it would have been 0.79% if the deal had been underwritten by a less reputable underwriter. The opposite is found for the less reputable group (4.18% versus 4.06% in the case of yields and 0.75% versus 0.78% in the case of fees). The results for the crisis years are also shown in Table VIII and suggest that reputation effects on yields increased during the crisis and that the yield savings were even larger when using a reputable underwriter.

Actual issue proceeds for the reputable group under the observed pricing conditions would be Eur 0.752 billion while the hypothetical proceeds (if the issues had been managed by less reputable underwriters) would have been Eur 0.743 billion. This implies a gain from reputation of Eur 9 million per deal (i.e. Eur 752 million minus Eur 743 million) . Similarly, the actual proceeds for the less reputable group are Eur 578 million, while the average hypothetical proceeds (if the deals had been underwritten by reputable underwriters) would have been Eur 584 million. This implies an average net loss of proceeds from poor underwriter reputation of Eur 6 million per deal in the less reputable group. If the same computations are made for the crisis years, the average gain for the reputable group is Eur 11 million and the average loss for the less reputable group is Eur 7.5 million. This evidence suggests that the certification benefits of reputable underwriters became even more important during the European crisis years.

### 4.6. Economic effects: gross spreads

An additional check of the net effect of reputation is to run a second-stage estimation of the joint sum of yields and fees (gross spreads)[10]. The results of this estimation are shown in Table IX. The Mills ratio indicates that the determinants of an issuer matching with a reputable underwriter have an overall negative effect on the gross spread of the deal, supporting the idea of an overall positive effect of underwriter reputation, even after accounting for fees. The effects are larger in magnitude during the crisis years and some pricing gains (such as those coming from better issue ratings) are only observable for the reputable underwriter group. These differences in both fees and yields, considered jointly, seem consistent with the findings in previous studies such as Kim et al. (2010) of a joint determination of yields and fees which, in our case, seem to be related to underwriter quality.

### 4.7. Robustness checks

#### 4.7.1. Results for the Euro-bond market

One feature of our baseline results from reputable matching shown in Section 3.2 is that they are based on the whole sample of domestic plus Euro-bond issues. This means that non-reputable deals include all bank bond deals, no matter if they are underwritten by third parties or self-underwritten. In order to control for the potential impact of including domestic deals we rely on a natural experiment that consists of a sub-set of issues that are entirely underwritten by third parties, which are mainly bank bonds issued in the Euro-Bond Market. These are 39% of the deals in our sample (1,452 transactions). As a result, we can look at the reputation-buying effect of issuing bank bonds from third-party banks.

[10] Although we assume a trade-off may exist between yield and fee benefits, we follow Fang (2005) and draw our conclusions from net pricing benefits using the sum of both fee and yield effects (gross spread).

The results for the yield equation in the case of the Euro-Bond deals are shown in Table X. The results are similar to the yield equation of the baseline sample although the economic effects are slightly smaller. For example, the impact of the Mills ratio (capturing reputation) on yields is -0.221 in the Euro-Bond market, compared to -0.238 for the baseline sample. However, the difference between the reputable group and the less reputable group is still statistically significant.

The results for the fee equation in the Euro-Bond market are also similar to the baseline tests (Table XI) although the overall positive effect of reputation on fees seems to be larger in the Euromarket since the estimated impact of the inverse Mills ratio is 0.163 compared to 0.126 in the baseline case. Moreover, the positive overall effect of underwriting reputation also holds when we use the sum of issue yields and underwriting fees (the gross spread) as the dependent variable (Table XII). As can be seen, the results are very similar to those of the baseline case, showing net savings from reputation.

### 4.7.2. Alternative measures of reputation

As our syndicated weighted-average measure of reputation is based on a measured value relative to the 7$^{th}$ underwriter's share in the European bond market underwriter league table, we first rerun our baseline model using alternatively a top-3 and a top-5 metric as the benchmark. For exposition simplicity, the results are shown in the online Appendix[11] on Table XIII-A Panels A and B, respectively. The dependent variable is the sum of the issue yield and fee to capture the gross spread effect. These results can be compared to those of the baseline model shown in Table VII. As can be seen, they show no significant differences in the signs of the coefficients or their

[11] The online Appendix is available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2883473

significance and few differences in the economic magnitude of the effects. In particular, a (more restrictive) top-3 definition implies smaller (but still positive and significant) reputation benefits while the impact is very similar when a top-5 ranking is used.

#### 4.7.3. Exclusion of the largest underwriter

A potential distortive effect may come from the influence of the top bank bond underwriter each year. In particular, it could be the case that changes in bank bond underwriting league tables are due to a particular underwriter offering specially beneficial pricing terms that year. As a result, the yields and fees might be driven to a larger extent by market power than by certification. One way of dealing with this is to remove the top-underwriter from the syndicate weighted ranking, and to re-run the equations. As shown in Table XIV-A (in the online Appendix) both the statistical relations and the magnitude of the economic effects remain very similar to those of the baseline estimations.

#### 4.7.4. Reputation and issue rating class

A further issue relates to the value added by reputation to the relations seen in a particular credit rating class. We therefore investigate whether the positive effect of underwriting reputation is uniformly distributed across credit rating classes. We test this by defining three rating classes and re-running our tests. The three rating classes are: i) top-rating for those deals having a rating between Aaa and Aa3; ii) medium-rating for those deals having a rating between A1 and Baa3; iii) Lower-rating for those deals whose rating is below Baa3. The results are shown in Table XV-A (online Appendix). Surprisingly, top-rated issues benefit to the largest extent from underwriter reputation (a negative impact on the gross spread of 0.534 in the reputable group versus 0.312 in the

less reputable group), with the reputation benefits being the lowest but still statistically significant for the medium and low rating classes.

#### 4.7.5. Differences between underwriter and issuer rating

Even if underwriting and issuer rating do not directly reflect the quality of the issue, we consider a robustness test in which the difference between underwriter and issuer rating is considered along with issue rating in the second-stage equation. A large difference between the rating of the underwriting and that of the issuer may potentially translate into a greater certification benefit and a lower gross spread. As can be seen from Table XVI-A (online Appendix), there is a negative and significant effect of the difference in ratings on the gross spread, i.e. the greater the rating differential between the rating of the underwriter and the rating of the issuer, the most beneficial it is to the issuer. Moreover, the negative effect strengthened during the crisis (as shown by the interaction of the variable with the crisis dummy).

#### 4.7.6. Discrete versus continuous measures of reputation

A further concern might relate to the discrete measurement of underwriter reputation used in this paper. Even if the binary distinction between reputable and non-reputable underwriters allows for better control of endogeneity, we examine next the effect of a continuous measure of reputation on bond pricing. In particular, we use the annual overall debt market share of the underwriter (or the average market share in the case of a syndicate) in each deal. The equation is estimated using two-stage least squares. Lagged values of the explanatory variables, and the log of the total bonds issued by rival banks in the same year are used as instruments. The results (Table XVII-

A in the online appendix) are fully consistent with the baseline estimations. The reputation variable is negative (i.e. underwriting costs are lower) and significant.

#### 4.7.7. Other robustness tests

Other robustness checks include a test for the sovereign debt crisis period. As the sovereign crisis unfolded in late 2009 when the spreads of Greece sovereigns started to rise significantly, we examine the extent to which the European sovereign crisis might have had an effect on the underwriting choices of bank bond issuers. In order to test this, we replicate the baseline test of Table XII for the gross spread using an alternative crisis dummy that takes the value 1 from November 2009 to December 2013 and zero otherwise. The results are shown in the online Appendix (Table XVIII-A). Although the estimated coefficient of the alternative crisis seems to be a bit lower than the crisis dummy that covers both the banking and sovereign crises, the results are very similar to those of Table XII.

We also conduct a test that removes Germany from the sample (as 26% of the deals in our sample were conducted by issuers in Germany) with no material changes in our baseline results. We also estimate the equations including a time trend rather than year dummies but again find no significant changes emerged. We also conducted our tests for non-listed bank issuers only, but no substantive differences were found either. Country dummies were replaced by country-risk indicators, such as sovereign-risk CDS indices, or the composite indicators of systemic stress (CISS) provided by the European Central Bank. However, no significant differences were found compared to our baseline results.

## 5. Conclusions

Prior studies have suggested that banks may offer a certification advantage to non-financial debt issuers. In particular, issuers can obtain pricing advantages from underwriter reputation. However, there has been no evidence of underwriting certification when the issuers are banks themselves. The case of banks is unique as they can choose whether to self- underwrite or use a third-party underwriter, although this latter choice may imply information sharing between participants in the same industry.

We examine the choice of self-underwriting versus third-party underwriting of bank bonds, as well as the effects of underwriting reputation on bank bond pricing (yields and fees) using a large sample of European bank bond deals. We control for the non-random matching of issuers and underwriters using a two-stage procedures that allows us to distinguish the pricing effects for issuers using reputable versus less reputable underwriters.

The results suggest European banks enjoy significant pricing advantages when the bond issues are managed by reputable underwriters, and that these advantages were larger during the crisis period. Using a bond sample encompassing both domestic and Euro-bond issues from 2003 to 2013, we estimate that there is a Eur 9 million net saving on average for issuers due to underwriter reputation per deal in the reputable underwriter group while there is a Eur 6 million net loss from the use of a less reputable underwriter. These differences grow to Eur 11 and Eur 7 million, respectively, during the European crisis years (2007-2012).

Despite the apparent cost saving advantages of third-party reputable underwriting, our results also suggest that some issuing banks may decide to self-underwrite when market conditions make it difficult for them to access third-party

underwriters, and/or when their information sharing incentives are lower (e.g. due to financial weakness).

Our results are also found to be robust to different identification and measurement tests, including considering only issuance by third parties in the Euro-Bond Market or alternative definitions of underwriter reputation.

Overall, our findings are in line with those obtained by Fang (2005) for non-bank bond deals. However, our results offer novel evidence on the incentives of banks to self-underwrite versus using third-parties and suggest that reputation is even stronger for third-party bank underwritten bonds.

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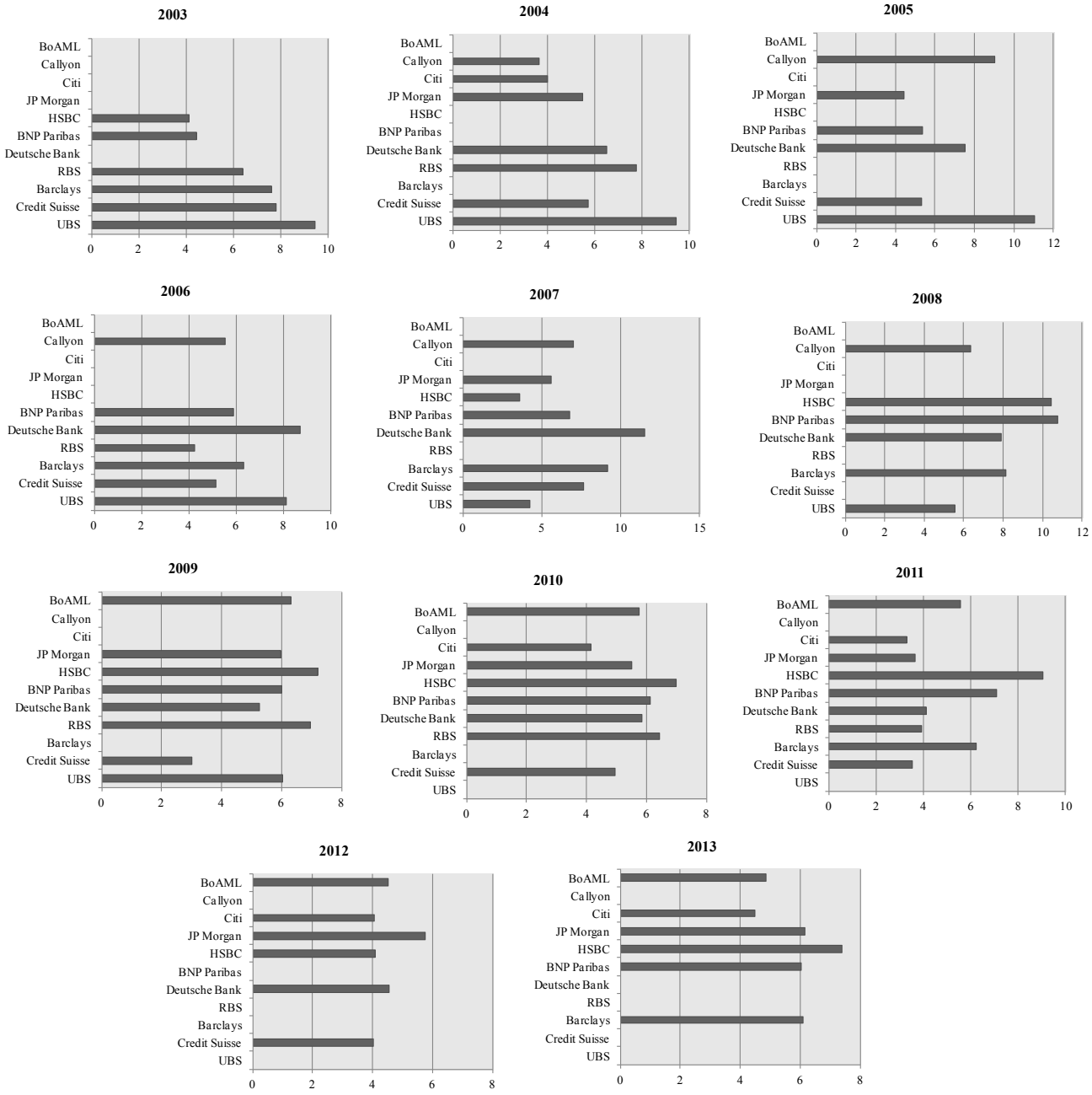
**Figure I. Main underwriters in the European bank bonds' market (2003-2013)**

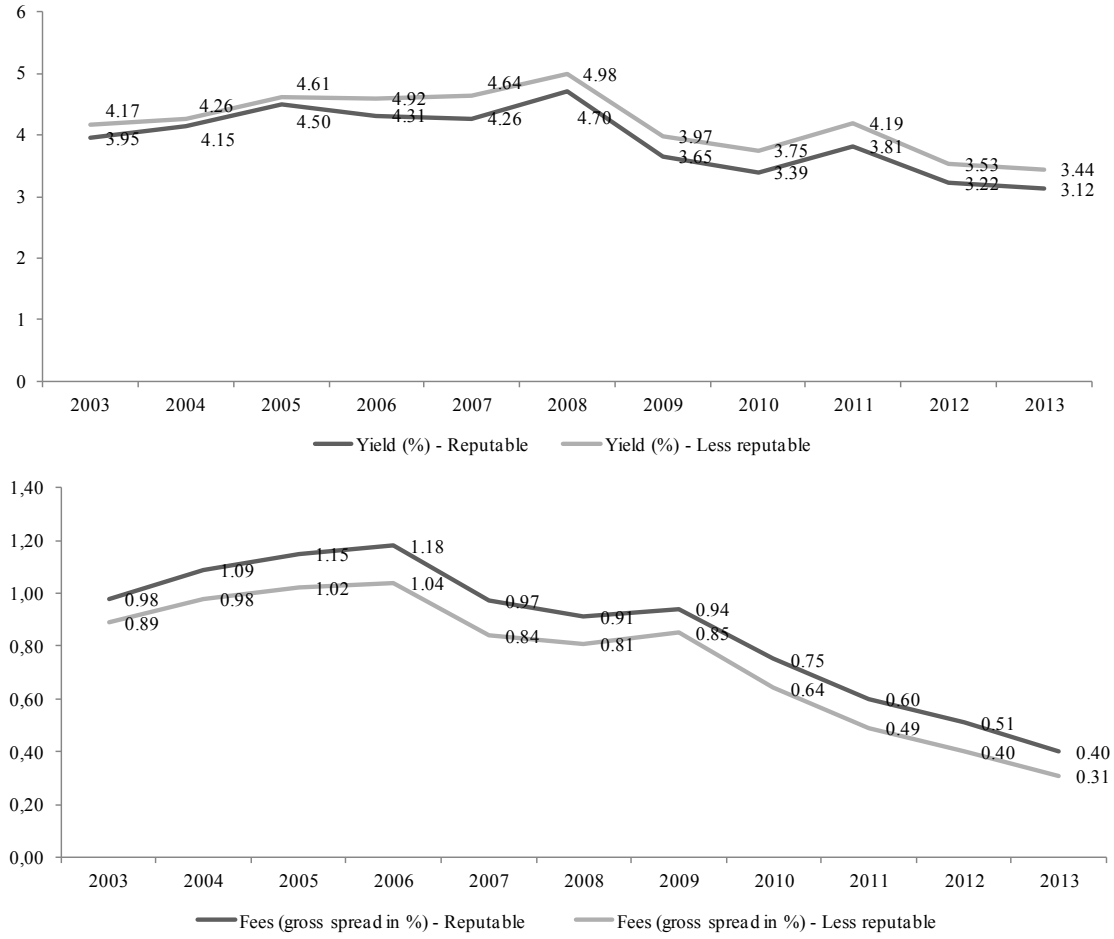
This figure shows the market share of the main underwriters of bank bonds in Europe over 2003-2013. The market shares of the underwriters are shown in percentage each year. A market share is not shown if the underwriter is not among the top-10 in a given year.




Source: Dealogic and own elaboration.

**Figure II. Yields and underwriter fees in the European bank bonds' market (2003-2013)**

The upper figure shows the evolution of the average yield (%) at the time of the issue of European bank bonds from 2003 to 2013. The lower figure shows the evolution of fees (%) of European bank bonds from 2003 to 2013.




Source: Dealogic and own elaboration.

## Table I. Descriptive statistics. All issues (2003-2013)

This table shows descriptive statistics over the whole sample period (2003-2013) for all the deals in the sample. The variable yield is the "offering yield" at the time of issuance. The fee is measured as a percentage of the issue amount charged by each underwriter. The variable issuer size is the year-end value of total assets in the year before the bond issue. Issuer profitability is net income divided by total assets for the year before the bond issue. Issue size is the value of the proceeds for the deal. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The frequency of issuance indicates the average number of times the deal's issuer has issued a bond over the sample period. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. . The maturity variable is the maturity of the bond as a number of years. The dummy for callable bonds is equal to 1 if the bond is callable and 0 otherwise. Underwriter market share is the average market share of the underwriter (or the weighted average of the market shares if the bond is issued by a syndicate, using the proceeds issued by each member of the syndicate as a weighting factor).

| | *Mean* | *p1* | *p50* | *p99* | *Max* | *min* | *Obs.* |
|---|---|---|---|---|---|---|---|
| *Yield (%)* | 4.04 | 0.95 | 3.60 | 13.26 | 42.09 | 0.03 | 3285 |
| *Fees (%)* | 0.85 | 0.06 | 0.68 | 2.00 | 4.00 | 0.01 | 897 |
| *Issuer size (Eur mill.)* | 56729.80 | 134.54 | 36993.30 | 2999906.16 | 3807503.10 | 115.83 | 3649 |
| *Issuer profitability* | 0.10 | 0.02 | 0.05 | 0.18 | 0.20 | -0.02 | 3289 |
| *Issuer volatility (%)* | 0.037 | 0.012 | 0.019 | 0.041 | 0.049 | 0.010 | 3780 |
| *Frequency of issuance* | 7.50 | 1.00 | 10.50 | 83.00 | 113.00 | 1.00 | 3780 |
| *Issue size (Eur mill.)* | 654.38 | 1.47 | 239.60 | 24436.19 | 57711.45 | 1.02 | 3780 |
| *Deal rating* | 18.00 | 9.00 | 18.00 | 21.00 | 22.00 | 5.00 | 3627 |
| *Maturity (years)* | 5.59 | 1.50 | 5.00 | 20.00 | 90.25 | 1.09 | 3780 |
| *Callable dummy* | 0.06 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 3780 |
| *Underwriter Market share (%)* | 2.83 | 0.00 | 1.89 | 11.17 | 13.66 | 0.00 | 3780 |

## Table II.A Descriptive statistics. Third-party underwritten deals vs. self-underwritten deals

This table shows descriptive statistics over the whole sample period (2003-2013) with a breakdown for deals self-underwritten vs. deals underwritten by third parties. The variable yield is the "offering yield" at the time of issuance. The fee is measured as a percentage of the issue amount charged by each underwriter. The variable issuer size is the year-end value of total assets in the year before the bond issue; Issuer profitability is net income divided by total assets for the year before the bond issue. Issue size is the value of the proceeds for the deal. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The frequency of issuance indicates the average number of times the deal's issuer has issued a bond over the sample period. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. . The maturity variable is the maturity of the bond as a number of years. The dummy for callable bonds is equal to 1 if the bond is callable and 0 otherwise. Underwriter market share is the average market share of the underwriter (or the weighted average of the market shares if the bond is issued by a syndicate, using the proceeds issued by each member of the syndicate as a weighting factor).

| *Panel A. Self-underwritten deals* | | | | | | | |
|---|---|---|---|---|---|---|---|
| | *Mean* | *p1* | *p50* | *p99* | *max* | *min* | *Obs* |
| *Yield (%)* | 4.12 | 0.99 | 3.79 | 13.12 | 29.64 | 0.13 | 1256 |
| *Fees (%)* | - | - | -- | - | - | - | - |
| *Issuer size (Eur mill.)* | 42002.17 | 10537.10 | 39073.30 | 230785.00 | 306311.00 | 115.83 | 1387 |
| *Issuer profitability* | 0.08 | 0.03 | 0.07 | 0.20 | 0.18 | -0.02 | 1459 |
| *Issuer volatility (%)* | 0.040 | 0.016 | 0.024 | 0.069 | 0.049 | 0.012 | 1459 |
| *Frequency of issuance* | 6.00 | 1.00 | 8.00 | 72.50 | 102.00 | 1.00 | 1459 |
| *Issue size (Eur mill.)* | 602.27 | 6.85 | 115.28 | 4638.06 | 5208.30 | 1.02 | 1459 |
| *Deal rating* | 16.00 | 7.00 | 16.00 | 20.00 | 22.00 | 5.00 | 1384 |
| *Maturity (years)* | 4.72 | 1.50 | 4.00 | 20.00 | 50.10 | 1.09 | 1459 |
| *Callable dummy* | 0.03 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1459 |
| *Underwriter Market share (%)* | 0.94 | 0.00 | 0.86 | 7.32 | 8.96 | 0.00 | 1459 |
| *Panel B. Deals underwritten by third parties* | | | | | | | |
| | *Mean* | *p1* | *p50* | *p99* | *max* | *Min* | *Obs* |
| *Yield (%)* | 4.02 | 0.79 | 3.04 | 12.62 | 16.05 | 0.03 | 2029 |
| *Fees (%)* | 0.85 | 0.06 | 0.68 | 2.00 | 4.00 | 0.01 | 897 |
| *Issuer size (Eur mill.)* | 71482.70 | 11373.60 | 51361.15 | 265345.50 | 3807503.10 | 10580.09 | 2262 |
| *Issuer profitability* | 0.11 | 0.02 | 0.06 | 0.18 | 0.20 | -0.01 | 2321 |
| *Issuer volatility (%)* | 0.032 | 0.01 | 0.02 | 0.05 | 0.041 | 0.010 | 2321 |
| *Frequency of issuance* | 8.50 | 1.05 | 12.00 | 89.50 | 113.00 | 1.0 | 2321 |
| *Issue size (Eur mill.)* | 703.30 | 19.17 | 188.03 | 5166.53 | 57711.45 | 16.16 | 2321 |
| *Deal rating* | 18.50 | 9.00 | 18.00 | 22.00 | 22.00 | 6.50 | 2243 |
| *Maturity (years)* | 6.13 | 1.50 | 4.75 | 25.00 | 90.25 | 1.18 | 2321 |
| *Callable dummy* | 0.06 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 2321 |
| *Underwriter Market share (%)* | 4.36 | 2.02 | 3.66 | 9.48 | 13.66 | 0.00 | 2321 |

| *Panel C. Mean differences test (t-statistics)* | |
|---|---|
| | Self-underwritten vs. third-party underwritten |
| *Yield (%)* | -2.02 |
| *Fees (%)* | - |
| *Issuer size (Eur mill.)* | -3.35 |
| *Issuer profitability* | -2.56 |
| *Issue size (Eur mill.)* | -2.81 |
| *Issuer volatility (%)* | 1.82 |
| *Frequency of issuance* | -1.97 |
| *Deal rating* | -2.02 |
| *Maturity (years)* | -3.17 |
| *Callable dummy* | -0.02 |
| *Underwriter Market share (%)* | -4.15 |

## Table II.B. Descriptive statistics. Underwritings conducted by reputable vs. less-reputable underwriters

This table shows descriptive statistics over the whole sample period (2003-2013) with a breakdown for deals issued by reputable underwriters vs. deals issued by less-reputable underwriters. The variable yield is the "offering yield" at the time of issuance. The fee is measured as a percentage of the issue amount charged by each underwriter. The variable issuer size is the year-end value of total assets in the year before the bond issue; Issuer profitability is net income divided by total assets for the year before the bond issue. Issue size is the value of the proceeds for the deal. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The frequency of issuance indicates the average number of times the deal's issuer has issued a bond over the sample period. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. The maturity variable is the maturity of the bond as a number of years. The dummy for callable bonds is equal to 1 if the bond is callable and 0 otherwise. Underwriter market share is the average market share of the underwriter (or the weighted average of the market shares if the bond is issued by a syndicate, using the proceeds issued by each member of the syndicate as a weighting factor.)

*Panel A. Deals underwritten by reputable underwriters*

| | *Mean* | *p1* | *p50* | *p99* | *max* | *min* | *Obs* |
|---|---|---|---|---|---|---|---|
| *Yield (%)* | 3.92 | 0.95 | 3.43 | 13.40 | 42.09 | 0.03 | 759 |
| *Fees (%)* | 0.92 | 0.06 | 0.75 | 2.05 | 4.00 | 0.01 | 375 |
| *Issuer size (Eur mill.)* | 97246.10 | 12210.10 | 63649.00 | 299906.00 | 380503.00 | 11144.51 | 774 |
| *Issuer profitability* | 0.08 | 0.01 | 0.04 | 0.16 | 0.18 | -0.04 | 839 |
| *Issuer volatility (%)* | 0.029 | 0.010 | 0.016 | 0.032 | 0.040 | 0.008 | 839 |
| *Frequency of issuance* | 128.53 | 3.00 | 81.00 | 458.00 | 458.00 | 1.00 | 839 |
| *Issue size (Eur mill.)* | 791.28 | 27.96 | 251.97 | 5918.71 | 5738.21 | 22.19 | 839 |
| *Deal rating* | 19.00 | 10.00 | 19.00 | 22.00 | 22.00 | 9.00 | 805 |
| *Maturity (years)* | 7.11 | 1.50 | 5.00 | 30.00 | 90.25 | 1.09 | 839 |
| *Callable dummy* | 0.06 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 839 |
| *Underwriter Market share (%)* | 7.10 | 4.03 | 6.34 | 13.66 | 13.66 | 3.91 | 839 |

*Panel B. Deals underwritten by less-reputable underwriters*

| | *Mean* | *p1* | *p50* | *p99* | *max* | *min* | *Obs* |
|---|---|---|---|---|---|---|---|
| *Yield (%)* | 4.44 | 1.02 | 4.15 | 12.83 | 17.19 | 0.23 | 2526 |
| *Fees (%)* | 0.74 | 0.07 | 0.50 | 2.00 | 3.15 | 0.01 | 522 |
| *Issuer size (Eur mill.)* | 45719.30 | 10537.10 | 39073.30 | 230785.00 | 306311.00 | 10015.67 | 2875 |
| *Issuer profitability* | 0.11 | 0.03 | 0.07 | 0.20 | 0.21 | -0.01 | 2941 |
| *Issuer volatility (%)* | 0.048 | 0.016 | 0.024 | 0.069 | 0.075 | 0.012 | 2941 |
| *Frequency of issuance* | 161.86 | 2.00 | 93.00 | 458.00 | 458.00 | 1.00 | 2941 |
| *Issue size (Eur mill.)* | 615.32 | 10.37 | 124.08 | 4414.34 | 5208.30 | 10.13 | 2941 |
| *Deal rating* | 17.00 | 8.00 | 17.00 | 22.00 | 22.00 | 4.00 | 2822 |
| *Maturity (years)* | 5.15 | 1.50 | 4.50 | 20.00 | 50.10 | 1.27 | 2941 |
| *Callable dummy* | 0.06 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 2941 |
| *Underwriter Market share (%)* | 1.61 | 0.00 | 0.97 | 5.29 | 5.96 | 0.00 | 2941 |

*Panel C. Mean differences test (t-statistics)*

| | Reputable vs. less-reputable |
|---|---|
| *Yield (%)* | -2.36 |
| *Fees (%)* | 2.16 |
| *Issuer size (Eur mill.)* | 5.18 |
| *Issuer profitability* | 1.84 |
| *Issue size (Eur mill.)* | 3.04 |
| *Issuer volatility (%)* | -2.39 |
| *Frequency of issuance* | 1.28 |
| *Deal rating* | 2.88 |
| *Maturity (years)* | 3.75 |
| *Callable dummy* | 0.06 |
| *Underwriter Market share (%)* | 4.84 |

## Table III. Selection equation (first-stage) regression. The likelihood to self-underwriting

This table reports the results of the first-stage selection equation for self-underwriting vs. third-party underwriting. It is a probit estimation where the dependent variable is a binary choice equaling 1 if the issuing bank is the underwriter of an issue, and 0 is the deal is underwritten by a third party. The variable issuer size is the year-end value of total assets in the year before the bond issue. Issuer profitability is net income divided by total assets for the year before the bond issue. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The frequency of issuance indicates the average number of times the deal's issuer has issued a bond over the sample period. The maturity variable is the maturity of the bond as a number of years. The dummy for callable bonds is equal to 1 if the bond has a call provision and 0 otherwise. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The variable "previous issue undertaken by a reputable underwriter" is a dummy that takes the value 1 if the previous placement of the issuer was conducted by a reputable underwriter, and zero otherwise. The market share of the issuer in the domestic market is the participation of the issuer in bank bond issuance in the country in that year. Market issuance is the amount issued by other banks in a month time window over the total market issuance in the year. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level.

| | Coefficient | z |
|---|---|---|
| *Issuer size* | -0.251*** | -2.62 |
| *Issuer profitability* | -0.234* | -2.01 |
| *Issuer volatility* | 0.183** | 2.24 |
| *Frequency of issuance* | -0.008*** | -3.15 |
| *Maturity* | -0.202** | -2.17 |
| *Callable dummy* | 0.008 | 0.49 |
| *Crisis dummy* | -0.353*** | -5.02 |
| *Domestic vs. Euro-bond dummy* | 0.599*** | 4.19 |
| *Previous issue undertaken by a reputable underwriter* | -0.136** | -2.28 |
| *Previous self-underwriting experience* | 0.088* | 1.89 |
| *Market share of the issuer in domestic market* | 0.014 | 0.68 |
| *Market issuance* | 0.466*** | 3.95 |
| *Constant* | -1.922*** | -3.74 |
| Country dummies | Yes | |
| Observations | 3,729 | |
| Log-likelihood | -197.60 | |
| Pseudo-$R^2$ | 0.42 | |
| *** p<0.01; ** p<0.05; * p<0.1 | | |

## Table IV. Second-stage baseline results for self-underwritten deals: yield equation

Second-stage OLS estimation results for the yield equation are shown in this table. The variable yield is the "offering yield" at the time of issue. Results are shown for self-issued deals and deals issued by third parties according to the definition in Table III. The F-tests estimate coefficient differences between both groups (p-values are reported). Standard errors are shown in parentheses below coefficient estimates. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The maturity variable is the maturity of the bond as a number of years. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is obtained from first-stage probit estimations to control for self-selection.

| | *Self-underwritten* | *Third-party* | *Self-underwritten* | *Third-party* | *F-tests (P-value)* |
|---|---|---|---|---|---|
| *Deal rating* | -0.379***<br>(0.125) | -0.563***<br>(0.157) | -0.362***<br>(0.118) | -0.518***<br>(0.122) | 0.04 |
| *Issuer volatility* | 0.146**<br>(0.069) | 0.123**<br>(0.057) | 0.140**<br>(0.064) | 0.135**<br>(0.065) | 0.22 |
| *Maturity* | 0.513*<br>(0.256) | 0.420**<br>(0.198) | 0.481*<br>(0.242) | 0.400**<br>(0.194) | 0.25 |
| *Deal rating X Crisis dummy* | - | - | -0.301***<br>(0.102) | -0.588***<br>(0.117) | 0.03 |
| *Issuer volatility X Crisis dummy* | - | - | 0.287***<br>(0.051) | 0.204***<br>(0.035) | 0.18 |
| *Maturity X Crisis dummy* | - | - | 0.221**<br>(0.110) | 0.155**<br>(0.076) | 0.06 |
| *Constant* | 4.43***<br>(1.118) | 6.30***<br>(1.732) | 4.16***<br>(1.101) | 4.51***<br>(1.503) | 0.39 |
| *Inverse Mills Ratio* | 0.328**<br>(0.160) | -0.029<br>(0.020) | 0.385**<br>(0.169) | -0.020<br>(0.016) | 0.02 |
| *Crisis dummy* | - | - | 0.015**<br>(0.004) | 0.010**<br>(0.005) | 0.07 |
| Year dummies | Yes | Yes | No | No | |
| Country dummies | Yes | Yes | Yes | Yes | |
| Observations | 1459 | 2,321 | 1459 | 2,321 | |
| $R^2$ | 0.72 | 0.81 | 0.75 | 0.84 | |

*** p<0.01; ** p<0.05; * p<0.1

## Table V. Selection equation (first-stage) regression. The likelihood to access a reputable underwriter

This table reports the results of the first-stage selection equation. It is a probit estimation of the matching equation between issuers and underwriters where the dependent variable is a binary choice equaling 1 if a reputable bank is the underwriter of an issue, and 0 otherwise. For syndicated issues the dependent variable equals 1 if the average market share of the syndicate is larger than the 7th underwriter in the league tables in that year and zero otherwise. The variable issuer size is the year-end value of total assets in the year before the bond issue. Issuer profitability is net income divided by total assets for the year before the bond issue. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The frequency of issuance indicates the average number of times the deal's issuer has issued a bond over the sample period. The maturity variable is the maturity of the bond as a number of years. The dummy for callable bonds is equal to 1 if the bond has a call provision and 0 otherwise. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The variable "previous issue undertaken by a reputable underwriter" is a dummy that takes the value 1 if the previous placement of the issuer was conducted by a reputable underwriter, and zero otherwise. Previous-issuer underwriting matching is a dummy that takes the value 1 if the same issuer-underwriter matching occurred earlier, and zero otherwise. Shared specialization is a dummy that takes the value 1 if the issuer and he underwriter has the same business specialization (commercial vs. investment banks) and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level.

| | Coefficient | z |
|---|---|---|
| *Issuer size* | 0.361*** | 6.06 |
| *Issuer profitability* | -0.174* | -1.94 |
| *Issuer volatility* | -0.323** | -2.15 |
| *Frequency of issuance* | 0.002** | 2.04 |
| *Maturity* | 0.268** | 2.31 |
| *Callable dummy* | 0.006 | 0.18 |
| *Crisis dummy* | 0.705*** | 4.93 |
| *Previous issue undertaken by a reputable underwriter* | 0.277** | 2.15 |
| *Previous issuer-underwriter matching* | 0.108* | 1.91 |
| *Shared specialization* | -0.063** | -2.23 |
| *Constant* | -4.101*** | -6.39 |
| Country dummies | Yes | |
| Observations | 3,729 | |
| Log-likelihood | -161.35 | |
| Pseudo-$R^2$ | 0.43 | |
| *** p<0.01; ** p<0.05; * p<0.1 | | |

## Table VI. Second-stage baseline results. Reputable vs. less reputable third-party underwriting: yield equation

Second-stage OLS estimation results for the yield equation are shown in this table. The variable yield is the "offering yield" at the time of issue. Results are shown for deals issued by reputable underwriters, and deals issued by less-reputable underwriters according to the definition in Table IV. The F-tests estimate coefficient differences between both groups (p-values are reported). Standard errors are shown in parentheses below coefficient estimates. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The maturity variable is the maturity of the bond as a number of years. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is obtained from first-stage probit estimations to control for self-selection.

| | *Reputable underwriters' yield equation* | *Less reputable underwriters' yield equation* | *Reputable underwriters' yield equation* | *Less reputable underwriters' yield equation* | *F-tests (P-value)* |
|---|---|---|---|---|---|
| *Deal rating* | -0.815***<br>(0.308) | -0.630***<br>(0.212) | -0.809***<br>(0.311) | -0.621***<br>(0.209) | 0.03 |
| *Issuer volatility* | 0.089**<br>(0.042) | 0.139**<br>(0.070) | 0.081**<br>(0.040) | 0.142**<br>(0.073) | 0.09 |
| *Maturity* | 0.460**<br>(0.229) | 0.572**<br>(0.191) | 0.434**<br>(0.208) | 0.598**<br>(0.197) | 0.18 |
| *Deal rating X Crisis dummy* | - | - | -0.372***<br>(0.124) | -0.121<br>(0.080) | 0.04 |
| *Issuer volatility X Crisis dummy* | - | - | 0.086**<br>(0.041) | 0.104***<br>(0.031) | 0.07 |
| *Maturity X Crisis dummy* | - | - | 0.222**<br>(0.108) | 0.365**<br>(0.163) | 0.04 |
| *Constant* | 7.23***<br>(1.152) | 5.11***<br>(0.605) | 6.84***<br>(1.052) | 5.44***<br>(0.728) | 0.15 |
| *Inverse Mills Ratio* | -0.263**<br>(0.113) | -0.080<br>(0.059) | -0.238**<br>(0.117) | -0.074<br>(0.067) | 0.02 |
| *Crisis dummy* | - | - | -0.025**<br>(0.012) | 0.025**<br>(0.012) | 0.03 |
| Year dummies | Yes | Yes | No | No | |
| Country dummies | Yes | Yes | Yes | Yes | |
| Observations | 839 | 2,890 | 839 | 2,890 | |
| $R^2$ | 0.78 | 0.84 | 0.75 | 0.83 | |

*** p<0.01; ** p<0.05; * p<0.1

## Table VII. Second-stage baseline results. Reputable vs. less reputable third-party underwriting: fee equation

Second-stage OLS estimation results for the fee equation are shown in this table. The fee is measured as a percentage of the issue amount charged by each underwriter. Results are shown for deals issued by reputable underwriters and for deals issued by less-reputable underwriters according to the definition in Table IV. The F-tests estimate coefficient differences between both groups (p-values are reported). Standard errors are shown in parentheses below coefficient estimates. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The maturity variable is the maturity of the bond as a number of years. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is obtained from first-stage probit estimations to control for self-selection.

| | *Reputable underwriters' fee equation* | *Less reputable underwriters' fee equation* | *Reputable underwriters' fee equation* | *Less reputable underwriters' fee equation* | *F-tests (P-value)* |
|---|---|---|---|---|---|
| *Deal rating* | -0.172***<br>(0.038) | -0.070***<br>(0.021) | -0.170***<br>(0.041) | -0.071***<br>(0.027) | 0.02 |
| *Issuer volatility* | 0.018*<br>(0.008) | 0.043*<br>(0.022) | 0.018*<br>(0.008) | 0.044*<br>(0.023) | 0.04 |
| *Maturity* | 0.204**<br>(0.083) | 0.315**<br>(0.162) | 0.205**<br>(0.094) | 0.325***<br>(0.162) | 0.15 |
| *Deal rating X Crisis dummy* | - | - | -0.212**<br>(0.100) | -0.119<br>(0.095) | 0.03 |
| *Issuer volatility X Crisis dummy* | - | - | 0.025**<br>(0.011) | 0.050***<br>(0.019) | 0.04 |
| *Maturity X Crisis dummy* | - | - | 0.217**<br>(0.104) | 0.388**<br>(0.182) | 0.04 |
| *Constant* | 0.61<br>(0.040) | 0.71<br>(0.055) | 0.69<br>(0.042) | 0.73<br>(0.053) | 0.56 |
| *Inverse Mills Ratio* | 0.127**<br>(0.056) | 0.019**<br>(0.008) | 0.126**<br>(0.058) | 0.015**<br>(0.07) | 0.01 |
| *Callable dummy* | - | - | -0.009*<br>(0.005) | -0.007*<br>(0.004) | 0.81 |
| *Crisis dummy* | - | - | 0.024**<br>(0.011) | 0.015<br>(0.012) | 0.05 |
| *Leverage* | - | - | -0.186*<br>(0.093) | -0.197**<br>(0.087) | 0.74 |
| Year dummies | Yes | Yes | No | No | |
| Country dummies | Yes | Yes | Yes | Yes | |
| Observations | 305 | 508 | 305 | 508 | |
| $R^2$ | 0.60 | 0.74 | 0.61 | 0.76 | |

*** p<0.01; ** p<0.05; * p<0.1

## Table VIII. Computing the value of reputation: baseline sample

This table compares the actual vs. the hypothetical value of the yields and fees. The difference between those magnitudes proxies the value of underwriter reputation. T-statistics for the mean difference test are reported. The computation of the hypothetical values is explained on section 3.2 and follows Fang (2005).

| | | | Actual | Hypothetical | *t-statistic* |
|---|---|---|---|---|---|
| Whole period | Issues of reputable underwriters | *Yield* | 3.96 | 4.14 | -2.86 |
| | | *Fee* | 0.83 | 0.79 | 2.59 |
| | Issues of less reputable underwriters | *Yield* | 4.18 | 4.06 | 4.17 |
| | | *Fee* | 0.75 | 0.78 | -3.22 |
| | | | Actual | Hypothetical | *t-statistic* |
| Pre-crisis years (2003-2006) | Issues of reputable underwriters | *Yield* | 4.23 | 4.36 | -7.55 |
| | | *Fee* | 1.13 | 1.07 | 4.78 |
| | Issues of less reputable underwriters | *Yield* | 4.86 | 4.70 | 5.10 |
| | | *Fee* | 0.98 | 1.05 | -4.63 |
| Crisis years (2006-2012) | Issues of reputable underwriters | *Yield* | 3.54 | 3.81 | -10.27 |
| | | *Fee* | 0.55 | 0.52 | 2.35 |
| | Issues of less reputable underwriters | *Yield* | 4.05 | 3.79 | 11.93 |
| | | *Fee* | 0.47 | 0.50 | -3.18 |

## Table IX. Second-stage baseline results: gross spread

Second-stage OLS estimation results for the sum of the yield and fees are shown in this table. The dependent variable is the sum of the offering yield at the time of issue and the fee charged by each underwriter. Results are shown for deals issued by reputable underwriters and for deals issued by less-reputable underwriters according to the definition in Table 3. The F-tests estimate coefficient differences between both groups (p-values are reported). Standard errors are shown in parentheses below coefficient estimates. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The maturity variable is the maturity of the bond as a number of years. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is obtained from first-stage probit estimations to control for self-selection.

| | *Reputable underwriters' gross spread equation* | *Less reputable underwriters' gross spread equation* | *F-tests (P-value)* |
|---|---|---|---|
| *Deal rating* | -0.374***<br>(0.109) | -0.148***<br>(0.047) | 0.02 |
| *Issuer volatility* | 0.077**<br>(0.040) | 0.116**<br>(0.059) | 0.06 |
| *Maturity* | 0.526**<br>(0.235) | 0.465**<br>(0.224) | 0.10 |
| *Deal rating X Crisis dummy* | -0.211**<br>(0.085) | -0.076<br>(0.050) | 0.04 |
| *Issuer volatility X Crisis dummy* | 0.080**<br>(0.039) | 0.121***<br>(0.032) | 0.06 |
| *Maturity X Crisis dummy* | 0.334***<br>(0.114) | 0.412**<br>(0.184) | 0.05 |
| *Constant* | 4.87***<br>(1.052) | 5.10***<br>(0.868) | 0.67 |
| *Inverse Mills Ratio* | -0.277**<br>(0.141) | 0.080<br>(0.059) | 0.01 |
| *Callable dummy* | -0.012*<br>(0.007) | -0.008*<br>(0.004) | 0.71 |
| *Crisis dummy* | -0.017**<br>(0.008) | 0.020**<br>(0.010) | 0.03 |
| *Leverage* | -0.174*<br>(0.082) | -0.180*<br>(0.084) | 0.68 |
| Country dummies | Yes | Yes | |
| Observations | 305 | 508 | |
| $R^2$ | 0.70 | 0.76 | |

*** p<0.01; ** p<0.05; * p<0.1

## Table X. Second-stage results for third-party underwriting (Euro-Bond Market): yield equation

Second-stage OLS estimation results for the yield equation in the Euro-market are shown in this table. This market controls for third-party issuance. The variable yield is the "offering yield" at the time of issuance. Results are shown for deals issued by reputable underwriters and for deals issued by less-reputable underwriters according to the definition in Table 3. The F-tests estimate coefficient differences between both groups (p-values are reported). Standard errors are shown in parentheses below coefficient estimates. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The maturity variable is the maturity of the bond as a number of years. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is obtained from first-stage probit estimations to control for self-selection.

| | *Reputable underwriters' yield equation* | *Less reputable underwriters' yield equation* | *F-tests (P-value)* |
|---|---|---|---|
| *Deal rating* | -0.802***<br>(0.306) | -0.507***<br>(0.204) | 0.03 |
| *Issuer volatility* | 0.086**<br>(0.040) | 0.136**<br>(0.071) | 0.08 |
| *Maturity* | 0.460**<br>(0.210) | 0.535**<br>(0.240) | 0.17 |
| *Deal rating X Crisis dummy* | -0.331***<br>(0.111) | -0.112<br>(0.076) | 0.04 |
| *Issuer volatility X Crisis dummy* | 0.084**<br>(0.038) | 0.107***<br>(0.030) | 0.05 |
| *Maturity X Crisis dummy* | 0.240**<br>(0.111) | 0.328**<br>(0.138) | 0.13 |
| *Constant* | 5.35***<br>(1.120) | 4.15***<br>(0.830) | 0.37 |
| *Inverse Mills Ratio* | -0.221**<br>(0.093) | -0.097<br>(0.070) | 0.02 |
| *Crisis dummy* | -0.026**<br>(0.010) | 0.031**<br>(0.015) | 0.06 |
| Country dummies | Yes | Yes | |
| Observations | 489 | 963 | |
| $R^2$ | 0.74 | 0.79 | |

*** p<0.01; ** p<0.05; * p<0.1

## Table XI. Second-stage results for third-party underwriting (Euro-Bond Market): fee equation

Second-stage OLS estimation results for the fee equation in the Euro-Bond Market are shown in this table. The fee is measured as a percentage of the issue amount charged by each underwriter. Results are shown for deals issued by reputable underwriters and for deals issued by less-reputable underwriters according to the definition in Table 3. The F-tests estimate coefficient differences between both groups (p-values are reported). Standard errors are shown in parentheses below coefficient estimates. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The maturity variable is the maturity of the bond as a number of years. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is obtained from first-stage probit estimations to control for self-selection.

| | *Reputable underwriters' gross spread equation* | *Less reputable underwriters' gross spread equation* | *F-tests (P-value)* |
|---|---|---|---|
| *Deal rating* | -0.356***<br>(0.110) | -0.162***<br>(0.041) | 0.02 |
| *Issuer volatility* | 0.017*<br>(0.007) | 0.041*<br>(0.023) | 0.03 |
| *Maturity* | 0.512**<br>(0.210) | 0.409**<br>(0.170) | 0.27 |
| *Deal rating X Crisis dummy* | -0.226***<br>(0.070) | -0.072<br>(0.046) | 0.03 |
| *Issuer volatility X Crisis dummy* | 0.023**<br>(0.011) | 0.055***<br>(0.017) | 0.03 |
| *Maturity X Crisis dummy* | 0.294**<br>(0.142) | 0.452***<br>(0.140) | 0.12 |
| *Constant* | 3.93***<br>(0.988) | 6.07***<br>(0.997) | 0.57 |
| *Inverse Mills Ratio* | 0.163**<br>(0.107) | 0.096<br>(0.060) | 0.01 |
| *Callable dummy* | -0.015*<br>(0.008) | -0.009*<br>(0.004) | 0.81 |
| *Crisis dummy* | -0.027***<br>(0.007) | 0.031***<br>(0.011) | 0.02 |
| *Leverage* | -0.164*<br>(0.080) | -0.191*<br>(0.088) | 0.76 |
| Country dummies | Yes | Yes | |
| Observations | 198 | 291 | |
| $R^2$ | 0.71 | 0.74 | |

*** p<0.01; ** p<0.05; * p<0.1

## Table XII. Second-stage results for third-party underwriting (Euro-Bond Market): gross spread

Second-stage OLS estimation results for the sum of the yield and fees in the Euro-Bond Market are shown in this table. The dependent variable is the sum of the offering yield at the time of issue and the fee charged by each underwriter. Results are shown for deals issued by reputable underwriters and for deals issued by less-reputable underwriters according to the definition in Table 3. The F-tests estimate coefficient differences between both groups (p-values are reported). Standard errors are shown in parentheses below coefficient estimates. Deal rating is a numerical rank for the Moody's bond rating from 1 to 22 with 22 being an Aaa rating. Issuer volatility is the standard deviation of the return-on-assets of the issuing bank in the year before the issue. The maturity variable is the maturity of the bond as a number of years. The crisis dummy takes the value 1 if the deal is issued from August 2008 to December 2012 and zero otherwise. The estimation includes country dummies. Standard errors are clustered at the issuer and deal level. The inverse Mills-ratio is obtained from first-stage probit estimations to control for self-selection.

| | *Reputable underwriters' gross spread equation* | *Less reputable underwriters' gross spread equation* | *F-tests (P-value)* |
|---|---|---|---|
| *Deal rating* | -0.313***<br>(0.090) | -0.120***<br>(0.034) | 0.03 |
| *Issuer volatility* | 0.079**<br>(0.039) | 0.117**<br>(0.051) | 0.06 |
| *Maturity* | 0.370**<br>(0.163) | 0.532**<br>(0.236) | 0.10 |
| *Deal rating X Crisis dummy* | -0.216**<br>(0.090) | -0.054<br>(0.033) | 0.03 |
| *Issuer volatility X Crisis dummy* | 0.081**<br>(0.038) | 0.123***<br>(0.030) | 0.05 |
| *Maturity X Crisis dummy* | 0.361***<br>(0.117) | 0.447**<br>(0.218) | 0.18 |
| *Constant* | 5.28***<br>(1.216) | 3.72***<br>(0.939) | 0.22 |
| *Inverse Mills Ratio* | -0.263**<br>(0.119) | 0.081<br>(0.052) | 0.01 |
| *Callable dummy* | -0.011*<br>(0.005) | -0.007*<br>(0.003) | 0.87 |
| *Crisis dummy* | -0.022**<br>(0.010) | 0.029**<br>(0.014) | 0.03 |
| *Leverage* | -0.197*<br>(0.095) | -0.207*<br>(0.102) | 0.85 |
| Country dummies | Yes | Yes | |
| Observations | 198 | 291 | |
| $R^2$ | 0.70 | 0.74 | |

*** p<0.01; ** p<0.05; * p<0.1