

Information asymmetry, the role of intermediaries, and underpricing in the global debt market

Abstract

This paper investigates underpricing in the global bond market. It associates losses in proceeds from bond issues to information asymmetry between issuers and investors. This information asymmetry is driven by firm risk and the quality of intermediaries, particularly when a transaction crosses a national border. Moreover, the influence of cross-listing on underpricing is contingent on the investor protection in home and host countries. The paper connects finance literature on underpricing with IB literature on liabilities of foreignness and intermediaries to make empirical predictions. These predictions are tested on a unique dataset of 5,507 bond issues in seven capital markets by firms from 23 home countries between 2007 and 2017. Empirical support for the theorized mechanisms is found.

Introduction

Firms raising capital in financial market has received substantial academic interest because it is a main mechanism how successful start-up firms raise external capital (Baum & Silverman, 2004, Chang, 2004, Ewens & Marx, 2017, Gomulya, Jin, Lee, & Pollock, 2018, Nanda & Rhodes-Kropf, 2013). It is well known in finance (e.g., Booth & Chua, 1996) and strategy (e.g., Filatotchev & Bishop, 2002) literature, however, that issuers receive on average less than the fair value of the shares they offer in public offerings. This is because the offering price that is agreed upon with investors and investment banks is usually lower than the closing price at the first day of trading. This phenomenon is known as IPO underpricing (Allen & Faulhaber, 1989, Beatty & Ritter, 1986, Loughran & Ritter, 2004). A similar phenomenon exists in debt markets, but has received substantially less academic attention (notable exceptions are Cai, Helwege, and Warga (2007), Mietzner, Proelss, and Schweizer (2018), Nagler and Ottonello (2018)). In both debt and equity markets, a prominent explanation for the underpricing phenomenon is an information asymmetry between the issuing firm and (potential) investors, as well as among differently informed investors (for a review see Ritter and Welch (2002)).

In International Business (IB) literature, information asymmetry has been acknowledged as a key mechanism that leads to disadvantages between differently informed parties from different countries under the concept of liabilities of foreignness (LoF; Hymer, 1976, Zaheer, 1995). This concept has been applied in literature on international strategy (e.g. Lu & Hwang, 2010, Miller & Parkhe, 2002, Zaheer & Mosakowski, 1997) and translated to financial markets (Bell, Filatotchev, & Rasheed, 2012), sometimes without mentioning the LoF concept (Claessens & Van Horen, 2012). There remain, however, several open questions regarding the connection of IB and finance literatures (Agmon, 2006, Bowe, Filatotchev, & Marshall, 2010), and numerous avenues for further integration of the two fields (Puck & Filatotchev, 2018). Particularly, it has been argued that liabilities of foreignness (LoF) are net effects of advantages and disadvantages (Wu & Salomon, 2017). This makes studying them in a structured way difficult in many circumstances. As a consequence, there has been a push to decompose advantages and disadvantages in order to understand liabilities of foreignness better (e.g. Bhattacharya, Galpin, & Haslem, 2007, Mezias, 2002).

Both finance literature on corporate bond underpricing and international business literature on the liabilities of foreignness in capital markets have so far largely neglected the role of intermediaries. While literature on corporate bond underpricing acknowledges that underwriters play an important role in the price-building mechanism (Cai, Helwege, & Warga, 2007), the extent to which differences in underwriter characteristics influence underpricing remains unclear. This is in stark contrast to equity IPO underpricing, where underwriter characteristics have received substantial attention (Carter & Manaster, 1990, Loughran & Ritter, 2004). In neither literature, however, the role of intermediaries has been connected with the “institutional envelope” (Ahuja, Capron, Lenox, & Yao, 2018) in which intermediaries have to operate. This is a particularly important gap in situations where intermediaries, as well as issuing firms, have to operate in two institutional environments because a transaction crosses borders.

IB literature acknowledges that intermediaries play important roles in facilitating cross-border business (Peng & Ilinitich, 1998). Kim and Jensen (2014), for example, argue that liabilities of foreignness are contingent on distributors abroad in the movie industry. Generally, intermediaries are seen as mechanisms that contribute to the reduction of LoF, or mechanisms that help firms overcome LoFs, albeit at a cost. Particularly, intermediaries have so far mostly been conceptualized as having aligned interest with the internationalizing firm, which ignores their own profit-maximizing incentives. Literature is also silent on the net effect that intermediaries have on LoFs, and on potential contingencies. Along these lines, the extra cost that foreign firms incur because they have to use intermediaries in order to collect relevant information has largely been overlooked. In addition, there is no investigation into the role of intermediaries in the context of capital market liabilities of foreignness (CMLoF), even though intermediaries are explicitly mentioned as potential contingencies by Bell, Filatotchev, and Rasheed (2012), who established CMLoF as a distinct element in IB research.

This paper investigates how information asymmetry influences corporate bond underpricing. It draws on the LoF concept and establishes bond underwriters as important intermediaries who condition the role that information asymmetry plays in the bond issuing process. It shows that there is

variation in underpricing depending on characteristics of capital markets, and that foreign bond issuers suffer from a liability of foreignness that compounds a loss in proceeds from bond issues on top of the underpricing an otherwise equivalent domestic firm would expect. The paper introduces a intermediaries as independent profit-maximizing entities that have strong influence on the proceeds from security issuance. Predictions are tested on a dataset of 5,507 corporate bond issues between 2007 and 2017 in several bond markets (the USA, Canada, Germany, France, Japan, China, and the UK), and from 23 different home countries. The bond market is arguably a good laboratory to test liabilities of foreignness, because transactions are clearly separate from each other, and information on pricing and trading proceeds are readily available. The bond market also lends itself to studies of intermediation, because the role of underwriters is clearly defined and can be traced over many issues and years. Because underwriters handle many issues, this market allows an analysis of the effect these intermediaries have separate from the (negative) effect of foreignness on how investors evaluate bond issues. This allows a separation of the effect of LoFs and the effect of using intermediaries in a foreign market.

This paper makes several contributions to finance and IB literature. First, it establishes information asymmetry between investor and issuer as a driving factor of bond underpricing. Second, it establishes the role of intermediary characteristics and characteristics of their environment in the relatively nascent literature on corporate bond underpricing. Doing so, it contributes to IB literature on how intermediation affects LoF. It argues that intermediary quality is an important driver of how information asymmetry influences market participants' assessments of offerings. It also shows that intermediary incentives can be aligned with issuer and investor incentives through the regulatory environment. Third, it connects the information asymmetry argument used in finance to the LoF concept in IB, showing that the two fields can benefit from cross-fertilization of theories. Fourth, it provides a deeper analysis of how negative effects of foreignness and positive effects of using intermediaries potentially cancel out. Finally, it illustrates for managers, how an informed choice of intermediary can reduce lost proceeds from bond issues resulting from underpricing.

Literature review

The literature analyzing underpricing in the context this paper investigates was published in three waves. First, there were empirical studies into bond underpricing (e.g. Ederington, 1974, Sorensen, 1982), second the literature focused on theoretical and empirical literature explaining equity underpricing (e.g. Beatty & Ritter, 1986, Loughran & Ritter, 2004), and third theoretical and empirical papers explaining bond underpricing were published (Cai, Helwege, & Warga, 2007) or are at working paper stage (Nagler & Ottonello, 2018). Literature on information asymmetry and intermediation of internationalization existed largely in parallel to those streams, with a recent focus on how information asymmetries lead to disadvantages for firms that issue securities abroad (Bell, Filatotchev, & Rasheed, 2012).

The first wave of literature on bond underpricing established the phenomenon of underpricing as a difference between prices primary and secondary markets (Ederington, 1974). Two possible explanations for why there should be a difference between the offering price and the trading price in an exchange were given. First, there could be a difference in coupon rates (Conard, 1966). Second, price differentials could result from differences in when a bond could be called by the issuer (Pye, 1967). Sorensen (1982) takes a different approach and separates reasons for differences between initial and seasoned offerings into micro- and macroeconomic factors. Literature established that price differences become smaller as initial and seasoned offerings remain in the market for a longer period of time, and when better fundamental information becomes available (Fung & Rudd, 1986). Nevertheless, the empirical evidence for underpricing, particularly for initial offerings, remained solid (Wasserfallen & Wydler, 1988).

The literature on equity underpricing is more substantial both in terms of amount of work published, and regarding the theoretical basis of the arguments presented. According to Cai, Helwege, and Warga (2007), the theoretical explanations for equity underpricing that are most relevant for the phenomenon in the bond market are information-based models (e.g. Allen & Faulhaber, 1989, Benveniste & Spindt, 1989, Rock, 1986) and liquidity-based models (e.g. Booth & Chua, 1996, Ellul & Pagano, 2006). In the information-based models, there is an information asymmetry between either

informed and not informed investors (Rock, 1986), or between managers and investors (Allen & Faulhaber, 1989). Underpricing results as a strategy that avoids “markets for lemons” (Akerlof, 1978), because underpriced bonds provide additional potential returns for investors that are unable to distinguish between high-quality and low-quality bonds. These investors would otherwise be left with those bonds that well-informed investors do not demand: the lemons. In the liquidity-based models, empirical evidence is unclear on whether underpricing is a compensation for potential future illiquidity (Ellul & Pagano, 2006), or whether underpricing leads to high liquidity in the secondary market (Booth & Chua, 1996). There is also a stream of literature specifically on underpricing of convertible bonds (e.g. Chan & Chen, 2007), which suggests that there are substantial similarities between equity and bond markets, as well as between new and seasoned offers.

The current theoretical and empirical literature on bond underpricing is relatively limited in scale, yet insightful. Cai, Helwege, and Warga (2007) give a thorough account of previous underpricing literature and argue that bookbuilding and information asymmetry are the main drivers of underpricing in the bond market. Nagler and Ottonello (2018) find that underpricing is to a large extent a consequence of relationship-building between underwriters and investment banks. Particularly, they find that in the aftermath of the financial crisis, when intermediaries were confronted with tighter rules and regulations (Duffie, 2012), relationship-driven allocations of bonds increased, which is associated with higher underpricing. There is also literature suggesting that the relationship between issuers and investment banks reduce underpricing (Henderson & Tookes, 2012). Mietzner, Proelss, and Schweizer (2018) argue that underpricing is a signaling strategy that resolves information asymmetries, and that high-quality firms can use underpricing to signal quality to investors. This is particularly relevant when rating agencies fail to provide assessments that send clear signals about differences in the probability of default between bonds (Bolton, Freixas, & Shapiro, 2012).

Information asymmetries are a much-discussed topics in finance, IB, and general management research (Bergh, Ketchen Jr, Orlandi, Heugens, & Boyd, 2019). At the interface of IB and finance, they were studied in the context of the misalignment of incentives between investors and managers (Jensen, 1986, Jensen & Meckling, 1976), and the resulting imperative for corporate governance to

correct for such misalignments (Aguilera & Jackson, 2003). This literature was also connected, to some extent, to the study of corporate bond markets (e.g. Bhojraj & Sengupta, 2003). With regards to the study of security cross-listings, scholars have argued that information asymmetries may lead to foreign issuance as a signaling strategy (Blass & Yafeh, 2001), but also to disadvantages that foreign firms face when being present in capital markets abroad (Filatotchev, Bell, & Rasheed, 2016), which was termed Capital Market Liabilities of Foreignness (CMLoF; Bell, Filatotchev, & Rasheed, 2012). Firm strategies to overcome such disadvantages, in turn, were put in context with governance structures that signal to investors that firms are able to comply with strict foreign rules and regulations, which in turn increase the proceeds that firms can raise when issuing securities abroad (Bell, Filatotchev, & Aguilera, 2014).

Intermediaries long played a minor role in research on firm internationalization, despite their paramount importance in the internationalization efforts particularly of smaller firms (Peng & Ilinitch, 1998). Intermediaries take a key role in connecting firms across national boundaries, and serve as conveyors of information that would otherwise be hard to obtain or hard to interpret (Cosimano, 1996). Marketing literature contains a substantial body of research on intermediaries that firms use to access foreign markets (e.g., Havila, Johanson, & Thilenius, 2004, Kuhlmeier & Knight, 2010, Skarmeas, Katsikeas, Spyropoulou, & Salehi-Sangari, 2008). In this literature, the relationships between internationalizing firms and their intermediaries are highlighted as key success factors for internationalization performance (Kuhlmeier & Knight, 2010). Relationship quality in turn is a consequence of the quality of cooperation (Holm, Eriksson, & Johanson, 1996), communication (Harvey & Griffith, 2002), commitment (Skarmeas & Robson, 2008), and trust (Zaheer & Zaheer, 2006). Intermediaries with these qualities potentially are particularly successful catalysts for the flow of information between the internationalizing firm and the target market (Lages, Lages, & Lages, 2005).

Theory and hypotheses

Underpricing models that build on the information asymmetry argument posit that underpricing is a compensation strategy that firms offer to uninformed investors (Allen & Faulhaber,

1989, Benveniste & Spindt, 1989, Rock, 1986). This is because otherwise uninformed investors will be crowded out of the bond IPO market: Informed primary investors (mostly investment banks) will exhibit demand for high-quality bonds, which are priced fairly or even below value. This will leave uninformed investors, who cannot distinguish between high-quality and low-quality bonds, crowded out of the market for high-quality bonds (Rock, 1986). Consequently, there is an adverse selection problem (Akerlof, 1978) in the bond issuing market, because only under-valued or fairly valued high-quality bonds will find demand. Cai, Helwege, and Warga (2007) suggest that underpricing is a solution for this inefficient market, because it provides uninformed investors who would otherwise not participate in the bond market with extra returns.

The extent to which underpricing is necessary as a compensation mechanism for information asymmetry increases with the degree of asymmetric information. The relevant information in the context of corporate bond issues is driven by the probability that the bond defaults before maturity (Longstaff & Schwartz, 1995). Because bond investors get fixed (in the case of fixed rate bonds) or relatively fixed (in the case of floating rate bonds) returns from bonds, and a repayment of the principal at maturity, bond investors are less concerned with potential upsides in future profits of the issuing firm than equity investors. Nevertheless, firms with different probabilities of default will exhibit differences in information asymmetry between the issuer and potential investors, which are associated with differences in bond ratings and yields (Atilgan, Ghosh, Yan, & Zhang, 2015). In the context of underpricing, a higher probability of default indicates higher information asymmetry, which is expected to lead to stronger underpricing.

Hypothesis 1: The higher the yield to maturity of a bond, the stronger bond underpricing.

One key source of information for potential investors are bond underwriting investment banks. Through a bookbuilding process (Cornelli & Goldreich, 2001), investment banks determine the offer price for a bond issue in cooperation with the issuing firm. In the context of information asymmetry, underwriters are a source of information for less-informed investors (Benveniste & Spindt, 1989). Because issue prospectuses contain material information about a firm's otherwise internal plans and

strategies, the materials prepared in support of a bond issue are a substantial source of information for outside investors. Investment banks, by means of certification through reputation, provide an important certification for the accuracy of information provided in a prospectus (Beatty & Ritter, 1986).

From the perspective of a potential (uninformed) investor, the underwriter's quality is a key signal for the accuracy of the issuing information in general, and the offer price in particular (Loughran & Ritter, 2004). If an issue is supported by an underwriter with large reputational capital, the underwriting investment bank has more to lose in terms of reputation (Carter & Manaster, 1990, Carter, Dark, & Singh, 1998). Consequently, higher underwriter quality is associated with lower underpricing (Loughran & Ritter, 2004). To some extent, this effect was found to revert in periods when shares with high potential future growth are issued, and during investment bubbles (Beatty & Welch, 1996). In the bond market, potential future growth is less important for valuation, however.

Hypothesis 2: The higher underwriter quality, the weaker bond underpricing.

This paper draws on information asymmetry and liabilities of foreignness to explain how bond underpricing is contingent on intermediaries and cross-border transactions. Management research acknowledges that information asymmetry is central to many important questions (Bergh, Ketchen Jr, Orlandi, Heugens, & Boyd, 2019). It relates to the liabilities of foreignness through two channels that were identified as sources of LoFs in general (Zaheer, 1995), and CMLoFs in particular (Bell, Filatotchev, & Rasheed, 2012). First, liabilities of foreignness are consequences of firms' unfamiliarity with a foreign market. Second, liabilities of foreignness are consequences of firms' lack of legitimacy in a foreign market.

In the context of security issuance, these two channels relate to two types of information asymmetry between issuers and potential investors. First, unfamiliarity with a foreign financial market will lead to lower information availability for local investors (Khurana, Pereira, & Raman, 2003). This is because information materials and analyst coverage for foreign issues will be less informative (Bae, Stulz, & Tan, 2008). Second, local investors will be less interested in foreign issues because these

issues appear less legitimate (Suchman, 1995) to them. This is a well-documented phenomenon in the context of investors' home bias (Anderson, Fedenia, Hirschey, & Skiba, 2011, Cooper & Kaplanis, 1994, Coval & Moskowitz, 1999, Kang, 1997, Ke, Ng, & Wang, 2010). Consequently, issues by foreign firms are confronted with higher information asymmetry, which translates into a specific cost of foreignness, a capital market liability of foreignness.

Hypothesis 3: Foreign bond issuers will experience stronger bond underpricing.

Firms are not helpless when confronted with Capital market liabilities of foreignness. If firms want to reduce their CMLoF, they need to reduce the information asymmetry that investors perceive. This can be done by choosing intermediaries that can provide credible quality signals. The key intermediaries in this market are of course underwriters. The more reputation capital those underwriters have, the lower will also be the liability of foreignness that emerges from information asymmetry. That is because credible quality signals will increase the perceived accuracy of information provided. If a highly reputable underwriting firm certifies this information, CMLoFs should be reduced. Moreover, because reputable underwriters also tend to have better contacts in the investor community, a bond underwritten by a reputable firm will also receive more attention. As a consequence, both mechanisms that lead to stronger underpricing for foreign firms are attenuated by signals that indicate certification by reputable intermediaries (Bell, Filatotchev, & Rasheed, 2012). In the context of the two avenues of how information asymmetry leads to CMLoF, certification increases the degree to which investors assume the information provided to be accurate, and increase legitimacy of the foreign offering. As a consequence, the CMLoF should be reduced.

Hypothesis 4a: Underwriter quality negatively moderates the positive effect of foreignness on bond underpricing.

Bond underwriters are not entities that act exclusively in their customers' interest, as demonstrated by a large literature on equity underpricing (e.g., Booth & Chua, 1996, Filatotchev & Bishop, 2002). Clearly, investment banks also have a profit-maximizing interest, and have relationships with investors and customers to consider in the bond issuing process (Chan & Chen,

2007). As agents of both issuers and investors, bond underwriters have to find a balance between competing interests: Issuers want to raise as much capital as possible on the sale of their bonds, while investors want to generate returns from their investments. Given they are profit maximizers, it is safe to assume that investment banks will try to absorb as much of the difference between the initial issuing price and the first day trading price as possible. They can either do so directly by keeping bonds on their books, or indirectly by providing their favored customers with opportunities to profit from underpricing. Investment banks' ability to use their access to private information for their own or their clients' benefit is constrained by investor protection legislation. The degree to which investors are protected against losses from incomplete representation of underlying economic events in company documents varies substantially across countries (La Porta, Lopez-de-Silanes, & Shleifer, 2006, López de Silanes, La Porta, Shleifer, & Vishny, 1998). In capital markets that have good investor protection, the interests of issuing firms and investors are more closely aligned. As a result, there will be less room for intermediaries to engage in profit-maximizing underpricing.

Hypothesis 4b: The quality of investor protection in the target capital market negatively moderates the positive effect of foreignness on bond underpricing.

Data and sample

The data for this study come from DealScan. The bond data are complemented by information from Orbis and Bloomberg. First day returns are taken from the TRACE database. Investor protection data are taken from La Porta, Lopez-de-Silanes, and Shleifer (2006). Overall, the dataset has 5,507 observations of bond issues. The bonds in the dataset are issued by firms from 23 countries in seven capital markets. 4,710 bonds are issued by firms that are headquartered in the USA, 234 in the UK, 194 in Canada, 96 in Japan, 67 in Ireland, 59 in Germany, 45 in France, 35 in Denmark, 14 in the Netherlands, 14 in China, 8 in Spain, 6 in India, 6 in Belgium, 3 in Russia, 3 in South Korea, 3 in Italy, 2 in Portugal, 2 in Finland, 2 in Australia, 1 in Norway, 1 Mexico, 1 in Malaysia, and 1 in Chile. 4,985 bonds are issued in the US capital market, 206 in Canada, 138 in the UK, 79 in Japan, 50 in France, 49 in Germany, and 3 in China. The skewed distribution in the home and target countries is a

consequence of the availability of first day trading returns. Bond issues by financial firms, firms located in tax havens, and bonds without a rating at launch are excluded.

The bonds in the data received S&P ratings between AAA and D at the time of issuance. The largest amount of bonds received a rating of BBB (1,005), followed by BBB+ (852), A (769), A- (660), BBB- (556), A+ (348), AA- (279), BB- (184), BB (183), BB+ (174), B+ (123), AA+ (107), AAA (104), B (103), B- (46), AA (42), D (12), CCC+ (6), CCC (2), and CC (2). The most prominent industry sector is Machinery, equipment, furniture, and recycling (1,124 bonds), followed by Gas, water, electricity (870), Other services (779), Chemicals, rubber, plastics, non-metallic products (654), Wholesale and retail trade (367), Food, beverages, tobacco (349), Primary sector (297), Transport (278), Post and telecommunications (249), Metals and metal products (142), Publishing and printing (113), Hotels and restaurants (96), Education and health (69), Wood, cork, paper (39), Construction (35), Other (30), and Textiles, wearing apparel, leather (16). The vast majority of bonds is fixed rate (5,477), 11 are floating rate, 10 are variable rate, 2 are convertible from fixed to floating rate, and 2 are zero coupon bonds. Bonds are issued between 2007 and 2017, with the highest number in 2015 (745), followed by 2016 (662), 2012 (639), 2017 (630), 2014 (593), 2013 (535), 2011 (455), 2010 (414), 2009 (371), 2008 (242), and 2007 (221).

Measures

The dependent variable in this study is the difference between the offer price and the closing price of the first day of trading for a newly issued bond. The focus is on new issues because of the confounding effect of earlier information disclosure in seasoned offerings. Only the first trading day is considered. The dependent variable is computed in basis points. The variable is limited to a range of 300 basis points to eliminate the effects of extreme outliers. Cases where no or only one trade is observed on the first trading day are excluded. Longer-term measures of underpricing that are used in other literature on underpricing (Nagler & Ottonello, 2018) may introduce additional complication because they are dependent on a reference market, which is not clearly defined for cross-border issues. Figure 1 gives an overview of the distribution of the dependent variable.

[Figure 1 about here]

A bond's yield to maturity is taken from DealScan. A novel measure for underwriter quality is developed to capture hypothesis 2¹. The countries where firms' ultimate owner is located are defined to be their "home country". If the home country is not the same as the country where the bond is listed, the cross-listing dummy is assigned the value one (else zero). Investor protection is captured by the La Porta, Lopez-de-Silanes, and Shleifer (2006) measure of disclosure requirements (public enforcement in robustness checks). Control variables used are bond face value (logged), whether the bond issue was syndicated (1, 0 else), whether it is fixed (0) or floating (1) rate, the years to maturity, the base real interest rate in the issuing country, risk aversion in the host country, firm size in terms of assets (logged), the ratio of fixed to total assets, and firm debt ratio.

Methodology

The estimation methodology is a hierarchical linear model (Alcácer, Chung, Hawk, & Pacheco-de-Almeida, 2018, Hox, 2002). Because of the multi-home and multi-host characteristics of the sample, two non-nested cluster levels are introduced: one on the home-country level, and one on the host-country level. Moreover, fixed effects for the issuing firm's major industry, type of bond, currency of issue, and rating classes are introduced. The estimation is conducted using the lmer() command (De Boeck, Bakker, Zwitser, Nivard, Hofman, Tuerlinckx, & Partchev, 2011) in an R 3.5.1 distribution (R-Core-Team, 2017). Formally, the extent of underpricing of bond i issued by firm j from country h in country k is estimated as follows:

$$\begin{aligned} \text{underpricing}_{h,i,j,k} &= \beta_0 + \beta_1 \cdot \mathbf{Controls}_{h,i,j,k} + \beta_2 \cdot \text{yield}_i + \beta_3 \cdot \text{reputation}_i + \beta_4 \cdot \text{crosslist}_i \\ &+ c_{ind} + c_{type} + c_{currency} + c_{rating} + u_h + u_k + \epsilon. \end{aligned}$$

Then, the coefficient β_4 is decomposed following H4a and H4b as follows:

$$\beta_4 = \gamma_0 + \gamma_1 \cdot \text{reputation}_i + \gamma_2 \cdot \text{investor protection}_k.$$

¹ See Appendix 1 for details.

Results

Table 1 presents summary statistics and pairwise correlations for all variables. First day returns are on average positive, with a mean of six basis points. Bond issues in the sample vary between below five million USD and 49 billion USD. The vast majority of deals (99%) are syndicated, and the average maturity is twelve years. The average real interest rate is 1.59 per cent, and the average firm is quite large at 76 billion USD. There is, however, quite substantial variation of issue sizes in the sample. The average firm has 74 per cent fixed assets, and a debt ratio of (relatively high) 34 per cent. The average bond's yield to maturity is 4.19 per cent. Average underwriter ranking is 1,455 Elo points, six per cent of the bonds are issued by foreign firms, and investor protection is on average 0.98 on the scale developed by (La Porta, Lopez-de-Silanes, & Shleifer, 2006). Pairwise correlations are available in Table 2. Correlations are generally very low, the highest is between years and yield to maturity (0.30). Following guidance by Lindner, Puck, and Verbeke (2019), control variables are included in the analysis regardless of their partial correlation with other explanatory variables.

[Tables 1 and 2 about here]

Table 3 presents regression results. The variables are introduced step-by-step. First, Model 1 only contains the model structure (fixed effects, random intercepts, and grand mean intercept). Model 2 also includes control variables. Models 3 to 5 introduce the main effects (H1-H3), and models 6 and 7 introduce the interaction hypotheses (H4a and H4b). Model 8 is the full model used for quantitative interpretation. Results are stable over the different models. Regarding hypothesis 1, the results indicate statistical support for the notion that riskier bonds lead to stronger underpricing: if the yield to maturity increases by one standard deviation, underpricing increases by approximately three basis points on average. As suggested by hypothesis 2, Table 3 shows that bonds underwritten by more better investment banks have lower underpricing: if quality increases by one standard deviation, underpricing decreases by a little bit more than one basis point on average. Supporting hypothesis 3, Table 3 shows that cross-listed bonds are underpriced by five basis points more than domestic bonds, everything else being equal.

[Table 3 about here]

Hypothesis 4a is not supported by the results presented in Table 3: higher underwriter quality seems not to moderate the relationship between cross-listing and underpricing. This non-finding will be picked up again in the discussion section. Hypothesis 4b is empirically supported by the models presented in Table 3: better investor protection reduces the degree of underpricing. The economic size of this effect is particularly remarkable, because a very good investor protection rating fully eliminates the underpricing effect of cross-listing.

[Figures 2-4 about here]

In terms of model fit, Table 3 shows that the Akaike Information Criterion (AIC) decreases substantially from Model 1 to Model 8, with the exception of Model 7, where the addition of the interaction hypothesis H4a only insignificantly reduces AIC. Model 8, with both interactions, however, has a lower AIC and hence better model fit than any other model presented in Table 3. In terms of economic significance, the effects identified in this paper are substantial, too. An increase of one standard deviation in the yield to maturity (which is associated with an increase in underpricing of three basis points) in the average bond issue in the sample (with volume of approximately 1.8 billion USD) is associated with a reduction in proceeds from a bond issue in the amount of 54 million USD because of underpricing. Similarly, bonds underwritten by investment banks with underwriter quality on standard deviation above the mean have proceeds that are approximately 20 million USD higher than bonds underwritten by average underwriters for the average bond in the sample. Cross-listed bonds raise 90 million USD less than domestic bonds due to underpricing for otherwise equivalent firms.

[Table 4 about here]

Table 4 presents several robustness checks with regards to modelling and sampling. Model 1 uses a standard OLS model instead of the hierarchical specification presented above. Model 2 uses a standard OLS model and no fixed effects. Both models show results that are very similar to the main results presented in Table 3. Model 3 in Table 4 uses a hierarchical specification, but without the random intercept on the target country level, and Model 4 uses a hierarchical specification without the

random intercept on the issuer country level. Both show results that are congruent with the main analysis. Model 5 uses a different measure of investor protection (enforcement of violations), and Model 6 includes non-rated bonds on top of the rating classes used in the main analysis, Model 7 also includes bonds issued by firms headquartered in tax havens, and Model 8 includes bonds issued by firms whose main industry is banking. All models are statistically equivalent to the main analysis. Additionally, the underwriter quality measure is replaced with the Loughran and Ritter (2004) measure. This test also shows statistically equivalent results (albeit a reduced sample).

Discussion and Conclusion

This paper argues that information asymmetry can be used to understand better how bond, intermediary, and national characteristics influence bond underpricing. The literature discussed in this paper points towards a potential synergy in explaining underpricing using intermediation (Benveniste & Spindt, 1989, Cornelli & Goldreich, 2001), information-asymmetry-related arguments that are based in IB (Bell, Filatotchev, & Rasheed, 2012), international finance (Atilgan, Ghosh, Yan, & Zhang, 2015, Blass & Yafeh, 2001), and international corporate governance literature (Filatotchev, Bell, & Rasheed, 2016). This literature is, in turn, related to how much money firms can raise from security issues abroad (Bell, Filatotchev, & Aguilera, 2014), depending on the risk propensity exhibited by investors (Karolyi, 2006).

The baseline hypothesis in this paper is that an increased information asymmetry leads to higher underpricing, following information-based models of underpricing (e.g. Rock, 1986). Hypothesis 1 tests this effect directly and associates the degree of information asymmetry between managers and investors with the probability of default as assessed by market participants. Given the payoff profile of debt investors, which exhibits a nonlinearity around the point when the issuer's assets are close to the amount of debt outstanding, debt investors will need extra incentives to request allocations of low quality bonds. One such incentive may be underpricing. Hypothesis 2 focusses on underwriter characteristics, and argues that more reputable underwriters do not have to resort to as much underpricing to find investors willing to take on bonds, regardless of bond quality. This relates to the bookbuilding models of underpricing (Benveniste & Spindt, 1989), but goes a step further in

linking underwriter characteristics (specifically underwriter quality) to bond underpricing. The mechanism for this connection is related to the signaling models of underpricing (Allen & Faulhaber, 1989, Grinblatt & Hwang, 1988), but adds underwriter quality as a signaling element.

Hypothesis 3 provides a strong link to the IB literature (to a lesser extent the signaling mechanism for H2 relates to that literature), where information asymmetry is a prominent source of liabilities of foreignness (Hymer, 1976, Zaheer, 1995), particularly in capital markets (Bell, Filatotchev, & Rasheed, 2012). International finance literature has also acknowledged that there is a premium that foreign investors have to pay to raise funds in capital markets abroad, both in the debt (Atilgan, Ghosh, Yan, & Zhang, 2015) and equity (Blass & Yafeh, 2001) markets. However, the theoretical link to the literature on liabilities of foreignness has been missing. In this sense, the paper at hand answers recent calls for reducing the gap between finance and IB in general (Agmon, 2006, Bowe, Filatotchev, & Marshall, 2010), and between security issuance and liabilities of foreignness in particular (Puck & Filatotchev, 2018). It needs to be acknowledged that the observed liability of foreignness documented in this paper is a net effect of advantages and disadvantages of cross-listing, and that there is a corporate governance effect that eliminates some of the liability because firms need to comply with regulation in the target capital market (Bell, Filatotchev, & Aguilera, 2014).

Hypothesis 4a relates the mechanism underlying hypothesis 3 to the IB literature on capital market internationalization, and to the finance literature on underpricing. Hypothesis 4a does not receive empirical support in this paper, even though the theoretical mechanism that links the quality of the underwriter signal to a reduction in capital market liabilities of foreignness is quite clear, following Bell, Filatotchev, and Rasheed (2012). One potential reason for this non-finding is that underwriting firms may not be considered as sufficiently “local” to provide a convincing signal that reduces the LoF. In this sense, it may be that it is not the quality of the underwriter as such that drives the assessment, but the degree to which the underwriter is perceived to be “local”. The fact that underwriting firms tend to locate in “Global Cities” (Goerzen, Asmussen, & Nielsen, 2013) may in fact reinforce this disadvantage, because this may even further reduce their perception of being local, even if they have a local presence in a country where a firm lists its bonds. This potential explanation

points towards a separation of “foreignness” into a component that relates to the country of operation, and a component that relates to the extent to which Global Cities are integrated with the rest of the countries where they are located.

The non-finding on hypothesis 4a in combination with the findings on hypothesis 4b point towards an important unexplained contingency in literature on intermediation in IB. It seems that intermediaries do not act as conveyors of information in the sense that information asymmetries across borders are reduced beyond the effect observed in domestic intermediaries. Rather, literature should probably conceive of intermediaries as independent profit-maximizing entities that absorb premiums when they connect internationalizing firms to their foreign partners. This is in line with a related stream of literature in finance, which thinks of underpricing as a consequence of intermediaries’ market power (Fohlin, 2010). As suggested by hypothesis 4b, it may be underwriters’ enveloping institutions that force them to act in their foreign business partners’ interest. Only if the capital market regulation forces them to disclose the information they have collected about an issuing firm, intermediaries will pass on this information to primary investors. This will then reduce the degree of underpricing. It is interesting to note how economically large this effect is for foreign issues. This points towards a constraining role of foreign capital market institutions to how much of potential proceeds from bond issues intermediaries can absorb.

By linking these streams of literature, this paper makes several theoretical and empirical contributions. First, it translates the logic of how information asymmetry between issuers and potential investors to underpricing to the bond market. Second, it provides an explicit rationale what kind of quality signal from an intermediary can help reduce information asymmetry, and consequently underpricing. In this vein, the paper also makes an empirical contribution by suggesting a novel measure of underwriter quality. Third, the paper connects the information asymmetry theory of underpricing to the information asymmetry logic of liability of foreignness in general, and capital market liabilities of foreignness in particular. In this vein, the paper also contributes to the integration of IB and finance literature, which has repeatedly been called for. For business practice, the paper makes two important contributions. First, it outlines and quantifies the extra cost that firms can expect

to be confronted with when issuing bonds in a foreign capital market, on top of potential disadvantages in valuation and rating. Second, it gives managers a ranking of underwriting banks that is independent of subjective assessments of prestige, and relatively independent of underwriter size.

Nevertheless, this paper also acknowledges several limitations. Foremost, the theoretical discussion is limited largely to information-asymmetry based explanations of underpricing. Second, the paper uses a sample of quite large firms, due to its focus on cross-national comparisons, which forces the selection of entities that are listed in stock exchanges to allow comparisons. Third, the data in the paper are dominated by firms headquartered and listed in the USA. Fourth, the paper only uses a select set of mechanisms that firms can employ to reduce liabilities of foreignness. Finally, the paper makes some generalizations from equity to debt market that need further empirical substantiation (such as the bookbuilding logic that is essentially transferred from an equity market logic).

A number of avenues for future research emerge from the theoretical reasoning, empirical findings, and limitations of this paper. First, it remains to be seen whether an information asymmetry in the financial market, which leads to underpricing, can be alleviated by internationalization in the product market, and what the interrelationships between these strategies are. Second, an empirical investigation into differences in underpricing, and the associated mechanisms with a balanced dataset from several countries could reveal additional reasons for differences in underpricing. These differences could also be linked to differences in risk preferences. Third, a deeper investigation into underwriter quality, particularly spillovers from quality in equity underwriting to debt underwriting could reveal additional effects of underwriter quality on underpricing and related phenomena. Finally, additional avenues for research integrating IB and finance literature remain to be investigated.

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Figure 1: Histogram of first day trading returns

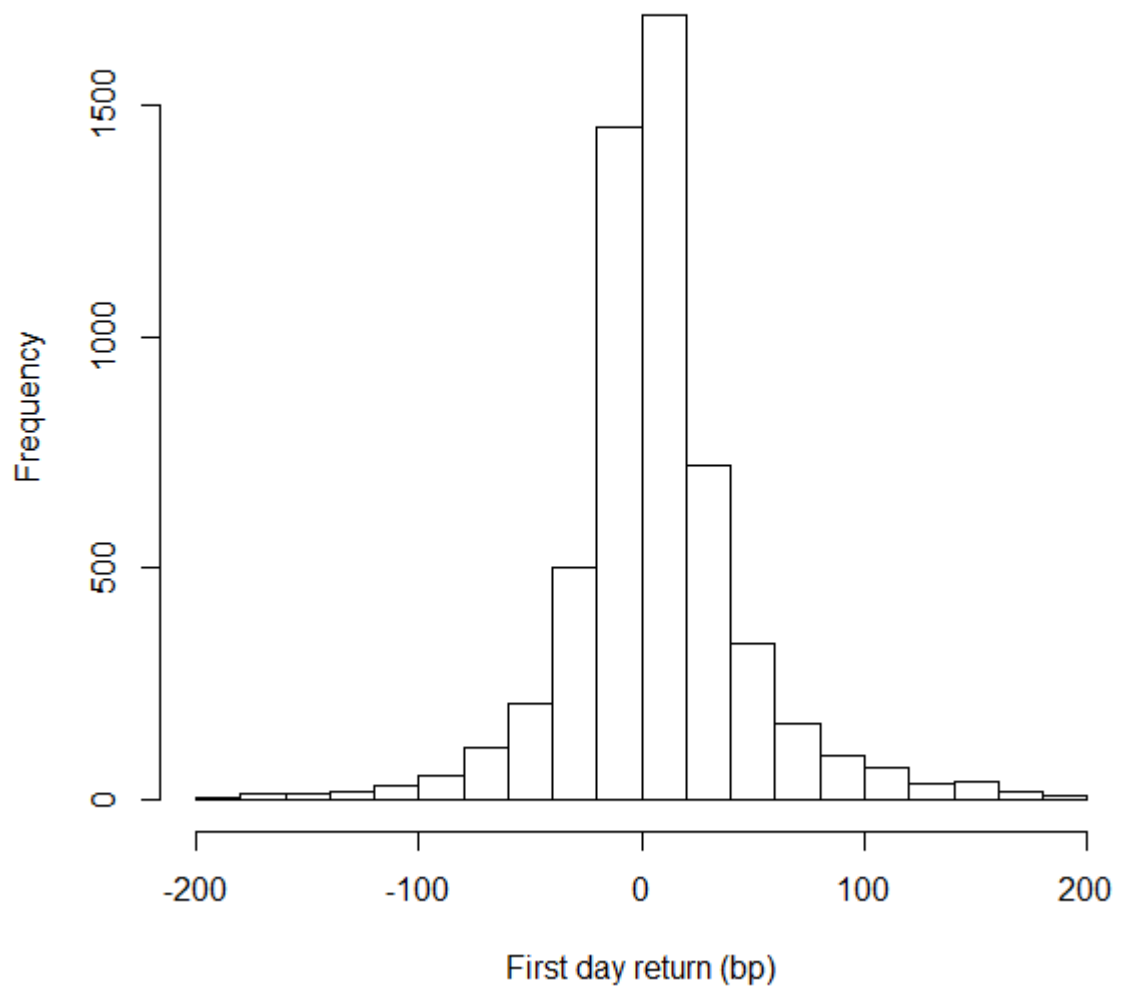


Figure 2: Partial effect plot of the relationship between underpricing and yield to maturity.

Plot based on full model (Model 8, Table 3).

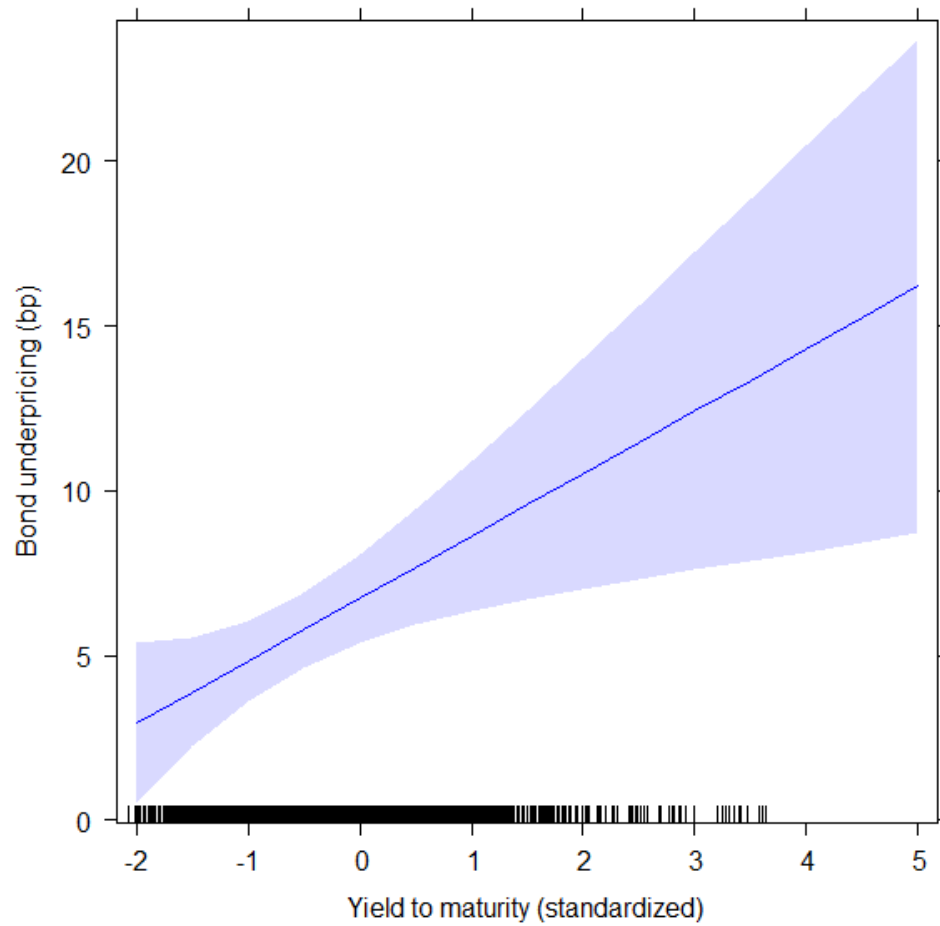


Figure 3: Partial effect plot of the relationship between underpricing and underwriter quality.

Plot based on full model (Model 8, Table 3).

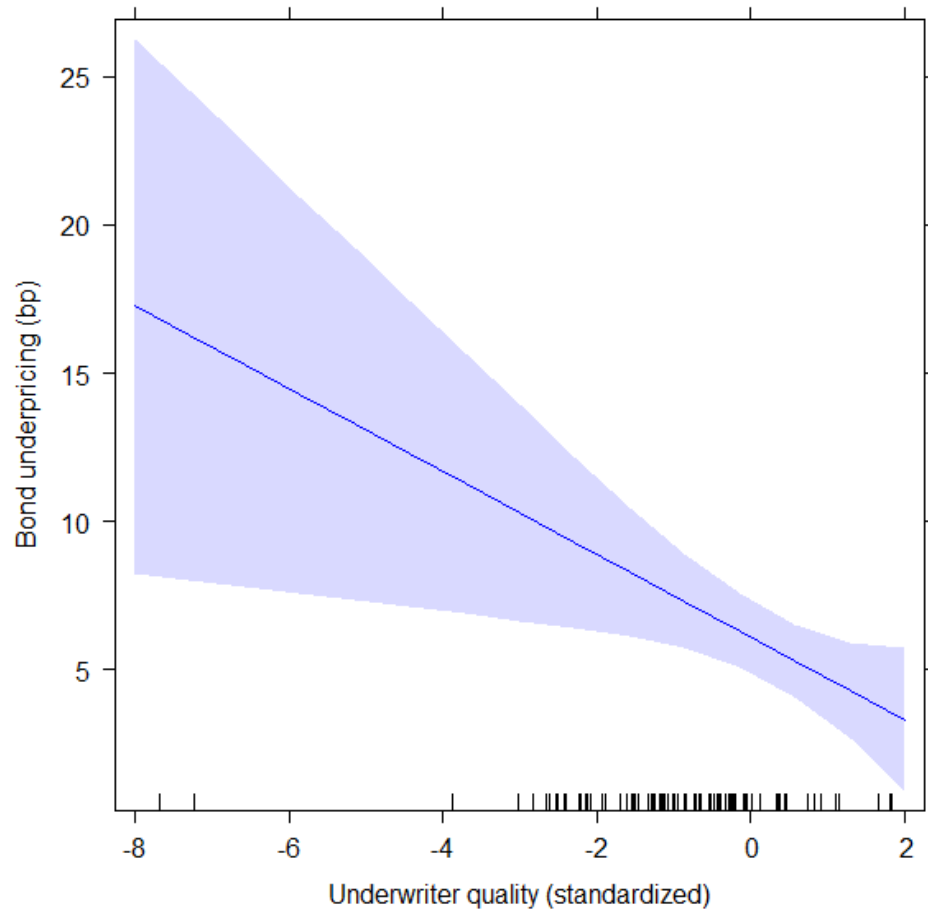


Figure 4: Boxplot comparing predicted underpricing for cross-listed (left) and domestic (right) bonds. Plot based on full model (Model 8, Table 3).

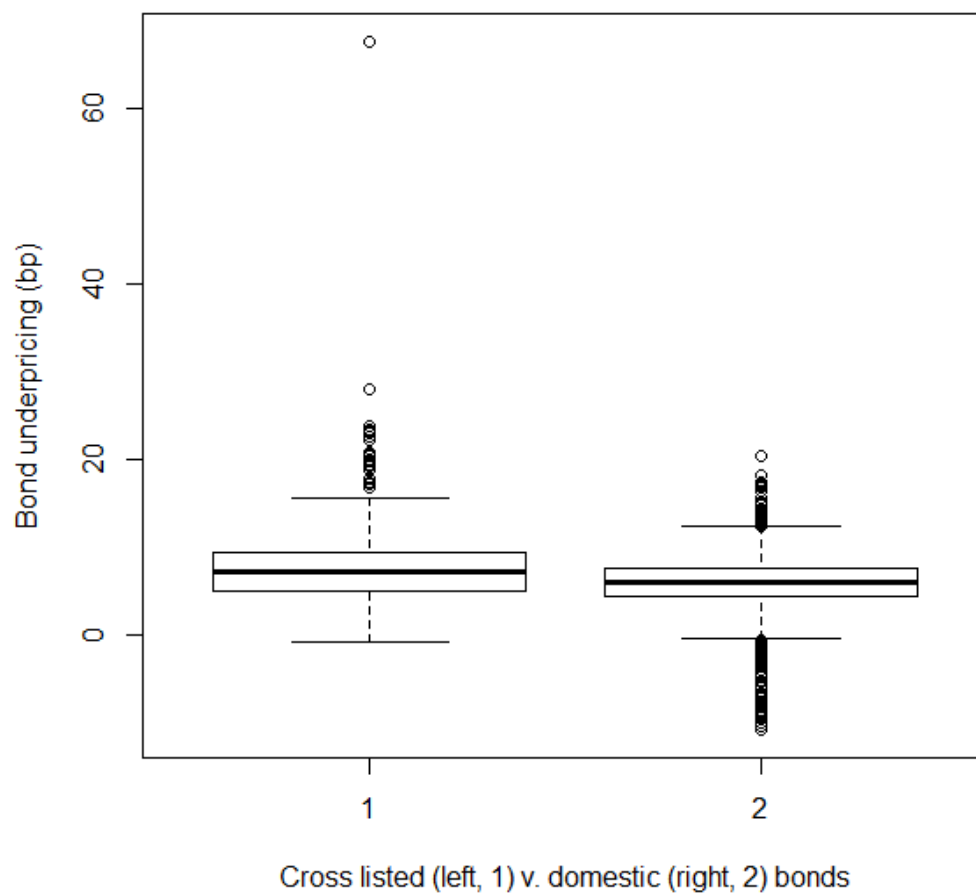


Table 1: Summary statistics

	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
First day returns	0.06	0.37	-1.46	-0.11	0.22	1.49
Issue volume (mn)	1,867.19	2,992.05	4.68	500.00	2,000,.00	49,000.00
Syndicated	0.99	0.09	0	1	1	1
Years to maturity	12.01	9.60	1.00	5.10	10.20	100.00
Risk aversion	0.78	0.03	0.54	0.78	0.78	0.80
Interest rate	1.59	1.06	-0.72	1.26	2.13	5.40
Total assets (mn)	76,307.90	111,881.69	0.51	14,187.80	79,804.00	706,634.25
Fixed ratio	0.74	0.20	0.00	0.61	0.91	1.00
Debt ratio	0.34	0.16	0.00	0.25	0.42	1.78
Yield to maturity	4.19	1.92	-0.42	2.81	5.31	17.28
Underwriter quality	1,455.02	93.05	699.13	1,421.84	1,494.12	1,670.25
Cross listing	0.06	0.24	0	0	0	1
Investor protection	0.98	0.07	0	1	1	1

Table 2: Pairwise correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
First day returns (1)	1	0.02	0.01	0.01	0.05	-0.01	-0.01	0.02	0.03	-0.02	0.01	-0.00
Issue volume (mn) (2)	0.02	1	0.04	0.00	-0.15	-0.07	0.35	-0.12	-0.09	-0.01	0.01	-0.04
Syndicated (3)	0.01	0.04	1	0.05	-0.05	-0.02	-0.03	0.04	-0.01	0.06	-0.02	0.01
Years to maturity (4)	0.01	0.00	0.05	1	0.29	0.04	-0.05	0.17	0.02	-0.00	-0.05	0.09
Risk aversion (5)	0.05	-0.15	-0.05	0.29	1	0.10	-0.19	0.12	0.15	0.04	0.01	0.09
Interest rate (6)	-0.01	-0.07	-0.02	0.04	0.10	1	-0.02	0.04	0.01	0.31	-0.01	0.05
Total assets (mn) (7)	-0.01	0.35	-0.03	-0.05	-0.19	-0.02	1	-0.10	-0.22	-0.00	0.08	-0.23
Fixed ratio (8)	0.02	-0.12	0.04	0.17	0.12	0.04	-0.10	1	0.21	-0.06	-0.16	0.07
Debt ratio (9)	0.03	-0.09	-0.01	0.02	0.15	0.01	-0.22	0.21	1	-0.01	-0.20	0.16
Yield to maturity (10)	-0.02	-0.01	0.06	-0.00	0.04	0.31	-0.00	-0.06	-0.01	1	0.01	0.02
Underwriter quality (11)	0.01	0.01	-0.02	-0.05	0.01	-0.01	0.08	-0.16	-0.20	0.01	1	-0.03
Investor protection (12)	-0.00	-0.04	0.01	0.09	0.09	0.05	-0.23	0.07	0.16	0.02	-0.03	1

Table 3: Regression results (standard errors in parentheses).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(Intercept)	1.540 (15.671) p = 0.922	-0.530 (27.940) p = 0.985	-4.575 (27.863) p = 0.870	-7.410 (27.821) p = 0.790	-16.724 (28.167) p = 0.553	-16.983 (28.187) p = 0.547	-44.284 (29.651) p = 0.136	-45.176 (29.745) p = 0.129
Issue volume (logged)		-0.509 (0.628) p = 0.418	-0.239 (0.631) p = 0.705	-0.186 (0.631) p = 0.768	-0.277 (0.633) p = 0.662	-0.275 (0.633) p = 0.665	-0.225 (0.632) p = 0.722	-0.221 (0.632) p = 0.727
Syndicated		6.003 (5.858) p = 0.306	6.300 (5.851) p = 0.282	7.289 (5.863) p = 0.214	7.548 (5.864) p = 0.199	7.490 (5.866) p = 0.202	9.006 (5.872) p = 0.126	8.934 (5.874) p = 0.129
Years to maturity		0.070 (0.055) p = 0.207	-0.026 (0.061) p = 0.666	-0.024 (0.060) p = 0.697	-0.023 (0.060) p = 0.708	-0.023 (0.060) p = 0.708	-0.024 (0.060) p = 0.693	-0.024 (0.060) p = 0.692
Risk aversion		21.792 (22.180) p = 0.326	21.236 (22.028) p = 0.336	20.508 (21.898) p = 0.349	22.798 (22.309) p = 0.307	22.762 (22.354) p = 0.309	56.374 (23.982) p = 0.019	56.619 (24.066) p = 0.019
Interest rate		-0.173 (0.478) p = 0.718	-0.333 (0.479) p = 0.488	0.027 (0.503) p = 0.957	0.033 (0.503) p = 0.948	0.034 (0.503) p = 0.947	0.044 (0.503) p = 0.931	0.044 (0.503) p = 0.930
Total assets (logged)		-0.429 (0.483) p = 0.375	-0.346 (0.482) p = 0.474	-0.321 (0.482) p = 0.506	-0.177 (0.490) p = 0.719	-0.171 (0.491) p = 0.728	-0.237 (0.494) p = 0.632	-0.228 (0.494) p = 0.645
Fixed ratio		12.682 (3.931) p = 0.002	12.669 (3.924) p = 0.002	12.263 (3.925) p = 0.002	12.543 (3.921) p = 0.002	12.522 (3.921) p = 0.002	12.921 (3.919) p = 0.001	12.890 (3.919) p = 0.002
Debt ratio		10.731 (3.629) p = 0.004	10.545 (3.623) p = 0.004	10.583 (3.619) p = 0.004	11.561 (3.654) p = 0.002	11.580 (3.655) p = 0.002	11.341 (3.655) p = 0.002	11.365 (3.655) p = 0.002
Yield to maturity (H1: +)			3.329 (0.855) p = 0.0001	3.317 (0.855) p = 0.0002	3.276 (0.855) p = 0.0002	3.278 (0.855) p = 0.0002	3.301 (0.854) p = 0.0002	3.303 (0.854) p = 0.0002
Underwriter quality (H2: -)				-1.300 (0.556) p = 0.020	-1.306 (0.555) p = 0.019	-1.363 (0.571) p = 0.017	-1.276 (0.555) p = 0.022	-1.355 (0.570) p = 0.018
Cross listing (H3: +)					5.062 (2.287) p = 0.027	4.989 (2.294) p = 0.030	120.008 (34.244) p = 0.0005	121.081 (34.288) p = 0.0005
Investor protection							-7.154 (8.209) p = 0.384	-6.985 (8.293) p = 0.400
Cross listing * Underwriter quality (H4a: -)						0.945 (2.173) p = 0.664		1.327 (2.174) p = 0.542
Cross listing * Investor protection (H4b: -)							-117.018 (34.792) p = 0.001	-118.215 (34.845) p = 0.001
Observations	5,507	5,507	5,507	5,507	5,507	5,507	5,507	5,507
Home country	YES	YES	YES	YES	YES	YES	YES	YES
Random Intercept								
Host country	YES	YES	YES	YES	YES	YES	YES	YES
Random Intercept								
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Currency FE	YES	YES	YES	YES	YES	YES	YES	YES
Rating class FE	YES	YES	YES	YES	YES	YES	YES	YES
AIC	55,105.9	55,075.3	55,060.6	55,056.5	55,050.7	55,049.2	55,027.3	55,025.5

Table 4: Robustness checks (standard errors in parentheses).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(Intercept)	-44.303 (29.541) p = 0.134	-52.864 (22.235) p = 0.018	-44.303 (29.541) p = 0.134	-45.176 (29.745) p = 0.129	-34.907 (28.899) p = 0.228	-41.692 (29.417) p = 0.157	-40.659 (29.481) p = 0.168	-40.644 (29.676) p = 0.171
Issue volume (logged)	-0.222 (0.632) p = 0.726	0.354 (0.568) p = 0.533	-0.222 (0.632) p = 0.726	-0.221 (0.632) p = 0.727	-0.154 (0.634) p = 0.809	-0.289 (0.624) p = 0.644	-0.209 (0.632) p = 0.741	-0.260 (0.631) p = 0.681
Syndicated	8.948 (5.874) p = 0.128	8.098 (5.810) p = 0.164	8.948 (5.874) p = 0.128	8.934 (5.874) p = 0.129	9.133 (5.882) p = 0.121	8.057 (5.812) p = 0.166	8.771 (5.872) p = 0.136	6.505 (5.808) p = 0.263
Years to maturity	-0.024 (0.060) p = 0.690	-0.008 (0.055) p = 0.887	-0.024 (0.060) p = 0.690	-0.024 (0.060) p = 0.692	-0.022 (0.060) p = 0.716	-0.025 (0.060) p = 0.678	-0.025 (0.060) p = 0.683	-0.025 (0.060) p = 0.677
Risk aversion	56.139 (23.852) p = 0.019	52.737 (23.278) p = 0.024	56.139 (23.852) p = 0.019	56.619 (24.066) p = 0.019	39.730 (21.613) p = 0.067	57.999 (23.776) p = 0.015	53.734 (23.814) p = 0.025	56.364 (24.028) p = 0.019
Interest rate	0.045 (0.502) p = 0.929	0.114 (0.492) p = 0.817	0.045 (0.502) p = 0.929	0.044 (0.503) p = 0.930	0.074 (0.505) p = 0.884	-0.020 (0.498) p = 0.968	0.014 (0.502) p = 0.978	0.059 (0.503) p = 0.907
Total assets (logged)	-0.227 (0.494) p = 0.646	0.125 (0.416) p = 0.764	-0.227 (0.494) p = 0.646	-0.228 (0.494) p = 0.645	-0.306 (0.497) p = 0.539	-0.298 (0.484) p = 0.538	-0.247 (0.494) p = 0.617	-0.264 (0.494) p = 0.594
Fixed ratio	12.907 (3.919) p = 0.001	4.298 (2.734) p = 0.116	12.907 (3.919) p = 0.001	12.890 (3.919) p = 0.002	12.959 (3.919) p = 0.001	12.289 (3.907) p = 0.002	12.701 (3.914) p = 0.002	13.679 (3.910) p = 0.0005
Debt ratio	11.354 (3.655) p = 0.002	7.143 (3.312) p = 0.032	11.354 (3.655) p = 0.002	11.365 (3.655) p = 0.002	11.443 (3.654) p = 0.002	11.173 (3.632) p = 0.003	11.595 (3.646) p = 0.002	11.176 (3.655) p = 0.003
Yield to maturity (H1: +)	3.306 (0.854) p = 0.0002	1.895 (0.693) p = 0.007	3.306 (0.854) p = 0.0002	3.303 (0.854) p = 0.0002	3.315 (0.854) p = 0.0002	3.425 (0.840) p = 0.00005	3.371 (0.853) p = 0.0001	3.294 (0.853) p = 0.0002
Underwriter quality (H2: -)	-1.357 (0.570) p = 0.018	-1.394 (0.563) p = 0.014	-1.357 (0.570) p = 0.018	-1.355 (0.570) p = 0.018	-1.368 (0.570) p = 0.017	-1.323 (0.567) p = 0.020	-1.358 (0.570) p = 0.018	-1.329 (0.570) p = 0.020
Cross listing (H3: +)	120.910 (34.282) p = 0.0005	106.932 (32.314) p = 0.001	120.910 (34.282) p = 0.0005	121.081 (34.288) p = 0.0005	106.761 (33.237) p = 0.002	120.844 (34.235) p = 0.0005	105.090 (33.169) p = 0.002	120.509 (34.304) p = 0.0005
Investor protection	-7.449 (8.074) p = 0.357	-5.990 (7.771) p = 0.441	-7.449 (8.074) p = 0.357	-6.985 (8.292) p = 0.400	-5.471 (4.318) p = 0.206	-7.277 (8.057) p = 0.367	-7.195 (8.071) p = 0.373	-7.216 (8.246) p = 0.382
Cross listing * Underwriter quality (H4a: -)	1.322 (2.174) p = 0.544	1.613 (2.160) p = 0.456	1.322 (2.174) p = 0.544	1.327 (2.174) p = 0.542	1.405 (2.176) p = 0.519	1.333 (2.167) p = 0.539	1.275 (2.163) p = 0.556	1.310 (2.175) p = 0.547
Cross listing * Investor protection (H4b: -)	-118.050 (34.840) p = 0.001	-105.774 (33.011) p = 0.002	-118.050 (34.840) p = 0.001	-118.214 (34.845) p = 0.001	-115.026 (37.503) p = 0.003	-117.832 (34.781) p = 0.001	-102.303 (33.747) p = 0.003	-117.625 (34.862) p = 0.001
Observations	5,507	5,507	5,507	5,507	5,507	5,587	5,521	5,523
AIC	55,283.0	55,266.8	55,023.5	55,023.5	55,028.0	55,826.1	55,166.4	55,187.3
Home country Random Intercept	NO	NO	YES	NO	YES	YES	YES	YES
Host country Random Intercept	NO	NO	NO	YES	YES	YES	YES	YES
Industry FE	YES	NO	YES	YES	YES	YES	YES	YES
Type FE	YES	NO	YES	YES	YES	YES	YES	YES
Currency FE	YES	NO	YES	YES	YES	YES	YES	YES
Rating class FE	YES	NO	YES	YES	YES	YES	YES	YES

Appendix 1: Ranking of underwriter banks²

Previous literature has focused mainly on the ranking of investment banks in terms of their role as equity underwriters. Carter and Manaster (1990) introduced a model where the underwriters' position in the "tombstone announcements" for IPOs is used to assess their prestige level. Megginson and Weiss (1991) use the market share for measuring the quality of the respective underwriter. The ranking developed by Loughran and Ritter (2004), though based on the Carter and Manaster (1990) approach, is still very popular today. These research streams however only focus on equity underwriting. This paper develops an evaluation of underwriter quality by evaluating members in bond issuing syndicates using the Elo system, originally created to rank chess players (Elo, 1978). The Elo system, which takes the quality of one's competitors into account, is widely used to rank competitors in areas such as bowling, college football, golf, soccer, tennis, and online-gaming (Cooney, Hill, Jordan, & Singh, 2004). The rating scheme developed here is based on a dataset containing 29,180 bond issues. This sample is substantially larger than the sample in the main analysis because there was no need to map control variables and firm characteristics with the original dataset. With an average issue of approximately 500 million USD, this sample accounts for a large part of overall bond issues in the observation period.

The underwriter rating model follows the general ideas of Carter and Manaster (1990) and Loughran and Ritter (2004). First, it allocates prestige to a set of roles in a consortium of banks underwriting a certain issue. Loughran and Ritter (2004: p38) say:

"[...] assigned a ranking based on the following: The May 1999 Goldman Sachs prospectus lists over 120 underwriters, with numerous brackets. Managing and co-managing underwriters are assigned a ranking of 9, with other underwriters given a ranking based on the bracket they are in, with a few minor adjustments made by the authors".

² This ranking methodology was developed in a dissertation submitted to WU Vienna in 2016.

This paper proceeds in a similar fashion, yet minimizes the subjective choices. Three categories are used as a starting point: Banks that act as “bookrunners” are in the highest category (3), banks that act as “non-bookrunners” are assigned category 2, and banks (or, often, law firms) that only act as “trustees” are assigned category 1. With this setting, 898,334 dyadic “games” from a sample of 29,180 bond issues are generated. In every game, two banks in a consortium are compared. If a bank is in a higher category than another (e.g. a bookrunning bank vs a trustee bank), the routine assigns a “win” to the higher-ranking bank and a “loss” to the lower-ranking one. If both banks are in the same category, the game “draws”. All banks start with a ranking of 1,000 points before their first entry into the “championship” of bond issuing. Depending on the strength of the opponents, banks gain points for “wins” over the sample period and “lose” points for losses. The procedure is implemented using the PlayerRatings package (Stephenson & Sonas, 2016).