THE JOURNAL OF FINANCE • VOL. LX, NO. 6 • DECEMBER 2005

# Investment Bank Reputation and the Price and Quality of Underwriting Services

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**ABSTRACT**

The relation between investment bank reputation and the price and quality of bond underwriting services is studied here. After controlling for endogeneity in issuer–underwriter matching, I find that reputable banks obtain lower yields and charge higher fees, but issuers' net proceeds are higher. These relations are pronounced in the junk-bond category, in which reputable banks' underwriting criteria are most stringent. These findings suggest that banks' underwriting decisions reflect reputation concerns, and are thus informative of issue quality. They also suggest that economic rents are earned on reputation, and thereby provide continued incentives for underwriters to maintain reputation.

IN CAPITAL MARKETS, INVESTMENT BANKS PLAY the important role of bridging firms that need capital with investors that seek investment opportunities. Intermediation services are valuable first because the banks' specialization in the sales and marketing of securities helps lower the issuers' *transactional* costs of borrowing. But perhaps more importantly, investment banks can provide value through their role in lowering the issuers' *informational* cost of capital. This role arises from the information asymmetry that typically exists between insiders (the issuing firms) and outsiders (the investors) in security issuance events. Such an information gap, as Akerlof demonstrated in his classic 1970 paper, at best causes investors to discount the securities, and at worst can threaten the existence of the market. Investment banks, standing between the insiders and the outsiders, seem to be in the perfect position to reduce information asymmetry and lower the cost of capital that issuers would otherwise have to pay.

But how does an investment bank solve its own information problem vis-à-vis the investor? One solution is the "reputation capital" at stake for the intermediary. A key difference between investment banks and ordinary issuers

*Lily Hua Fang is from Finance Area, INSEAD. This paper is based on a chapter of my dissertation. I am indebted to my advisors, Gary Gorton, Robert Holthausen, Andrew Metrick, David Musto, and Ayako Yasuda for their guidance and support. I owe special thanks to an anonymous referee, whose insightful comments helped me improve the paper greatly. I also want to thank Franklin Allen, John Core, Petra Todd, Jay Ritter, and Robert Stambaugh (the editor) for valuable feedback. Comments and suggestions from seminar participants at Boston College, INSEAD, University of Colorado (Boulder), University of Oregon, University of Washington, Washington University in St. Louis, Yale School of Management, Wharton, and the NY Federal Reserve are gratefully acknowledged. Last but not least, I thank Robert Kiernan and Jack Malvey at Lehman Brothers and Cheryl Francis at RR Donnelly for generously spending time to share their insights with me. All omissions and errors are my own.

is that banks are repeated players in the financial markets, and as such, their survival and future income is directly tied to their reputation: Although dishonesty may increase short-term profit, such profit will be earned at the cost of losing reputation and future income. As long as the present value of future income exceeds the short-term profit from fraud, investment banks will find defrauding investors suboptimal.

Thus, reputation is a valued asset in the investment banking industry. The need to protect reputation capital has further implications for both the banks' underwriting decisions and fee structures, and the market-clearing security prices. Since bad security performance damages the reputation of the underwriter, banks with prominent reputations will select underwriting assignments cautiously; to the extent that these banks are better able to access issue quality, they will underwrite high quality issues that pose little risk to their reputation. In equilibrium, knowing the investment banks' reputation concerns, investors can infer a positive signal from a reputable underwriter's agreement to underwrite, and ceteris paribus, the market clears at a better price for the issuer. To sustain this equilibrium, banks with good reputations need to be able to charge premium fees, which serve both as compensation for their investment in reputation and as an incentive for the continued provision of high-quality intermediation services.

While theoretically the role of intermediary reputation is well established, the empirical evidence is less unified. There is mixed evidence on the relation between underwriter reputation and security pricing, and little is known as to whether a good reputation commands a fee premium. In this paper, I contribute to the literature by studying simultaneously the relations among the reputations of the underwriters, the prices of the securities they underwrite, and the fees they charge.

An important departure of this paper from existing work in the area is that the empirical model used takes into account the endogenous nature of the matching between issuers and underwriters. This is important because as existing theory and evidence suggest this matching is nonrandom; failing to control for this endogeneity confounds intermediary-reputation effects with clientele effects and could lead to incorrect conclusions.

After accounting for issuer–underwriter matching, I find that reputable underwriters obtain lower yields (higher prices) for their issuers. Interpreting the superior pricing as higher quality, this shows that the more reputable underwriters offer higher quality services. Consistent with higher quality, I find that these banks also charge premium fees, again after accounting for self-selection. However, the fee premium is outweighed by the yield reduction, so that issuers' net proceeds remain higher when reputable banks are hired as underwriters. Overall, the findings suggest that reputable underwriters offer high quality services (lower bond yields and higher issuer proceeds) at premium prices (higher fees), reminiscent of a "high price as an indicator of quality" type of equilibrium in the spirit of Klein and Leffler (1981).

While economies of scale and scope unique to the large underwriters help explain their superior pricing ability, these factors do not seem to account for

the entire pricing differential. In particular, pricing improvements are found to be especially large for junk bonds, for which information asymmetries are expected to be the greatest. Meanwhile, the reputable banks' underwriting criteria are also found to be especially stringent for this category. Among junk issues, not only do these banks underwrite fewer deals, but also deals of significantly higher quality. Interestingly, this selectivity is not observed in the investment-grade category. This unique selectivity in underwriting standards in the junk category, together with the result that junk issuers enjoy larger pricing improvements when underwritten by reputable banks, lends strong support to a certification role of intermediary reputation.

Overall, the findings suggest that banks' underwriting decisions reflect reputation concerns, and thus are informative of issue quality. Investors infer a positive signal when a reputable underwriter agrees to put his name on the line, and ceteris paribus, the market clears at a higher price for the issuer. In this equilibrium, economic rents in the form of premium fees are earned on reputation, which is necessary to provide a continued incentive for the reputable underwriters to provide high-quality underwriting services.

The rest of the paper is organized as follows. Section I reviews related literature. Section II discusses the data. Section III presents the empirical model that accounts for the endogeneity in the issuer–underwriter matching. Sections IV and V present and discuss the main empirical findings. Section VI concludes.

## I. Related Literature

### *A. Theory*

From the theoretical literature on reputation—in both the banking industry specifically and the products market in general—one can draw the conclusion that reputation should positively correlate with both the price (fee) and quality (security pricing) of underwriting services.

Chemmanur and Fulghieri (1994) model the reputation acquisition of investment banks and show that reputation is established by adopting stringent evaluation standards. They show that in equilibrium, reputable investment banks underwrite less risky issues, obtain higher prices for the issuers, and receive higher compensation. Booth and Smith (1986) model underwriter reputation as a bonding mechanism that solves the information problem between the intermediary and the investor. They emphasize the intermediary's certification role under asymmetric information. Both papers suggest a positive relation between underwriter reputation and security prices.

On the relation between reputation and (product) price, the classic works of Klein and Leffler (1981), Shapiro (1983), and Allen (1984) demonstrate that when quality is unobservable, a premium price arises as a means of quality assurance because such a price ensures that the present value of future income is greater than the short-term profit from cutting quality and selling low quality goods at high quality prices. These theories on product prices are applicable to the underwriting market because this market satisfies the key

assumption that quality is ex ante unobservable. The theories imply that a fee premium is needed to induce honest information production because it renders the alternative—defrauding the investors and taking the short-term profit—suboptimal. Importantly, in this "price as an indicator for quality" type of equilibrium, premium fees need not imply positive or larger profits since rents are dissipated through the provision of higher quality services at higher costs.

### *B. Empirical Literature on Intermediary Reputation*

Empirical studies of the relation between underwriter reputation and security pricing have focused on equity initial public offerings.[1] The underlying hypothesis is that underpricing should decrease in underwriter reputation because underpricing arises from information asymmetry, which intermediary reputation helps resolve.

The evidence on this seemingly obvious prediction is mixed. While earlier papers such as McDonald and Fisher (1972), Logue (1973), Tinic (1988), and Carter and Manaster (1990) document a negative relation between underpricing and underwriter reputation, more recently, Beatty and Welch (1996), Cooney et al. (2001), and Logue et al. (2002) find either the opposite or no relation at all.[2]

The inconclusive evidence perhaps points to an inherent difficulty in the assumption of a negative relation between underwriter reputation and IPO underpricing. The reason is that even if underwriter reputation reduces underpricing, this effect can be observed only if the underwriters pass this gain on to the issuers, that is, the banks' incentives are aligned with maximizing issuers' proceeds. While underpricing represents money left on the table for the issuer, it enlarges investors' profits and reduces underwriters' selling efforts. Both effects can make underpricing rather attractive to the underwriters. Importantly, this misalignment of objectives may be particularly severe in equity IPOs because IPO firms are small and young, with little bargaining power vis-à-vis powerful investment banks.

Empirical evidence on the relation between underwriter reputation and compensation is surprisingly sparse. James (1992) finds a negative relation between

[1] Studies of bond IPO performance are relatively rare. Datta, Iskandar-Datta, and Patel (1997) find that investment grade IPOs tend to be underwritten by reputable banks, and junk IPOs tend to be underwritten by less reputable banks. While investment grade IPOs are often overpriced, junk grade IPOs are likely to be underpriced. Their findings are consistent with reputable banks having superior pricing abilities.

[2] This reversal of the underwriter-reputation and underpricing relation could indicate a shift in the incentive structure in the IPO market. In the bubble period of the late 1990s, many IPOs that experienced astronomical initial returns were underwritten by prestigious investment banks. It is unclear that the degree of underpricing in these issues is solely due to information asymmetry. Instead, it seems that in the 1990s underpricing was particularly advantageous for the underwriters, not only because it makes marketing easier, but also because it favors key investors who can generate more brokerage business. Loughran and Ritter (2004) provide a rich set of evidence supporting this view.

underwriter reputation and fees in the IPO market. Livingston and Miller (2000) also document such a "reputation discount" in the bond underwriting market. These results are at odds with both intuition and the theoretical prediction that a fee premium is needed to induce high-quality information production.

This puzzling result can be explained by the endogeneity in the matching between issuers and underwriters. Rather than being a true discount, the lower fees documented for reputable banks may simply arise from the lower risks of the issues that these banks underwrite. Moreover these banks may have chosen (self-selected) to underwrite higher quality issues precisely out of reputation concerns. Thus, failing to control for this type of self-selection could lead to incorrect conclusions.

In this paper, I bridge the two largely disconnected strands of literature by studying the relations between underwriter reputation and both the price and quality of underwriting services. This allows me to examine not only the tradeoff between price (fee) and quality (security pricing), but also the impact on issuers' net proceeds, neither of which has been done before.

In this effort, two deliberate departures from existing works are made in terms of the empirical method and data. First, since the issuer–underwriter matching is likely endogenous,[3] I use an empirical model that explicitly controls for this endogeneity, thus removing the potential bias due to self-selection. Second, I collect data from the corporate bond market to examine the effects of underwriter reputation. In addition to the paucity of existing evidence, the corporate bond market differs from the equity IPO market in ways that alleviate some of the inference problems in the IPO literature. Notably, the severe misalignment of incentives in the IPO market is less likely a problem in the bond market because bond issuers are generally large and established firms that have more bargaining power vis-à-vis the investment banks, and also because competition among banks for bond issues is intense.[4] This means that underwriters' incentives are more aligned with proceeds-maximization for the issuer, and the hypothesis of a positive relation between underwriter reputation and security pricing is more likely to hold. In addition, in the bond market, systematic measures of issue quality are available from rating agencies. Standardized quality measures reduce the heterogeneity in the data and allow for cleaner inferences on reputation effects.

[3] Indeed, this endogeneity has been discussed in the literature. For example, Carter and Manaster (1990) note that, "... reputable underwriters are associated with lower risk offerings" (p. 1045). Beatty and Welch (1996) also observe that, "... underwriters earn a return on their built-up reputation capital and primarily do so by taking larger, less risky firms public" (p. 578).

[4] The intensity of competition is evident from the market being sometimes called a "commodity" business on Wall Street, with lower margins than other investment banking services. While underwriting fees for IPOs cluster around 7% (Chen and Ritter (2000)), fees for bond issues are typically below 1%.

## II. Data

### A. Measures of Price, Quality, and Underwriter Reputation

In this paper, both the price and quality of underwriting services are defined from the issue's perspective. Price is measured by the gross spread, which is the cash compensation to the underwriter as a percentage of the issue amount. Quality is measured by the offering yield on each issue, which reflects the price that the underwriter can obtain for the issuer.

For the reputation of an investment bank, I use a measure based on the bank's market share.[5] Intuitively, market share captures the "brand name" and "goodwill" of an investment bank. As Klein and Leffler (1981) point out, if a firm engages in quality cutting, this information disseminates more rapidly if the firm has a large market share. Economicly, market share reflects the revenue stream at stake, and larger banks have more to lose from a tarnished reputation. This point is illustrated in De Long (1991, p. 209–210):

> If reputations as honest brokers are sufficiently fragile, a firm with a large market share . . . will not imperil its reputation for the sake of higher short-run profits on any one deal. . . . By contrast, a firm with a small market share may well decide to cash-in its reputation by luring investors into a profitable deal that is unsound . . . With a small market share, the future returns expected from a reputation as an honest broker may also be small, and might be less than the benefits from exploiting to the fullest one unsound deal in the present.

Instead of using market share as a continuous measure of reputation, however, I discretize the measure into a binary classification of the underwriters. Economicly, the binary classification captures the empirically observed two-tiered power structure in the investment banking industry. On Wall Street, an investment bank seems to either belong to the "bulge bracket" or it does not. This hierarchical structure has been observed in both the academic literature and the financial press.[6] Econometrically, using a continuous measure relies not only on the assumption that the measure can capture reputation with precision, but also that it has a constant effect on the variables of interest. The binary classification avoids both assumptions and enables a better inference on the *qualitative* differences between large, prominent underwriters and their smaller rivals.

In the existing literature, a popular measure of underwriter reputation is the Carter–Manaster ranking based on tombstone announcements of equity

[5] Market share has been used frequently in the existing literature as an empirical proxy for reputation. See, for example, McDonald and Fisher (1972), Simon (1990), De Long (1991), Megginson and Weiss (1991), and Beatty and Welch (1996). The popular Carter–Manaster measure based on tombstone announcements is used in Carter and Manaster (1990), James (1992), Carter, Dark, and Singh (1998), and Logue et al. (2002). Two other papers, Logue (1973) and Tinic (1988) use rankings in Hayes (1971), which is an early version of the Carter–Manaster measure since it is also based on tombstone announcements.

[6] See, among others, Hayes (1971), Tinic (1988), and Carter et al. (1998).

offerings.[7] I do not use this measure in the baseline analysis primarily because the bond underwriting market differs significantly from the equity underwriting market. Notably, there are many more banks in equity underwriting than in bond underwriting. While a number of small boutique firms can be classified as "reputable" in equity underwriting due to their niche in certain market segments, underwriters in the bond market tend to be large investment banks that do not specialize in only a few segments. Moreover, the correlation between market share and the Carter–Manaster measure is over 95%. Nevertheless, robustness checks using the Carter–Manater measure will be presented in Section V.

### *B. Data and Descriptive Statistics*

Data on corporate nonconvertible bonds issued between January 1, 1991 and December 31, 2000 are collected from the SDC database, which provides detailed issue information, including underwriter compensation. Consistent with prior studies, I exclude utility and financial issues from the sample. Firm attributes such as market capitalization and stock returns are obtained from the Compustat and CRSP databases. There are over 3,000 bond issues and 51 distinct investment banks in the resulting sample.

Figure 1 provides a histogram for the number of issues underwritten by each bank. Table I lists summary statistics for the top 15 banks measured by market share over the sample period. A pronounced feature of the data in both the figure and the table is that the bond underwriting market is highly concentrated. The largest five banks underwrite over 60% of all deals, and the largest 15 banks account for roughly 95% of all deals.

For the baseline analysis, the top eight banks by market share—Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ—are classified as "reputable," and the rest as "less reputable." This initial cut is made on the basis of the fact that these eight banks appear almost every year among the top-10 list in *Investment Dealers' Digest*'s annual league tables,[8] and thus there is a sense of stability of their reputation over time. Casually speaking, all these names seem to be the blue-chips on Wall Street, and roughly correspond to the bulge bracket set. Nevertheless, since there is an inherent degree of arbitrariness in this binary cut, Section V contains robustness checks to ensure that the main results do not hinge upon comparing these particular eight banks with the rest.

A notable feature in Table I is that there is a nonrandom relation between the banks' rankings and the average fees and yields on the issues they underwrite.

[7] See Carter and Manaster (1990) and Carter et al. (1998) for tabulations of this measure. Tombstone announcements are marketing brochures of pending security offerings. It is alleged that investment banks in the underwriting syndicate are listed in these documents according to a strict hierarchy, where banks deemed more prestigious appear above those considered less prestigious. The Carter–Manaster measure is based on an investment bank's position in these documents.

[8] The bank with the least frequent appearance among the top-10 is J. P. Morgan, which appears eight times during the 10-year period.

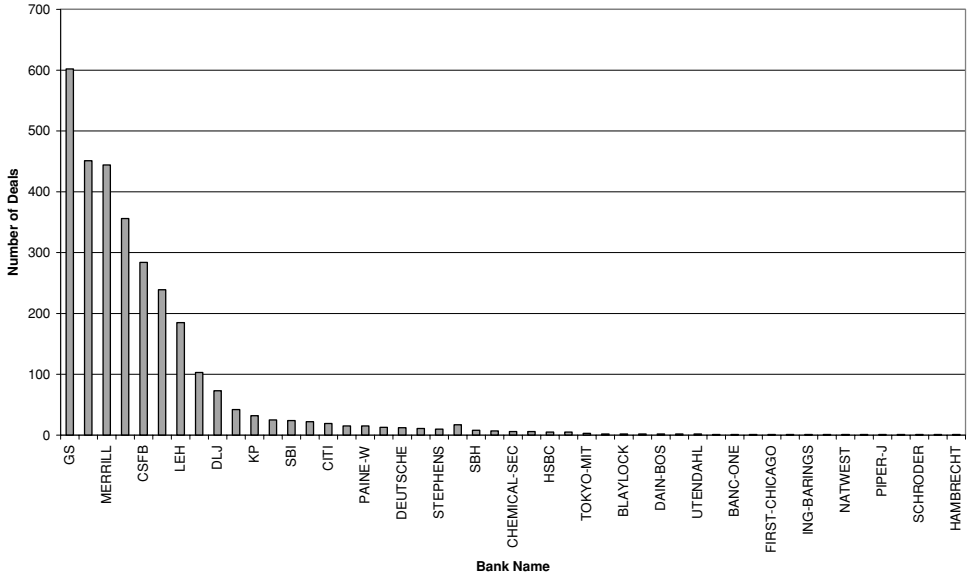


**Figure 1. Deals led by each underwriter in the sample (1991–2000).** This graph plots the number of bond issues (with complete information) lead-underwritten by each underwriter in the sample. There are 51 unique bond underwriters in the sample. If a deal has co-lead underwriters, each co-lead bank is given credit for that deal in this tabulation.

The second-to-last column in Table I lists the average fees for each of the top 15 banks. Casual inspection reveals a reputation discount in the fee pattern: The average fees for the reputable banks cluster around 0.9%, compared to about 1.5% for the less reputable banks; as we go down the list, the average generally increases. Similarly, the last column in the table shows that average yields also increase as one goes down the list.

While these patterns could indicate a combination of lower yields and lower fees in the price–quality schedule of underwriting services, such a combination would seem strange. If more reputable banks are able to obtain higher prices for the issuers, why should they charge *lower* fees?

A more plausible explanation for these patterns is that the matching between underwriters and issuers is endogenous. Supporting this possibility, Table II compares the means of various firm and issue characteristics for the issues underwritten by the two bank groups. The two groups are remarkably different along various dimensions. The reputable banks underwrite for firms that are significantly less risky, with higher credit ratings and lower stock return volatilities. But they also underwrite larger deals with longer maturity, which are presumably more difficult to float. The sample also exhibits interesting patterns in issuance activity. On the one hand, clients of the reputable banks are more frequent issuers, issuing on average 3.84 times during the 10-year period compared to 3.00 times for clients of the less reputable banks. On the

**Table I**
**Summary Statistics for Top 15 Underwriters**

This table presents summary statistics for the top 15 banks in terms of market share for the 1991–2000 period. The variable total amount is the total corporate bond underwriting volume for the bank during the 10 years, measured in millions of 1991 dollars. Each lead underwriter is given full credit for a deal. The variable total deals is the total number of issues underwritten by each bank for the same time period. The market share variable is computed by dividing each underwriter's underwriting volume (amount or frequency) by the corresponding market total. The average fee is the average gross spread (as a percentage of issue amount) charged by each bank over the sample period. The average yield is the average yield-to-maturity on the issues underwritten by each bank over the sample period. All fee and yield figures are in percentage terms.

| Underwriter | Total Amount | Total Deals | Market Share in Amount | Market Share in Deals | Average Fee | Average Yield |
|---|---|---|---|---|---|---|
| Goldman Sachs | 168,651.20 | 797 | 0.20 | 0.18 | 0.85 | 7.65 |
| Merrill Lynch | 130,868.80 | 660 | 0.16 | 0.15 | 0.95 | 7.98 |
| Morgan Stanley | 120,510.60 | 611 | 0.14 | 0.14 | 0.91 | 7.67 |
| Salomon | 90,341.30 | 507 | 0.11 | 0.11 | 0.87 | 7.62 |
| CSFB | 73,801.00 | 486 | 0.09 | 0.08 | 0.92 | 7.75 |
| Lehman Brothers | 55,156.10 | 283 | 0.07 | 0.06 | 0.94 | 7.84 |
| JP Morgan | 52,045.90 | 299 | 0.06 | 0.07 | 0.73 | 7.21 |
| DLJ | 33,369.30 | 171 | 0.04 | 0.04 | 2.23 | 9.87 |
| Chase Security | 23,167.40 | 141 | 0.03 | 0.03 | 0.83 | 7.35 |
| Bear Stearns | 20,134.50 | 98 | 0.02 | 0.02 | 1.42 | 8.31 |
| Bankers Trust | 7,562.10 | 42 | 0.01 | 0.01 | 2.46 | 10.98 |
| Kidder Peabody | 7,494.50 | 52 | 0.01 | 0.01 | 1.18 | 8.47 |
| Smith Barney | 6,945.00 | 35 | 0.01 | 0.01 | 1.44 | 8.52 |
| Dillon Read | 6,238.50 | 42 | 0.01 | 0.01 | 1.49 | 8.66 |
| Citi Corp | 5,315.50 | 48 | 0.01 | 0.01 | 1.70 | 9.27 |

other hand, clients of the less reputable banks are the heavier borrowers relative to their own sizes. These firms on average borrow 1.05 times their market capitalization of equity, compared to 0.51 times for the reputable banks' clients. It seems that clients of the less reputable banks are overall less credit worthy but more credit hungry.

The systematic differences between the issues underwritten by the two bank groups highlight the endogenous nature in the issuer–underwriter matching. The model presented in the next section will take this endogeneity into account.

## III. Empirical Methods

### *A. Model Setup*

Previous studies on reputation effects typically employ a dummy variable specification, where a reputation dummy equals one if an issue is underwritten

**Table II**

**Firm and Issue Characteristics by Underwriter Reputation**

This table reports means of select firm and issue characteristics for issues underwritten by the reputable banks as well as those underwritten by the less reputable banks. The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The credit rating variable indicates Moody's rating for the bond issue. The highest value of 17 is assigned to an Aaa-rating; other ratings are numerated in decreasing order. The variable issue size is the issue proceeds in millions of dollars; relative issue size is the ratio between issue proceeds and the contemporaneous firm size measured as the market capitalization of equity. The maturity variable is the bond's time to maturity in years. The indicator variable shelf registration is equal to 1 if the issue is shelf-registered and 0 otherwise. The firm size variable measures the issuers' year-end market capitalization of equity for the year before the bond issue, in billions of dollars. Variables beta and sigma are the firm's market beta and stock return volatility over the 120-day period prior to the bond issue date. The variable profitability is computed as net income divided by total assets using data from the year before the bond issue; leverage is the ratio between total debt and total asset, measured as of the year-end before the bond issue. The variable issue frequency is the number of bond issues conducted by the firm during the 10-year sample period; total issue is the sum of relative issue sizes (issue size/concurrent market capitalization) for all issues of a firm during the sample period. Variables yield and treasury spread are the offering yield and the spread to treasury, respectively. The variable gross spread is the amount of underwriting fee as a percentage of the offering amount. Variables yield, yield spread, and gross spread are expressed in percentage terms. The *t*-statistics for differences in means are reported.

| | Issues Underwritten by Reputable Banks | Issues Underwritten by Less Reputable Banks | *t*-Statistics |
|---|---|---|---|
| Credit rating | 10.32 | 9.18 | 7.13 |
| Issue size | 206.01 | 158.15 | 8.21 |
| Relative issue size | 0.14 | 0.34 | −2.84 |
| Maturity | 13.80 | 11.72 | 5.18 |
| Shelf registration | 0.87 | 0.75 | 6.67 |
| Firm size | 12.86 | 8.27 | 5.45 |
| Beta | 0.88 | 0.84 | 1.86 |
| Sigma | 0.02 | 0.02 | −2.01 |
| Profitability | 0.19 | 0.20 | −1.87 |
| Leverage | 0.67 | 0.66 | 0.39 |
| Issue frequency | 3.84 | 3.00 | 2.08 |
| Total issue | 0.51 | 1.05 | −2.27 |
| Yield | 7.60 | 8.08 | 6.29 |
| Treasury spread | 1.35 | 1.78 | 6.38 |
| Gross spread | 0.87 | 1.10 | −5.71 |

by a reputable bank and zero otherwise. In this setup, the dummy variable is treated as exogenous. Since the issuer–underwriter matching is nonrandom, however, this treatment confounds the effects of underwriter reputation with the effects due to issue characteristics. To correctly measure reputation effect, the inference we are interested in is the following "what-if" type of question: For an issue underwritten by a reputable bank, what would the alternative yield and gross spread be had it been underwritten by a less reputable bank instead? The answer to this question holds the issue constant, and separates out the effect due to underwriter reputation.

Empirically, this type of "what-if" question can be analyzed by a switching-regression model with endogenous switching.[9] The model consists of a binary outcome equation that reflects the matching between the issuer and the underwriter, and two regression equations on the variable of interest. Formally, we have

$$I_i^* = Z_i'\gamma + \varepsilon_i, \tag{1}$$

$$y_{1i} = x_i'\beta_1 + u_{1i}, \quad \text{and} \tag{2}$$

$$y_{2i} = x_i'\beta_2 + u_{2i}. \tag{3}$$

Equation (1) is the latent issuer–underwriter matching equation. To reflect binary outcomes, $I^*$ is discretized as follows:

$$I_i = 1 \text{ iff } I_i^* > 0, \quad \text{and } I_i = 0 \text{ iff } I_i^* \leq 0. \tag{4}$$

In other words, $I_i$ equals one if and only if an issue is underwritten by a reputable bank.[10]

In this setup, the issuer–underwriter matching is modeled in reduced form. The dependent variable $I_i$ indicates the outcome of whether an issue is underwritten by a reputable bank, which results from decisions of both the issuer and the underwriter. Accordingly, in the empirical specification, the vector $Z_i$ contains variables that might matter for either party. Firm-level characteristics that could affect the matching include size, profitability, stock return volatility, and the issuer's borrowing patterns such as issue frequency and amount. Issue-level characteristics such as credit rating, call provision, and maturity should also affect the matching. Finally, to the extent that preexisting issuer–underwriter relationships can also significantly impact the matching, a scope variable is constructed to reflect the scope of service that the underwriter has rendered the issuer in the past.

Equation (2) is the yield equation for the reputable banks, and (3) is that for the less reputable banks, *for the same issue*. Of course, for each issue, we only observe either $y_{1i}$ or $y_{2i}$, depending on the outcome of $I_i$, so that the following observation rules hold:

$$y_i = y_{1i} \quad \text{iff} \quad I_i = 1, \quad \text{and } y_i = y_{2i} \quad \text{iff} \quad I_i = 0. \tag{5}$$

The endogeneity is modeled by allowing the residual yield to correlate with the residual in the matching equation, so that unobserved or missing variables (e.g., private information) in the matching equation are allowed to also affect the yield. This implies that the following covariance matrix is nondiagonal:

[9] See Maddala (1983) for a detailed discussion of this model.

[10] Empirically, if an issue has multiple lead underwriters, then the maximum of the lead banks' reputations is defined as the reputation of the syndicate. In other words, an issue is considered underwritten by a reputable bank if and only if at least one of the lead underwriters is a reputable bank.

$$\operatorname{cov}(u_{1i}, u_{2i}, \varepsilon_i) = \begin{bmatrix} \sigma_{11} & \sigma_{12} & \sigma_{1\varepsilon} \\ \sigma_{21} & \sigma_{22} & \sigma_{2\varepsilon} \\ \sigma_{1\varepsilon} & \sigma_{2\varepsilon} & 1 \end{bmatrix}. \tag{6}$$

This model appears in Lee (1978) in his study of unionism and wage rates, and Dunbar (1995) in his study of the use of warrants as underwriter compensation. It is a generalization of the two-stage model used in Gande et al. (1997), Gande, Puri, and Saunders (1999) and Puri (1996), which study the entry of commercial banks to the bond underwriting market. In these papers, to control for commercial banks' endogenous decisions, the authors use a similar two-stage model, except that instead of two pricing equations for the two bank groups, there is one second-stage equation, which in effect restricts the beta coefficients in equations (2) and (3) to be the same across bank types.[11] Relaxing the equality of the pricing coefficients makes this model more general. A priori, there is no reason to believe that the two types of banks should have the same pricing technology. In addition, the model with one pricing equation seems more suitable for truncated data where the alternative is not observed, a classic example of which is the effect of labor participation on wage rates, where wages are unobservable for people not in the labor force. Since yields are always observed, but from different types of banks, the two-equation model is more appropriate.

The same framework is used to study the relation between underwriter reputation and fees by replacing the two yield equations with two gross spread equations.

### *B. Estimation and Method of Inference*

To estimate the model, a key observation is that since either equation (2) or (3) is realized depending on the outcome of $I^*$ (but never both), the observed yield is a conditional variable. Taking expectations of equation (2), we obtain

$$\begin{aligned} E[y_{1i}] &= E[y_i \mid I_i = 1] \\ &= E\left[y_i \mid I_i^* > 0\right] \\ &= E[X_i'\beta_1 + u_{1i} \mid Z_i'\gamma + \varepsilon_i > 0] \\ &= X_i'\beta_1 + E[u_{1i} \mid \varepsilon_i > -Z_i'\gamma]. \end{aligned} \tag{7}$$

Because $u_1$ and $\varepsilon$ are correlated, the last conditional expectation term in (7) does not have a zero mean, and OLS on equation (2) will generate inconsistent

[11] In Gande et al. (1997), Gande et al. (1999), and Puri (1996), the two-stage system reduces to the following regression: $Y_i = X_i'\beta + E[u_i \mid B] \times D_i + E[u_i \mid NB] \times (1 - D_i) + v_i$, where $D_i = 1$ if a commercial bank underwrites the issue, and $D_i = 0$ otherwise. This is equivalent to a first-stage selection equation and one second-stage yield equation, which in effect restricts the pricing equation to be the same for the commercial banks and the investment banks. The conditional expectations of $u$ are computed in the same way as in this paper, resulting in inverse Mills-ratio variables that correct the nonzero mean of the original residual.

estimates. If, however, $E[u_{1i} \mid \varepsilon_i > -Z_i'\gamma]$ can be proxied by a variable $M$, say, and included as a right-hand-side variable, then the augmented equation becomes

$$E[y_{1i}] = X_i'\beta_1 + cM_i + v_i. \tag{8}$$

Since the new residual $v$ has a zero mean, equation (8) can be consistently estimated by OLS.

The joint-normality assumption on $u$ and $\varepsilon$ makes the foregoing strategy feasible. By the properties of the joint normal, we have

$$E[\mu_{1i} \mid \varepsilon_i > -Z_i'\gamma] = \sigma_{1\varepsilon}\left(\frac{\phi(-Z_i'\gamma)}{1-\Phi(-Z_i'\gamma)}\right) = \sigma_{1\varepsilon}\left(\frac{\phi(Z_i'\gamma)}{\Phi(Z_i'\gamma)}\right), \tag{9}$$

where $\sigma_{1\varepsilon}$ is the covariance between $u_1$ and $\varepsilon$, and $\phi$ and $\Phi$ are the density and cumulative distribution functions of the normal distribution, respectively. The term $\phi(Z_i'\gamma)/\Phi(Z_i'\gamma)$ in (9) is called the inverse Mills ratio. If this term is added to the regression as a right-hand-side variable, we can use OLS to consistently estimate $\beta_1$ as well as $\sigma_{1\varepsilon}$ from equation (8).

The above discussion forms the basis of the two-stage estimation method used in Lee (1978) and discussed in Heckman (1979) and Maddala (1983). Equation (1) is first estimated by a probit regression, yielding consistent estimates of $\gamma$. With this, the inverse Mills-ratio terms can be computed for equations (2) and (3).[12] Both equations are then augmented with the inverse Mills ratios as additional regressors. These terms adjust for the conditional mean of $u$, and allow the equations to be consistently estimated by OLS.

To infer reputation effects in bond pricing, I compute the following difference:

$$\underbrace{E\left[y_{2i} \mid I_i^* > 0\right]}_{\text{hypothetical}} - \underbrace{y_{1i}}_{\text{actual}}. \tag{10}$$

The second term in (10) is the actual yield from a reputable bank; the first is the hypothetical yield that would be obtained by a less reputable bank for the same issue. If the difference is positive, then the reputable bank's service results in a price improvement for the issuer since the actual yield is lower. For this reason, the difference term will be called the "yield improvement." To compute the yield improvement, we observe that

$$\begin{aligned} E\left[y_{2i} \mid I_i^* > 0\right] &= E[X_i'\beta_2 + u_{2i} \mid Z_i'\gamma + \varepsilon_i > 0] \\ &= X_i'\beta_2 + \operatorname{cov}(u_{2i}, \varepsilon_i)\left(\frac{\phi(-Z_i'\gamma)}{1-\Phi(-Z_i'\gamma)}\right) \\ &= X_i'\beta_2 + \operatorname{cov}(u_{2i}, \varepsilon_i)\left(\frac{\phi(Z_i'\gamma)}{\Phi(Z_i'\gamma)}\right). \end{aligned} \tag{11}$$

[12] The inverse Mills-ratio term for equation (3) is obtained likewise, and it turns out to be $-\left(\frac{\phi(Z_i'\gamma)}{1-\Phi(Z_i'\gamma)}\right)$.

Equation (11) indicates that the hypothetical yield is the predicted value from evaluating the issue attributes in the less reputable banks' pricing equation. In the empirical analyses below, yield and fee improvement terms similar to (10) will be computed for issues underwritten by both bank groups, and will form the basis of the inferences.

## IV. Empirical Findings

### A. Baseline Results

Table III shows estimation results for the first-stage issuer–underwriter matching equation. As discussed in Section III.A., the empirical specification contains variables that reflect considerations of both the issuer and the underwriter. The estimation results show that the reputable banks are more likely to underwrite investment-grade issues of larger firms. These patterns suggest

**Table III**
**Estimation Results for the Issuer–Underwriter Matching Equation**

This table presents the probit estimation results for the matching equation between issues and underwriters. The dependent variable is a binary variable equaling 1 if a reputable bank is the lead underwriter of an issue, and 0 otherwise. For issues with multiple lead underwriters, the dependent variable equals 1 if and only if at least one of the co-lead banks is a reputable bank. The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The variable firm size is the year-end market capitalization of equity in the year before the bond issue; profitability is net income divided by total assets for the year before the bond issue. The indicator variable investment grade is equal to 1 if an issue is of investment grade (Moody's Baa or higher), and 0 otherwise. The variable sigma is the issuer's stock return volatility during the 120 days prior to the bond issue date. The indicator variable callable is equal to 1 if the bond is callable and 0 otherwise. The maturity variable is the natural log of the actual maturity in years. The frequency variable indicates the number of bond issues the firm conducts during the 10-year sample period; total issue is the sum of all issue sizes relative to concurrent firm size for the firm during the sample period. The scope variable indicates the extent to which the lead underwriter of the issue has served the issuer in the 10-year period prior to the bond issue. It is constructed using M&A, equity, and bond issuance data from SDC for the 1981–1990 period. A scope of three means that the lead underwriter has served the issuer in all three services: M&A, equity, and bond underwriting. Scopes of two and one are similarly defined.

| | Coefficient | *t*-Statistics |
|---|---|---|
| Firm size | 0.01 | 2.56 |
| Profitability | −0.60 | −0.27 |
| Investment grade | 0.28 | 3.04 |
| Sigma | −2.56 | −0.59 |
| Callable | 0.68 | 6.38 |
| Maturity | 0.09 | 2.09 |
| Frequency | 0.01 | 1.98 |
| Total issue | −0.02 | −0.98 |
| Scope | 0.32 | 6.84 |
| Constant | −0.01 | −0.07 |
| $N$ | 3,092 | |
| Pseudo $R^2$ | 0.08 | |

that these banks tend to underwrite less risky offerings, consistent with reputation concerns. Call provisions and maturity both significantly increase the probability of a reputable bank being the underwriter, consistent with issuers' need to hire larger underwriters for more complex deals. Frequent issuers' offerings are more likely to be underwritten by a reputable bank, indicating that repeated transactions are valuable to both issuers and underwriters. Finally, the scope of the past issuer–underwriter relationship is the most significant determinant in the matching equation, suggesting that relationships, and the large banks' economies of scope, play an important role in obtaining underwriting contracts.[13]

Table IV shows estimation results for the second-stage yield equations. On the basis of parsimony, the empirical specification includes only firm- and issue-level risk measures that should affect the offer price: credit rating, maturity, and the issuer's stock return volatility.[14] While most variables have the same sign in both equations, the pricing technologies for the two bank groups are notably different. In particular, credit quality improvements[15] reduce yields more steeply in the reputable banks' equation, the $F$-statistics for coefficient-equality being highly significant ($p$-values tabulated). Moreover, the differences seem particularly large for lower rated issues, suggesting that larger banks have comparative advantages in risk-bearing.

Interestingly, these results suggest that credit ratings are not sufficient statistics in yield determination. The fact that yield reductions on similarly rated bonds are significantly larger for issues underwritten by the reputable group indicates that underwriters have information beyond that possessed by the rating agencies. This observation is further evidenced by the significant sign on the inverse Mills-ratio variable in the reputable banks' yield equation. The sign on this endogeneity control is negative, indicating that certain unobserved issuer characteristics that increase the likelihood of hiring a reputable underwriter contribute to further reduce the yield. If one interprets the unobserved characteristics (the $\varepsilon$ in the matching equation) as the underwriters' private information, then this suggests that the reputable banks' private information is consistent with higher issue quality.

Table V shows estimation results for the second-stage fee equations. The empirical specification draws upon previous work on underwriter function and costs. Booth and Smith (1986) and Hansen and Torregrosa (1992) argue that underwriter functions include certification, risk-bearing, and marketing. To capture certification and risk-bearing costs, issue- and firm-level risk measures such as credit rating, maturity, firm beta, leverage, and return volatility are included. Following Altinkilic and Hansen (2000), I include issue size and its

[13] Econometrically, the issuing frequency, total amount, and scope variables serve as identification restrictions in the two-stage model.

[14] Year dummies are included as additional controls, but are not reported in the table.

[15] The excluded category is issues rated Caa or below. Therefore, each rating shown in the regression is an improvement, consistent with the negative coefficients on the rating variables.

**Table IV**
**Estimation Results for the Yield Equations**

This table reports estimation results for the two second-stage yield equations, one for the reputable bank group and the other for the less reputable bank group. The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The dependent variable is the offering yield of each bond issue. Variables Aaa–B3 indicate the Moody's rating on the issue. The omitted category is Caa or below. The variable sigma is the stock return volatility of the issuer, calculated using 120 days of return data prior to the bond issue date. The variable maturity is the natural log of the actual maturity in years. Year dummies are included in the estimation but are not reported in this table. The variable Mills is the inverse Mills-ratio variable used to adjust for self-selection. The *p*-values for coefficient equality based on *F*-tests are reported.

| | Reputable Banks' Yield Equation | | Less Reputable Banks' Yield Equation | | |
|---|---|---|---|---|---|
| | Coefficient | *t*-Statistics | Coefficient | *t*-Statistics | *p*-Value |
| Aaa | −5.43 | −9.11 | −4.13 | −6.97 | 0.13 |
| Aa1 | −5.32 | −8.98 | −2.89 | −3.30 | 0.02 |
| Aa2 | −5.81 | −9.94 | −3.83 | −7.48 | 0.01 |
| Aa3 | −5.21 | −8.94 | −4.39 | −7.95 | 0.07 |
| A1 | −5.29 | −9.11 | −3.93 | −8.35 | 0.08 |
| A2 | −5.04 | −8.69 | −3.64 | −7.82 | 0.06 |
| A3 | −4.95 | −8.55 | −3.64 | −7.76 | 0.11 |
| Baa1 | −4.64 | −8.01 | −3.21 | −6.77 | 0.02 |
| Baa2 | −4.60 | −7.94 | −3.41 | −7.31 | 0.01 |
| Baa3 | −4.48 | −7.71 | −2.81 | −6.02 | 0.01 |
| Ba1 | −3.66 | −6.28 | −1.81 | −3.32 | 0.01 |
| Ba2 | −3.38 | −5.77 | −1.55 | −3.25 | 0.01 |
| Ba3 | −2.97 | −5.07 | −0.95 | −2.01 | 0.05 |
| B1 | −2.33 | −3.97 | −0.72 | −1.56 | 0.03 |
| B2 | −1.86 | −3.19 | −0.28 | −0.59 | 0.03 |
| B3 | −1.46 | −2.47 | 0.47 | 0.99 | 0.01 |
| Sigma | 20.04 | 6.89 | 26.97 | 4.76 | 0.24 |
| Maturity | 0.63 | 24.41 | 0.68 | 10.47 | 0.56 |
| Mills | −0.60 | −2.88 | −0.08 | −0.34 | 0.00 |
| Constant | 10.60 | 17.66 | 9.69 | 15.55 | 0.26 |
| *N* | | 2,560 | | 529 | |
| $R^2$ | | 0.81 | | 0.84 | |

scaled version relative to firm size to capture the fixed and variable components of the underwriters' distribution costs.[16]

The estimation results reveal several systematic differences in the two underwriter groups' fee schedules. First, larger underwriters seem to have higher marginal costs related to the distribution of the issues. Relative issue size (issue size/firm size) increases fees more steeply in the larger underwriters' equation, indicating higher marginal costs. Second, larger underwriters seem to have

[16] Altinkilic and Hansen (2000) argue that since the relative issue size holds firm size fixed as proceeds expand, it allows the variable (total) costs of underwriting to increase at an increasing rate.

**Table V**
**Estimation Results for Fee Equations**

This table presents estimation results for the two second-stage fee equations, one for the reputable bank group and the other for the less reputable bank group. The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The dependent variable is the gross spread of each issue. The variable issue size is the natural log of issue proceeds; relative size is issue proceeds scaled by market capitalization of equity. Variables Aaa–B3 indicate Moody's credit rating on the issue. The omitted category is Caa or below. The indicator variable callable is equal to 1 if the bond is callable and 0 otherwise. The variable maturity is the natural log of the actual maturity in years. Variables beta and sigma are the market beta and stock return volatility over the 120-day period prior to the bond issue date. The variable leverage is total debt divided by total assets as of the year-end before the bond issue. The variable Mills is the inverse Mills ratio used to adjust for self-selection. The *p*-values for coefficient equality based on *F*-tests are reported.

| | Reputable Banks' Fee Equation | | Less Reputable Banks' Fee Equation | | |
|---|---|---|---|---|---|
| | Coefficient | *t*-Statistics | Coefficient | *t*-Statistics | *p*-Value |
| Issue size | 0.00 | 0.31 | −0.02 | −1.37 | 0.16 |
| Relative size | 0.07 | 5.79 | 0.03 | 3.52 | 0.03 |
| Aaa | −2.56 | −13.18 | −2.09 | −8.10 | 0.15 |
| Aa1 | −2.48 | −12.88 | −1.93 | −5.03 | 0.20 |
| Aa2 | −2.58 | −13.61 | −2.09 | −9.35 | 0.08 |
| Aa3 | −2.51 | −13.22 | −2.07 | −8.64 | 0.15 |
| A1 | −2.55 | −13.52 | −2.11 | −10.30 | 0.11 |
| A2 | −2.52 | −13.36 | −2.04 | −10.07 | 0.08 |
| A3 | −2.50 | −13.31 | −2.01 | −9.84 | 0.07 |
| Baa1 | −2.50 | −13.27 | −2.06 | −10.01 | 0.11 |
| Baa2 | −2.49 | −13.27 | −2.03 | −9.95 | 0.09 |
| Baa3 | −2.49 | −13.21 | −2.01 | −9.86 | 0.08 |
| Ba1 | −1.87 | −9.86 | −1.12 | −4.66 | 0.01 |
| Ba2 | −1.53 | −8.05 | −1.09 | −5.21 | 0.11 |
| Ba3 | −1.33 | −6.97 | −0.51 | −2.44 | 0.00 |
| B1 | −0.88 | −4.62 | −0.18 | −0.91 | 0.01 |
| B2 | −0.54 | −2.85 | −0.16 | −0.76 | 0.15 |
| B3 | −0.49 | −2.52 | 0.06 | 0.26 | 0.06 |
| Callable | −0.03 | −1.68 | −0.03 | −0.31 | 0.93 |
| Maturity | 0.21 | 23.79 | 0.22 | 7.59 | 0.54 |
| Beta | −0.02 | −1.51 | −0.10 | −2.78 | 0.04 |
| Sigma | 3.35 | 3.39 | 13.88 | 5.62 | 0.00 |
| Leverage | −0.19 | −5.75 | −0.30 | −2.85 | 0.30 |
| Time trend | −0.00 | −1.72 | −0.01 | −2.01 | 0.24 |
| Mills | 0.22 | 3.14 | 0.18 | 1.76 | 0.81 |
| Constant | 11.92 | 2.24 | 30.43 | 1.95 | 0.26 |
| $N$ | 2,505 | | 528 | | |
| $R^2$ | 0.81 | | 0.87 | | |

superior risk-bearing: Firm-level risk measures such as beta and sigma are less important in these banks' fee equation, and coefficients on the rating variables are generally more negative. Third, the time trend is significantly more negative in the smaller underwriters' fee equation, suggesting that the larger banks do not cut fees as aggressively over time as their smaller competitors.

**Table VI**
**Actual versus Hypothetical Yields and Fees**

This table compares the means of the actual yields and fees with their hypothetical counterparts for issues underwritten by the reputable banks (Panel A) and those underwritten by the less reputable banks (Panel B). The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The hypothetical measures reflect what the yield and fee would be if the other type of bank had been retained as the lead underwriter for the issue. The computation of these imputed values is discussed in Section III.B. All variables are measured in percentages. The *t*-statistics for differences in means are reported.

| | Actual | Hypothetical | *t*-Statistics |
|---|---|---|---|
| Panel A: Comparisons for Issues Underwritten by Reputable Banks | | | |
| Yield | 7.61 | 7.73 | −5.87 |
| Fee | 0.88 | 0.57 | 29.81 |
| Panel B: Comparisons for Issues Underwritten by Less Reputable Banks | | | |
| Yield | 8.15 | 7.96 | 4.58 |
| Fee | 1.13 | 1.45 | −13.56 |

Finally, the coefficient on the inverse Mills ratio is positive and significant in the reputable banks' fee equation, indicating that there is a premium in these banks' fees beyond what is explained by observable characteristics. Together with the negative sign on the inverse Mills ratio in the yield equation, this suggests that reputable banks can obtain lower yields but charge premium fees.

To summarize the results on both price and quality, Table VI compares the actual and hypothetical yields and fees for issues underwritten by the two bank groups. Consistent with the insights gleaned from the inverse Mills-ratio variables, we find a yield reduction and a fee premium for issues underwritten by the reputable banks (Panel A). The mean actual yield obtained by these banks is 7.61%, 12 basis points (bps) lower than the hypothetical 7.73% average that the less reputable banks would obtain. The mean actual fee charged by these banks is 88 bps, 31 bps above the hypothetical 57 bps that the less reputable banks would charge. Both differences are highly significant. In contrast, Panel B indicates that for issues underwritten by the less reputable banks, the actual yield (8.15%) is higher than the hypothetical yield (7.96%), and the actual fee (1.13%) is lower than the hypothetical fee (1.45%). Both differences are again highly significant. Thus, the conclusion is that ceteris paribus, issues underwritten by the reputable banks enjoy a price improvement but face a fee premium.

While the foregoing separate analyses on price and quality are insightful, an immediate question is whether the yield reduction outweighs the fee premium so that issuers' net proceeds remain higher when reputable underwriters are used. To answer this question, Table VII tabulates the implied net proceeds to the issuers.

For issues underwritten by the reputable banks, the average size is $205 million, maturity is 13.8 years, and coupon rate is 7%. Under the actual yield-fee

**Table VII**
**Actual versus Hypothetical Net Proceeds**

This table reports mean issue characteristics and compares the net proceeds implied by the actual yield-fee combination with that implied by the hypothetical yield-fee combination, for issues underwritten by the reputable banks as well as those underwritten by the less reputable banks. The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The variable hypothetical yield is the imputed yield that would be obtained by the alternative group of underwriters. The variable hypothetical fee is similarly defined. Computation of these imputed values is discussed in Section III.B. The variable implied net proceeds: Actual is the net proceeds implied by the actual yield-fee combination. Similarly, implied net-proceeds: Hypothetical is net proceeds implied by the hypothetical yield-fee combination. All principal and proceeds measures are in millions of dollars and all yield and fee measures are in percent, and maturity is measured in years. The *t*-statistics for differences in means of the implied net proceeds are reported.

| | Issues Underwritten by Reputable Banks | Issues Underwritten by Less Reputable Banks |
|---|---|---|
| Principal amount | 205.00 | 158.00 |
| Maturity | 13.80 | 11.70 |
| Coupon rate | 7.00 | 7.80 |
| Actual yield | 7.61 | 8.15 |
| Actual fee | 0.88 | 1.13 |
| Hypothetical yield | 7.73 | 7.96 |
| Hypothetical fee | 0.57 | 1.45 |
| Implied net proceeds: Actual | 193.81 | 154.78 |
| Implied net proceeds: Hypothetical | 192.31 | 155.91 |
| *t*-Statistics for implied proceeds | 3.87 | −3.99 |

combination of 7.61% and 88 bps, respectively, the average implied net proceeds is $193.81 million. If underwritten by the less reputable banks, the hypothetical yield-fee combination of 7.73% and 57 bps would imply net proceeds to be $192.31 million, $1.5 million less than the actual case, the difference being statistically significant. In contrast, the average issue underwritten by the less reputable banks has a principal of $158 million, a maturity of 11.7 years, and a coupon rate of 7.8%. The actual yield-fee combination of 8.15% and 1.13% implies net proceeds to be $154.78 million. If underwritten by the reputable banks, with the combination of a 7.96% yield and a 1.45% fee, the net proceeds would be $155.91 million, about $1.1 million more than the actual figure; the difference is again statistically significant.[17] Thus, both comparisons lead to the conclusion that the fee premium is more than accounted for by the yield reduction, and on average the reputable banks' underwriting services result in higher net proceeds for issuers.

Overall, findings in this section show that the reputable banks' underwriting services result in price improvements for the issuers. Interpreting

[17] The reported results use implied proceeds. Separately, I also use the two-stage framework to study the net proceeds directly using SDC proceeds data. Results are quantitatively as well as qualitatively similar to the implied proceeds analysis.

superior pricing as higher quality, this suggests that these banks provide higher quality services. Consistent with higher quality, they also charge premium fees, which can be interpreted as economic rents on reputation. It is important to note that the fee premium need not imply larger profits since rents can be dissipated through the provision of higher quality services, presumably at higher costs.

### *B. Robustness Checks*

To contrast my findings with earlier studies, Table VIII reports dummy variable regression results on the relation between underwriter reputation and fee. Model I replicates the specification in Livingston and Miller (2000), and Model II includes additional variables used in this paper. Both specifications yield similar results to previous studies: The negative signs on the reputation dummies suggest a fee discount for reputable banks, a counterintuitive result that is puzzling in light of theory. The contrast between this result and the fee premium obtained under the model with endogeneity control demonstrates the importance of accounting for self-selection.

Table IX presents four sets of robustness checks. The first robustness issue is whether the qualitative result hinges on the specific definition of the top eight banks as the reputable group and the rest as the less reputable group. A related issue is that while underwriter reputation is based on market share in this paper, the Carter–Manaster measure provides a ready alternative.

Panels A and B of Table IX tabulate robustness-check results that address these concerns. Panel A uses the Carter–Manaster measure. Here, the reputable group is restricted to those banks with the highest ranking of nine in the original Carter and Manaster (1990) paper. According to the authors, a ranking of nine means the bank has never been superseded by any other in any tombstone announcement. There are only five such banks: Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, and CSFB. Interestingly, these five banks exactly correspond to the top five in Table I. Results in Panel A show that the main inferences from this alternative definition of reputation are unchanged from the baseline analysis. Panel B contains results when the top 10 banks in market share are defined as the reputable group. Again, the main results are unchanged.

A second robustness issue concerns commercial bank underwriting. During the sample period, commercial banks made considerable entry into the bond underwriting business. A growing body of research shows that there are significant differences in commercial bank and investment bank underwriting.[18] This raises the question of whether the baseline results are driven by

[18] Gande et al. (1997) find that ceteris paribus, commercial banks are able to obtain lower yields for their clients, and attribute the finding to banks' certification role. Gande et al. (1999) provide evidence that commercial banks price their services aggressively so that average underwriting fees drop after bank entry. Yasuda (2005) provides evidence that preexisting bank–issuer relationships intensify the competition in the underwriting market.

**Table VIII**
**Benchmark—Dummy Variable Regressions for Fees**

This table presents dummy variable regression results on fees. The dependent variable is the gross spread of each issue. Model 1 replicates the specification in Livingston and Miller (2000). Model 2 includes additional variables used in this paper but not in Livingston and Miller (2000). The indicator variable reputation is equal to 1 if at least one of the lead underwriters belongs to the reputable group and 0 otherwise. The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The variable issue size is the natural log of issue proceeds; relative size is issue proceeds scaled by market capitalization of equity. Variables Aaa–B3 indicate Moody's credit rating on the issue. The omitted category is Caa or below. The indicator variable callable is equal to 1 if the bond is callable and 0 otherwise. The maturity variable is the natural log of the actual maturity in years. Variables beta and sigma are the market beta and stock return volatility over the 120-day period prior to the bond issue date. The time trend is the calendar year of the bond issue.

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | Coefficient | *t*-Statistics | Coefficient | *t*-Statistics |
| Reputation | −0.03 | −2.22 | −0.02 | −1.84 |
| Issue size | 0.00 | 0.61 | 0.00 | 0.19 |
| Relative size | – | – | 0.04 | 6.49 |
| Aaa | −2.33 | −23.66 | −2.25 | −22.86 |
| Aa1 | −2.26 | −22.69 | −2.16 | −21.74 |
| Aa2 | −2.36 | −24.99 | −2.29 | −24.25 |
| Aa3 | −2.31 | −24.81 | −2.22 | −23.97 |
| A1 | −2.33 | −25.50 | −2.25 | −24.69 |
| A2 | −2.30 | −25.26 | −2.23 | −24.52 |
| A3 | −2.28 | −24.97 | −2.21 | −24.24 |
| Baa1 | −2.27 | −24.92 | −2.21 | −24.32 |
| Baa2 | −2.27 | −24.88 | −2.21 | −24.25 |
| Baa3 | −2.26 | −24.67 | −2.21 | −24.21 |
| Ba1 | −1.74 | −18.32 | −1.69 | −17.87 |
| Ba2 | −1.42 | −14.91 | −1.38 | −14.46 |
| Ba3 | −0.91 | −9.58 | −0.92 | −9.75 |
| B1 | −0.56 | −5.89 | −0.56 | −5.91 |
| B2 | −0.29 | −3.04 | −0.33 | −3.49 |
| B3 | −0.09 | −0.97 | −0.18 | −1.90 |
| Callable | 0.03 | 1.65 | 0.02 | 1.04 |
| Maturity | 0.19 | 25.47 | 0.19 | 25.57 |
| Beta | – | – | −0.05 | −4.22 |
| Sigma | – | – | 5.74 | 6.81 |
| Time trend | −0.00 | −0.94 | −0.01 | −3.70 |
| Constant | 6.48 | 1.54 | 19.91 | 4.21 |
| $N$ | 3,033 | | 3,033 | |
| $R^2$ | 0.81 | | 0.82 | |

the difference between commercial banks and investment banks.[19] To ensure that the reputation effect is not a mislabeled bank-type effect, I reestimate the

[19] One argument that alleviates this concern is that since the focus of this paper is on reputation effects, and not institutional differences, it is correct to categorize commercial banks as either reputable or less reputable on the same basis as investment banks, irrespective of their institutional origin.

**Table IX**
**Robustness Checks**

This table provides summary results for four robustness checks. Panel A uses the Carter–Manaster measure for underwriter reputation, defining as the reputable group those banks that have the highest ranking of nine. Panel B defines the top 10 banks by market share as the reputable group. Panel C drops all commercial-banks issues from the sample. Panel D uses treasury spread as the dependent variable for the second-stage yield equations.

| | Actual | Hypothetical | *t*-Statistics |
|---|---|---|---|
| Panel A: Carter–Manaster Measure for Reputation | | | |
| Reputable group yield | 7.60 | 7.80 | 11.84 |
| Reputable group fee | 0.85 | 0.31 | 77.00 |
| Less reputable group yield | 7.87 | 7.57 | 12.39 |
| Less reputable group fee | 1.07 | 1.43 | 34.45 |
| Panel B: Top-10 as Reputable Group | | | |
| Reputable group yield | 7.67 | 7.89 | 14.92 |
| Reputable group fee | 0.88 | 0.54 | 54.59 |
| Less reputable group yield | 7.90 | 7.76 | 14.60 |
| Less reputable group fee | 1.00 | 1.10 | 1.38 |
| Panel C: No Commercial Banks | | | |
| Reputable group yield | 7.68 | 8.16 | 35.27 |
| Reputable group fee | 0.90 | 0.38 | 70.14 |
| Less reputable group yield | 8.19 | 8.06 | 3.34 |
| Less reputable group fee | 1.13 | 1.13 | 0.94 |
| Panel D: Yield Spread to Treasury | | | |
| Reputable group yield spread | 136.71 | 148.20 | 10.27 |
| Reputable group fee | 0.88 | 0.33 | 55.24 |
| Less reputable group yield spread | 182.24 | 172.12 | 3.16 |
| Less reputable group fee | 1.14 | 1.22 | 4.91 |

two-stage model after dropping all commercial bank issues from the sample. Results reported in Panel C of Table IX indicate that the main findings are strengthened in the remaining investment bank sample.[20]

Finally, Panel D of Table IX reports the main findings when the treasury-yield spread rather than the offering yield is used as the inference variable for underwriting quality. Results here are qualitatively similar to the baseline findings.

[20] The quantitative difference between this set of results with only investment bank issues and the baseline supports commercial banks' certification role documented in Gande et al. (1997). After dropping commercial banks (which mostly belong to the less reputable group) from the sample, the hypothetical yield for issues underwritten by reputable banks is higher than before, meaning that the presence of commercial banks lowers the implied yield in the baseline result, consistent with commercial banks' certification role.

## V. What Makes Large Banks Special?

The previous section establishes that more reputable underwriters provide higher quality services by obtaining lower yields for issuers' bond offerings. Consistent with higher quality and earning economic rents on reputation, more reputable underwriters are compensated with premium fees. The natural question is: What are the sources of rent in the bond underwriting market? What makes large underwriters special?

### *A. Economies of Scale and Scope*

One natural source of rent is the larger banks' economies of scale. Large underwriters have extensive distributional networks that tap into institutional as well as individual investor pools. Their superior selling power enables them to price the securities more aggressively. Importantly, this distributional prowess—the scale economy—can be a lasting source of rent not only because its acquisition is costly, but also because it is a relationship-specific asset, relying heavily on the (sometime personal) relationships between individual bankers and investors. While it might be common for key individuals to move laterally among bulge bracket banks, a vertical move to a non-bulge bracket bank is less common. This helps explain why the bulge bracket "club" is stable and difficult for a small firm to enter.

Larger banks also have economies of scope that can be valuable to issuers. In Section IV we see that the scope of past services is the most significant determinant in the issuer–underwriter matching. Table X provides further evidence that scope economies are valued by issuers. Here, a separate fee equation is estimated for each underwriter group, and a "scope" variable is included among the explanatory variables. Results in Table X indicate that while issuers pay higher fees for the scope of services from a reputable bank, the scope variable is insignificant for the less reputable banks. This difference helps explain the fee premium that reputable banks are able to charge.

Consistent with being a source of rent, economies of scope are also costly to acquire. Perhaps as indirect evidence of this is the fact that while there are a few hundred investment banks in equity underwriting,[21] only 50 or so have a meaningful presence in bond underwriting. This is likely because bond issues are much larger than equity,[22] and their marketing imposes a threshold requirement on the banks' distributional ability. This threshold serves as an entry barrier for the smaller underwriters and a source of rent for the larger ones.

[21] There are 184 equity underwriters ranked in Carter et al. (1998).

[22] From 1991 to 2000, the mean and median offer sizes for corporate nonconvertible bonds are $196 million and $150 million, respectively; the corresponding statistics for all equity issues are $77 million and $40 million, respectively. IPO issues are even smaller, with mean and median sizes of $52 million and $31 million, respectively. Source data: SDC.

**Table X**
**Is Scope of Service Priced in the Fees?**

This table examines whether the scope of investment banking services provided by an underwriter is priced in the fee. Separate fee equations are estimated for the reputable and the less reputable banks. The dependent variable is gross spread. The explanatory variables include those previously used, plus the scope variable reflecting the scope of past transactions between the issuer and the underwriter. The scope variable is constructed using M&A, equity, and bond issuance data from SDC for the period 1981–1990 (the 10-year period before the sample period). A scope of three means that the lead underwriter has served the issuer in all three services: M&A, equity, and bond underwriting. Scopes of two and one are similarly defined. The variable issue size is the natural log of issue proceeds; relative size is issue proceeds scaled by market capitalization of equity. Variables Aaa–B3 indicate Moody's credit rating on the issue. The omitted category is Caa or below. The indicator variable callable is equal to 1 if the bond is callable and 0 otherwise. The variable maturity is the natural log of the actual maturity in years. Variables beta and sigma are the market beta and stock return volatility over the 120-day period prior to the bond issue date. The variable leverage is total debt divided by total assets as of the year-end before the bond issue.

| | Reputable Banks' Fee Equation | | Less Reputable Banks' Fee Equation | |
|---|---|---|---|---|
| Issue size | 0.00 | 0.52 | −0.02 | −1.38 |
| Relative size | 0.06 | 5.63 | 0.03 | 3.47 |
| Aaa | −2.51 | −13.01 | −2.04 | −8.05 |
| Aa1 | −2.42 | −12.68 | −1.90 | −4.98 |
| Aa2 | −2.53 | −13.42 | −2.02 | −9.27 |
| Aa3 | −2.46 | −13.06 | −2.02 | −8.56 |
| A1 | −2.50 | −13.34 | −2.04 | −10.11 |
| A2 | −2.47 | −13.19 | −1.99 | −10.04 |
| A3 | −2.46 | −13.15 | −1.96 | −9.69 |
| Baa1 | −2.46 | −13.13 | −2.01 | −9.98 |
| Baa2 | −2.45 | −13.12 | −1.98 | −9.83 |
| Baa3 | −2.45 | −13.06 | −1.96 | −9.72 |
| Ba1 | −1.85 | −9.80 | −1.11 | −4.66 |
| Ba2 | −1.52 | −8.01 | −1.06 | −5.16 |
| Ba3 | −1.32 | −6.93 | −0.51 | −2.45 |
| B1 | −0.87 | −4.60 | −0.18 | −0.89 |
| B2 | −0.52 | −2.74 | −0.15 | −0.73 |
| B3 | −0.48 | −2.48 | 0.07 | 0.34 |
| Callable | 0.01 | 0.27 | 0.06 | 0.75 |
| Maturity | 0.21 | 25.21 | 0.23 | 8.46 |
| Beta | −0.02 | −1.69 | −0.09 | −2.44 |
| Sigma | 3.19 | 3.36 | 12.20 | 5.28 |
| Leverage | −0.18 | −5.71 | −0.27 | −2.67 |
| Scope | 0.02 | 2.48 | 0.05 | 1.83 |
| Time trend | −0.01 | −1.49 | −0.01 | −2.00 |
| Constant | 12.45 | 2.36 | 25.01 | 1.63 |
| $N$ | 2,505 | | 528 | |
| $R^2$ | 0.81 | | 0.88 | |

### *B. Issuer–Underwriter Relationships*

A second potential source of rent for the larger underwriters is their relationships with issuers. To study how relationship matters, I divide issuers into three groups based on the strength of their relationships with the underwriters,

and study the yield and fee improvements for each group. Specifically, issuers are classified as switchers, which are the firms that sometimes hire a reputable bank and sometimes hire a less reputable bank (i.e., they switch between the two bank groups), or nonswitchers, either those associated with the reputable banks, or those associated with the less reputable banks. Table XI tabulates the yield, fee, and net proceeds improvements for each of the three groups.

Among issuers underwritten by the reputable banks (Panel A), nonswitchers on average enjoy a significant 17 bps yield reduction and a $2.11 million proceeds improvement, while switchers do not enjoy any significant pricing improvements. Interestingly, nonswitchers are generally of lower credit-quality than switchers.[23] The fact that despite their lower credit quality, nonswitchers enjoy larger pricing improvements, demonstrates that close relationships with reputable underwriters are valuable.

Interestingly, results in Panel B seem to indicate that nonswitchers that use the less reputable underwriters would benefit from switching—they appear to be losing $2.31 million in net proceeds with their current underwriters. It is important to keep in mind that the improvement figures are calculated from hypothetical scenarios. In reality, an issuer may not be able to realize the potential gains simply because an underwriter may refuse to market its issues. This is indeed likely the case for the nonswitchers with less reputable underwriters because these issuers are found to be predominantly in the junk grade.

### *C. Reputation*

Finally, theory suggests that an important source of rent is the reputation of an underwriter. According to theory, when quality is unobservable, a premium price arises as a mechanism for quality assurance because such a price ensures that the value of a future income stream exceeds the short-term profit from fraud. Thus reputation as a high quality producer is the source of a premium stream. To maintain a good reputation, an investment bank must repeatedly identify and market high quality issues. The important implication is that since underwriting decisions reflect the banks' reputation concerns, they become informative of issue quality. Investors can infer a positive signal when a reputable underwriter agrees to put his name on the line, and ceteris paribus, the market clears at a higher price. It is in this sense that the underwriter's reputation serves as a certification for the quality of the issue.

Empirically, one way to test for this certification role is to examine both the banks' underwriting decisions and the resulting security prices. The certification role of intermediary reputation predicts that price improvements should be particularly large in segments of the market in which reputable underwriters are especially selective about the issues they underwrite. Importantly, this

[23] The average issuer credit rating for the switchers is BAA1, an investment grade. Nonswitchers using reputable banks have an average rating of BAA3—still an investment grade, but the lowest of such rating. Nonswitchers with less reputable banks have an average rating of BA3, a junk grade.

**Table XI**

## Yield, Fee, and Net Proceeds Improvements by Issuer–Underwriter Relationship

This table tabulates yield, fee, and net proceeds improvements for issues underwritten by the reputable banks (Panel A) and those underwritten by the less reputable banks (Panel B). The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The first column summarizes the results for the overall sample from Tables VI and VII. The latter two columns tabulate the improvements terms for the "switchers" and "nonswitchers" subsamples, respectively. Switchers are the firms that sometimes hire a reputable underwriter and sometimes a less reputable one, and thus switch between the underwriter groups. Nonswitchers always use one type of underwriter. The yield/fee improvements (in bps) are calculated as the hypothetical yield/fee minus the actual yield/fee, so that positive terms indicate an improvement with the actual underwriter. Details of these calculations are discussed in Section III.B. The net proceeds improvements (in millions of dollars) are the differences between the net proceeds implied by the actual yield-fee combination and that implied by the hypothetical yield-fee combination. The *t*-statistics for the significance of the improvement terms are in parentheses.

| | All | Switchers | Nonswitchers |
|---|---|---|---|
| Panel A: Comparisons for Issues Underwritten by Reputable Banks | | | |
| Yield improvement | 12 | 6 | 17 |
| | (5.87) | (1.29) | (5.42) |
| Fee improvement | −31 | −30 | −32 |
| | (29.81) | (33.73) | (24.90) |
| Net proceeds improvement | 1.50 | 0.46 | 2.11 |
| | (3.87) | (0.55) | (5.03) |
| Panel B: Comparisons for Issues Underwritten by Less Reputable Banks | | | |
| Yield improvement | −19 | −16 | −26 |
| | (4.58) | (2.96) | (3.52) |
| Fee improvement | 32 | 32 | 33 |
| | (13.56) | (26.76) | (8.59) |
| Net proceeds improvement | −1.13 | −1.49 | −2.31 |
| | (−3.99) | (−0.84) | (−4.31) |

testable implication is unique to the certification role, and not fully consistent with either an ability effect or a pure operational efficiency effect.[24] Implementing this test involves two steps. The first entails identifying a segment of the market for which underwriters are most concerned about the reputation repercussions of their underwriting choices. The second involves checking that pricing improvements are especially large for this segment.

The corporate bond market provides an ideal setup for this test because the two naturally distinct segments—the investment grade and the junk grade

[24] A bank ability effect predicts that while the more reputable banks can better assess issue quality, they will also be more willing to underwrite risky deals and thus compensated appropriately for taking the risk. An operational efficiency effect alone does not predict a differing amount of pricing improvement. Rather, it predicts that the more reputable banks improve pricing across the board. This is related to the economies of scale and scope discussed in an earlier section.

issues—have significantly different default probabilities and pose different degrees of risk to the underwriters' reputations. Junk issues are highly risky, hence reputable underwriters should be particularly selective in this segment, "cherry-picking" only the high quality issues to underwrite. Investment-grade issues, however, have low default risk and are unlikely to damage the underwriter's reputation. The degree of selectivity should be correspondingly less for this segment.

Evidence supporting these predictions of underwriters' reputation concerns is found in Figure 2 and Table XII. Figure 2 plots the fraction of issues in each rating category that is underwritten by the reputable group. A dramatic feature in the graph is that as the rating deteriorates, the reputable banks underwrite a smaller and smaller fraction of the issues, suggesting that they are selective in the *quantitative* dimension.

Table XII provides further evidence of this selectivity in the *qualitative* dimension. Panel A of the table compares the risk characteristics of issues underwritten by the two bank groups in the investment grade category. Panel B repeats the comparisons for the junk category. The difference between the two panels is stark, and consistent with underwriters' reputation concerns. In the investment grade category, the risk profile of issues underwritten by the two groups shows no difference. If anything, there seems to be more risk-taking among the larger underwriters. While there is no significant difference in the issues' credit ratings, the reputable group underwrites significantly larger issues relative to firm size, and their issuers have lower profitability and higher return volatility.[25]

The comparison is dramatically different for the junk category shown in Panel B. Here, the reputable banks underwrite issues that are significantly higher in credit ratings and smaller relative to firm size, and their issuers have lower return volatility and higher profitability. The reputable group also underwrites a significantly higher fraction of issues under shelf registration, and their clients tend to be more frequent issuers in the market. Hence in the junk category, for which ex ante default risk is high, the reputable banks have significantly more stringent underwriting criteria than their smaller competitors. Importantly, the fact that this selectivity is unique to the junk category is consistent with the banks' reputation concerns.

Let's now compare the price improvements in the two segments. Fee, yield, and proceeds improvements for the two segments are compared in Table XIII. Panel A is for issues underwritten by the reputable group and Panel B is for issues underwritten by the less reputable group. For ease of comparison, the first column summarizes the baseline results for the overall sample (those found in Tables VI and VII).

Consistent with the certification role of underwriter reputation, among issues underwritten by the reputable group (Panel A), junk issues receive significantly larger yield reductions (29 bps) than investment grade issues

[25] Since investment grade issues have little default risk, some risk-taking in this category is consistent with the investment banks' objective to maximize fee income.

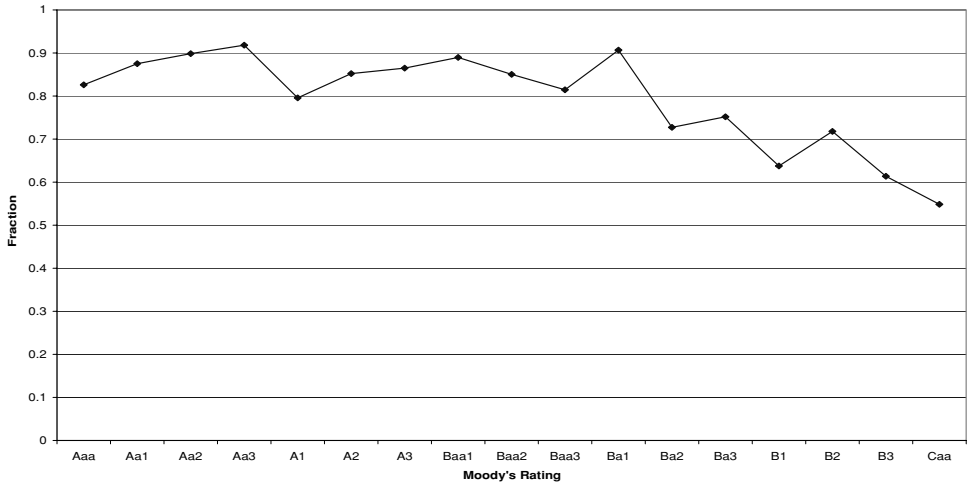


**Figure 2. Fraction of each rating category underwritten by reputable banks.** This figure plots the fraction of bond issues in each rating category that is underwritten by the reputable banks. The group of reputable banks is: Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ.

(9 bps). Correspondingly, junk issues enjoy a significant proceeds improvement of $3.59 million, while investment grade issues see an insignificant improvement of only $0.86 million. In contrast, among issues underwritten by the less reputable group (Panel B), junk issues lose more in yield (30 bps) than investment grade issues (6 bps). Their corresponding opportunity losses in proceeds are a significant $2.50 million and an insignificant $0.22 million, respectively. These comparisons are consistent with the notion that the incremental value of the "stamp of approval" is larger for junk bonds, for which risks are high and information problems are severe.

The findings in underwriter selectivity and price improvements together lead to the conclusion that the degree of selectivity in the banks' underwriting standards is positively related to the amount of price improvements for the issuers. Junk issues—the category in which banks are particularly selective in their underwriting decisions—enjoy significantly higher price improvements than investment grade issues if underwritten by reputable banks. This positive correlation between the selectivity in underwriting standards and the improvements in bond pricing lends strong support for a certification role of underwriter reputation.

Overall, the evidence in this paper suggests that reputation is a valued asset in the underwriting market. A reputation as a high quality underwriter entitles an investment bank to a stream of premium fees. The need to safe-guard this asset disciplines the bank to apply high standards in its selection of underwriting assignments, which in turn benefits the issuer as a stamp of approval. It is important to emphasize that the premium fees that the reputable banks

**Table XII**

## Comparisons of Issue and Firm Characteristics by Rating Category

This table compares select firm and issue characteristics for the issues underwritten by the reputable banks and those underwritten by the less reputable banks. The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The variable credit rating indicates the Moody's rating for the bond issue. The highest value of 17 is assigned to an Aaa-rating; other ratings are numerated in decreasing order. The variable relative issue size is the ratio between issue proceeds and the contemporaneous firm size measured as the market capitalization of equity. The maturity of an issue is measured in years. The indicator variable shelf registration is equal to 1 if the issue is shelf-registered and 0 otherwise. The variable firm size is the market capitalization of equity at the year-end before the bond issue, in billions of dollars. The variable sigma is the firm's stock return volatility over the 120-day period prior to the bond issue date. The profitability variable is computed as net income divided by total assets using data from the year before the bond issue. The issue frequency variable is the number of bond issues conducted by the firm during the 10-year sample period. The total issue variable is the sum of relative issue sizes (issue size/concurrent market capitalization) for all issues of a firm during the sample period. The *t*-statistics for differences in means are reported.

| | Issues Underwritten by Reputable Banks | Issues Underwritten by Less Reputable Banks | *t*-Statistics |
|---|---|---|---|
| Panel A: Investment-Grade Issues | | | |
| Credit rating | 11.21 | 11.13 | 0.73 |
| Relative issue size | 0.07 | 0.05 | 2.24 |
| Maturity | 14.44 | 12.81 | 3.08 |
| Shelf registration | 0.91 | 0.87 | 1.73 |
| Firm size | 14.59 | 11.09 | 3.29 |
| Sigma | 0.02 | 0.01 | 3.28 |
| Profitability | 0.19 | 0.21 | −3.38 |
| Issue frequency | 10.41 | 10.86 | 0.87 |
| Total issue | 0.39 | 0.38 | 0.21 |
| Panel B: Junk Grade Issues | | | |
| Credit rating | 4.69 | 3.86 | 3.88 |
| Relative issue size | 0.52 | 1.16 | −2.27 |
| Maturity | 9.90 | 9.05 | 3.35 |
| Shelf registration | 0.49 | 0.29 | 4.66 |
| Firm size | 1.81 | 0.81 | 4.79 |
| Sigma | 0.02 | 0.03 | −2.16 |
| Profitability | 0.19 | 0.17 | 1.29 |
| Issue frequency | 3.55 | 2.55 | 3.92 |
| Total issue | 0.99 | 1.67 | −2.56 |

charge do not equate to positive or higher economic profits, which would violate the free-entry condition. The reason is that in order to maintain reputation, higher costs must be expended to enforce higher quality. In Section V, we see evidence in the fee equations that indicates higher marginal costs among the larger underwriters. In addition, hiring high quality staff would presumably be more costly, as long as the labor market in the investment banking industry is reasonably efficient. Thus, it may well be the case that the profits of low quality

**Table XIII**

## Yield, Fee, and Proceeds Improvement by Credit-Rating Category

This table tabulates yield, fee, and net proceeds improvements for issues underwritten by reputable banks (Panel A) and those underwritten by less reputable banks (Panel B). The group of reputable banks includes Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, CSFB, Lehman Brothers, JP Morgan, and DLJ. The first column summarizes the results for the overall sample from Tables VI and VII. The latter two columns tabulate the improvement terms for the investment-grade and junk-grade subsamples, respectively. The yield/fee improvements (in bps) are calculated as the hypothetical yield/fee minus the actual yield/fee, so that positive terms indicate an improvement with the actual underwriter. Details of these calculations are discussed in Section III.B. The net proceeds improvements (in millions of dollars) are the differences between the net proceeds implied by the actual fee-yield combination and that implied by the hypothetical fee-yield combination. The *t*-statistics for the significance of the improvement terms are in parentheses.

| | All | Investment Grade | Junk Grade |
|---|---|---|---|
| Panel A: Comparisons for Issues Underwritten by Reputable Banks | | | |
| Yield improvement | 12 | 9 | 29 |
| | (5.87) | (3.68) | (4.31) |
| Fee improvement | −31 | −33 | −16 |
| | (29.81) | (33.24) | (2.96) |
| Net proceeds improvement | 1.50 | 0.86 | 3.59 |
| | (3.87) | (1.95) | (3.49) |
| Panel B: Comparisons for Issues Underwritten by Less Reputable Banks | | | |
| Yield improvement | −19 | −6 | −30 |
| | (4.58) | (1.39) | (4.04) |
| Fee improvement | 32 | 33 | 22 |
| | (13.56) | (32.02) | (5.94) |
| Net proceeds improvement | −1.13 | −0.22 | −2.50 |
| | (−3.99) | (−0.45) | (−2.61) |

underwriters are actually higher than those of high quality underwriters,[26] because it is costly to maintain a good reputation through proper due diligence. In equilibrium, the rents received by the high quality underwriters in terms of higher fees are dissipated through the provision of superior services at higher costs.[27]

[26] Indeed the less reputable banks may have monopoly power over and thus earn high profits from issuers who are otherwise unable to access the bond market. The most likely candidates for such "captured" issuers are the nonswitchers in Table XI and the junk issuers in Table XIII that hire the less reputable banks (the lower-right panel of both tables). The fact that these issuers indeed are the biggest losers in terms of net proceeds could indicate that they are subject to some monopoly power of their underwriters.

[27] Other rent-dissipating channels include forms of nonprice competition discussed in Klein and Leffler (1981). One example is investments in firm-specific, "conspicuous" assets, such as expensive logos and luxurious office spaces. The *Wall Street Journal* article "DLJ: Firm is dead, but its 'stuff' lives on," *WSJ* Aug. 28, 2003, contains interesting anecdotes on the value of such firm-specific, conspicuous assets. According to Klein and Leffler (1981), advertising campaigns and endorsements by prestigious investment banks are also rent-dissipating devices that help ensure no free-entry into the bulge bracket group.

## VI. Conclusion

Using a framework that controls for the endogenous matching between issuers and underwriters, this paper studies the relation between investment bank reputation and the price and quality of bond underwriting services. I find that, ceteris paribus, more reputable banks obtain lower yields for issuers compared to their less reputable competitors. Interpreting yields (bond prices) as a quality measure of underwriting services, this suggests that more reputable banks provide higher quality underwriting services.

Consistent with higher quality, I find that these banks also charge higher fees, which can be interpreted as economic rents on reputation. On the tradeoff between price and quality, I find that the higher bond prices outweigh the higher fees, so that issuers' net proceeds remain higher when a more reputable investment bank is hired as the underwriter. Overall, these findings suggest that in the bond underwriting market, high quality services are provided at premium prices, reminiscent of a "price as an indicator of quality" type of equilibrium in the spirit of Klein and Leffler (1981). Importantly, in this equilibrium, the higher prices (fees) need not imply higher profits, as rents are dissipated through the provision of higher quality services at higher costs.

Beyond documenting the above price–quality relation, this paper makes an attempt to uncover the sources of rent that make the more reputable (and, by definition in this paper, the larger) banks special. I show that the economies of scale and scope unique to the larger banks, as well as these banks' relationships with issuers, help explain their superior pricing ability. Importantly, these factors can serve as lasting sources of rent because their acquisition requires costly and firm-specific investments.

In addition, I present evidence that the reputation of the intermediary is another important source of rent. Consistent with reputation concerns, more reputable investment banks have more stringent underwriting standards, especially for junk bonds. These banks not only underwrite fewer issues in this category, but also cherry-pick issues of superior quality. Importantly, I find that the degree of selectivity in underwriting standards is positively related to the degree of price improvements for the issuers. Junk issues—the category in which banks are especially selective in their underwriting decisions—enjoy significantly larger price improvements than investment grade issues when underwritten by reputable banks.

This positive correlation between the selectivity in the ex ante underwriting decisions and the improvements in ex post pricing provides strong support for a certification role of underwriter reputation. Overall, the evidence in this paper is consistent with a story in which, ex ante, out of reputation concerns, reputable investment banks cherry-pick high quality issues to underwrite. Ex post, knowing that underwriting decisions reflect reputation concerns, investors infer a positive signal when a reputable underwriter agrees to put his name on the line, and ceteris paribus, the market clears at a higher price for the issuer. In this equilibrium, economic rents are earned by reputable underwriters in terms of higher fees, which serve both as compensation for the banks' investment in reputation, as well as continued incentives for honest information production.

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