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Bank relationships and underwriter competition: Evidence from Japan ☆

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Abstract

I examine the effects of bank relationships on underwriter choice in the Japanese corporate bond market following the 1993 deregulation. Bank relationships have significant positive effects on a firm's underwriter choice. Relationship firms receive a small but significant fee discount and, consistent with the mitigating effect of competition on hold-up costs, multiple-relationship firms receive a significantly deeper discount than single-relationship firms. Bank shareholding *alone* negatively affects underwriter choice, whereas shareholding *together* with loans has significantly more positive effects than loans alone. Finally, existing relationships reduce a Japanese firm's switching probability by 32%, in contrast to only 6% for U.S. firms.

JEL classification: G24; G28; L11; L13; L14; L50; L84

Keywords: Bank relationships; Bank equity holdings; Universal banking; Underwriter competition; Comparing financial systems

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1. Introduction

The Financial System Reform Act of 1992 allowed Japanese commercial banks to re-enter the underwriting market for corporate bonds by establishing wholly owned securities subsidiaries.[1] Within a few years, commercial banks made dramatic inroads into the market. For instance, between 1994 and 1998, the top 11 commercial banks collectively accounted for 55% of corporate bond underwriting, with the top four securities houses (Nomura, Daiwa, Nikko, and Yamaichi) holding on to the remaining 45%. In contrast, U.S. commercial banks collectively gained a market share of only 13% over a comparable period (Yasuda, 2005).

Why were Japanese commercial banks such successful entrants into the underwriting business? The literature offers three explanations.[2] First, many authors argue that Japanese banks have close, long-term, and exclusive relationships with their borrowers. Allen and Gale (2000), for example, suggest that one characteristic of financial systems that rely on banks (such as Japan) is the greater importance of long-term relationships compared to financial systems that rely on markets (such as the U.S.). These relationships may provide significant benefits to the banks' client firms, inducing them to choose their lender banks as underwriters, all else equal. Second, to the extent that Japanese commercial banks enjoy greater economies of scope and/or scale in the production of information than investment banks, they can strategically transfer this benefit to clients through fee discounts. In particular, the degree of fee discounts may depend on the degree of interbank competition. Third, in contrast to the U.S., where banks are prohibited from holding equity in their client firms under normal circumstances, Japanese banks are allowed to own equity in their client firms.[3] This additional control right may account for the greater success of Japanese banks in gaining market share in the corporate bond underwriting market.

These studies raise a number of empirical questions: For instance, do commercial banks charge the firms with which they have relationships discount or premium underwriting fees? Do the relationship discounts (or premiums) depend on the degree of interbank competition? Do existing relationships affect the firm's underwriter choice *over and above* their effect on fees? Do they affect the firm's decision to switch underwriters? And finally, do bank equity holdings affect the firm's underwriter choice or the underwriting fee it is charged?

In this paper I investigate these questions by analyzing the effects of bank relationships on the firm's underwriter choice, using a framework that allows for the imputation of unobserved fees conditional on the choice of underwriter. By directly modeling the firm's underwriter choice problem and disentangling relationships' effects on the choice of underwriter from their effects on fees, this paper sheds light on how commercial banks' entry into the securities business is affected by bank relationships with borrower firms. I also examine what role (if any) banks' equity holdings play in determining the firm's

[1]The law took effect on April 1, 1993. The first bank subsidiary was established in July of 1993.

[2]See Aoki and Patrick (1994) and Aoki and Saxonhouse (2000) for excellent surveys of the Japanese financial system. See James (1987) and Billett, Flannery, and Garfinkel (1995), among others, for empirical evidence on the uniqueness of banks as information producers. See also Sharpe (1990) and Rajan (1992) for theoretical analyses of the ability of banks to extract information rents ex post from their borrower firms.

[3]As an exception to this rule, U.S. banks are allowed to hold equity as a result of debt restructuring. See James (1995) for a study of this issue.

underwriter choice and the fee it is charged. Since banks in many non-U.S. countries (e.g., Germany) are allowed to own equity in borrower firms, findings on equity relationships have important implications for countries besides Japan.[4]

The literature provides extensive and growing evidence on the effects of commercial banks' entry into the securities business on bond performance, underwriting fees, and the firm's underwriter choice in the U.S. Many of these studies examine whether conflicts of interest offset commercial banks' certification ability. For example, Puri (1996) and Gande, Puri, Saunders, and Walter (1997) examine ex ante yields of bonds and find that issues underwritten by commercial banks perform better than or as well as those underwritten by investment banks, which is consistent with net certification.[5] On the question of the effect of commercial bank underwriting on fees, Gande, Puri, and Saunders (1999), Roten and Mullineaux (2002), and Yasuda (2005) find that firms underwritten by commercial banks pay fees that are lower than or equal to those paid by firms underwritten by investment banks. Yasuda (2005) examines the firm's underwriter choice and finds that bank relationships have positive and significant effects on the firm's underwriter choice, over and above their effects on fees.[6] Moreover, Yasuda (2005) finds that this effect is sharply higher for junk-bond issuers and first-time issuers. Collectively, the findings of studies examining the U.S. market support the view that firms benefit from the joint activities of commercial bank lending and underwriting.

In contrast, empirical evidence on the effects of commercial bank underwriting in countries outside of the U.S. is more mixed. On the one hand, Klein and Zoeller (2003) study the German market and find that IPOs underwritten by universal banks are more underpriced than those underwritten by specialized banks, which is consistent with investors requiring discounts to compensate them for the banks' possible conflicts of interest. On the other hand, Ursel and Ljucovic (1998) study the Canadian IPO market and find that IPOs underwritten by universal banks are either less underpriced than or similarly underpriced as those underwritten by other underwriters.[7] One factor limiting the results of these analyses is that lending and equity relationships are not explicitly controlled for at the firm-bank level due to data constraints in these countries. In the case of Japan, however, comprehensive lending and equity relationship data at the firm-bank level are available. Thus, by studying the Japanese market, we can shed light on the general question of whether the joint activities of lending and underwriting are beneficial to firms in a financial system outside of the U.S.

[4]Others examine how a bank's relationship with a borrower is affected by extra control rights, including bank shareholding, proxy voting rights, and board seats (e.g., Berlin, John, and Saunders, 1996). For representative empirical studies, see, among others, Gorton and Schmid (2000) (for equity ownership by German banks), Kaplan and Minton (1994) (for board seats held by Japanese banks), and Kroszner and Strahan (2001) and Santos and Rumble (2006) (for board seats and proxy voting rights controlled by U.S. banks via trust business). See Gorton and Winton (2003) for a comprehensive review of the theoretical and empirical literature on the subject.

[5]See also Ang and Richardson (1994), Kroszner and Rajan (1994), and Puri (1994) for studies of bond performance using pre-war data, Gompers and Lerner (1999) and Li and Masulis (2005) for pre-IPO bank shareholding via venture capital subsidiaries, and Schenone (2004) for pre-IPO bank lending relationships and IPO underpricing.

[6]Bharath, Dahiya, Saunders, and Srinivasan (2007) also document that bank relationships positively and significantly affect the ability of banks to win future lending business in the U.S.

[7]See Drucker and Puri (2006) for a comprehensive review of the international evidence on conflicts of interest. On the slightly different question of the potential cost of universal banking which combines underwriting and asset management, see Ber, Yafeh, and Yosha (2001) and Massa and Rehman (2005).

While several existing studies examine the effects of commercial bank underwriting in the Japanese market, the evidence is far from conclusive.[8] Using data from 1992 to 2000, Takaoka and McKenzie (2006) find that bank entry significantly lowers both underwriting commissions and yield spreads. They also find that commissions charged by banks are significantly lower than those charged by investment banks. However, using a somewhat shorter sample period, Hamao and Hoshi (2003) and Kang and Liu (2007) find that commercial bank underwriting is associated with higher yield spreads. Further, while Takaoka and McKenzie (2006) report a positive effect of bank relationships on the firm's underwriter choice, Hamao and Hoshi (2003) report the opposite, that is, banks attempt to attract new clients with weak or no bank ties rather than to serve firms with existing relationships.

An important difference between this paper and previous studies is that while the papers above predominantly deal with equilibrium pricing outcomes, I directly model the firm's underwriter choice problem and measure the effect of relationships on the choice of underwriter. To isolate the relationship effect, I use a multinomial choice setup in which a firm chooses one out of multiple banks, conditional on the full variation across banks in terms of the relationships it has with them. Further, using the framework developed in Yasuda (2005), I disentangle the effects of relationships on the underwriter choice from the effects of relationships on fees. In doing so, I attempt to jointly address the questions of whether bank relationships have positive or negative effects on the firm's underwriter choice, *over and above* their effects on fees, and whether the relationships are associated with fee discounts or premiums.

In order to estimate this model, I construct a unique data set consisting of 1,302 Japanese domestic corporate bond issues for the period 1994–1999. This data set combines issue-specific bond data with firm- and bank-specific data on previous lending and shareholding relationships. Bank relationship data are constructed from the JDB Database, which is compiled by the former Japan Development Bank and consists of comprehensive financial statement information for listed companies in Japan. Bond data are constructed from the Japan Domestic New Issues Database by Thomson Financial Securities Data. Finally, bank equity holding data are constructed from the Compendium of Firm Groupings (*kigyo keiretsu souran*).

The results indicate that bank relationships are very important in shaping bank competition in the corporate bond underwriting market in Japan. First, based upon the estimates of the underwriter choice model, I find that lending relationships have significantly *positive* effects on a firm's underwriter choice, over and above their effects on fees. This result is sharply stronger for top lenders. Further, based upon the estimates of the fee model, I find evidence of a significant fee discount in the presence of lending relationships between firms and commercial bank underwriters.

Second, examining whether the fee discount derives from bank competition, I find that firms with multiple relationships receive significantly deeper fee discounts than single-relationship firms. This is consistent with Rajan (1992), who argues that multiple banking relationships potentially mitigate bank information monopolies.[9]

[8]Also see Konishi (2002) for analysis of the pre-war Japanese market.

[9]See Ongena and Smith (1998) for a comprehensive review of existing research on this question. Section 5.5 also discusses the existing literature in more detail.

Third, I find that bank equity holdings alone have significantly *negative* effects on a firm's underwriter choice, whereas equity holdings together with lending relationships have significantly more positive effects than lending relationships alone. These findings suggest a complementary relation between bank equity holdings and bank lending, and are related to Puri (1999), who argues that the retirement of financial claims using proceeds of bond issues hurts banks' certification ability. One interpretation of this result is that equity holdings alone (without loans) indicate past retirement of financial claims by banks using proceeds from prior issues. With respect to fees, equity holdings alone are associated with a *fee premium*, whereas lending relationships alone are associated with a *deeper fee discount* than lending relationships together with equity holdings. These fee premium results suggest the strong bargaining power of lender banks that also hold equity.

Finally, assessing the economic significance of bank relationships for Japanese firms using U.S. firms as benchmarks, I find evidence that the relative success of Japanese banks' entry into the underwriting business owes more to their bank relationships than to the fee discounts they give their client firms. When I examine this comparative result in the context of the firm's switching behavior, I find that the presence of existing lender relationships with commercial banks reduces a Japanese firm's switching probability by 32%, in contrast to only 6% for U.S. firms with existing lender relationships with commercial banks and 0% (no reduction in switching probability) for U.S. firms with existing lender relationships with *investment* banks. These results indicate that, ceteris paribus, Japanese firms are more reluctant to hire a new commercial bank underwriter in the presence of lending relationships than U.S. firms.[10] A plausible interpretation of this finding is that on average a bank relationship is more valuable in Japan than in the U.S. and that this makes it more costly for a Japanese firm to hire a new commercial bank in the underwriting market. Alternatively, in Japan loyalty pays more: by continuing with the same bank underwriter, a Japanese firm enjoys greater benefits such as lower future fees, greater access to capital, or a more cooperative creditor in the event of financial distress.[11]

The remainder of this article is organized as follows. Section 2 discusses the corporate bond underwriting market in Japan and the research hypotheses to be tested. Section 3 describes the data. Section 4 specifies the empirical model, and Section 5 presents the estimation results. Section 6 concludes.

2. The Japanese bond market and my research questions

2.1. Development of the Japanese bond underwriting market

In the literature on comparative financial systems, Japan is often characterized as a bank-based system of relationship finance in contrast to the U.S.-style, market-based system of direct finance. Less noted but hardly less important is the fact that Japan has one of the largest capital markets (both stocks and bonds) outside of the U.S.[12] as well

[10]Petersen and Rajan (1994) report that small U.S. firms display similar reluctance to borrowing from a new commercial bank in the presence of existing relationships for fear of retaliation by their current lenders.

[11]See Hoshi, Kashyap, and Scharfstein (1990a) and Hoshi, Kashyap, and Scharfstein (1991) for studies of bank ties and cash-flow sensitivity of investments by Japanese firms, and Hoshi, Kashyap, and Scharfstein (1990b) for analysis of bank ties and financial distress; see Gilson, John, and Lang (1990) for U.S. evidence. See also Weinstein and Yafeh (1998), Hayashi (2000), Kang and Stulz (2000), and Dewenter and Warther (1998).

[12]See, for example, Rajan and Zingales (1995).

as a history of banking regulation that has paralleled that of the U.S. since the end of World War II.

Specifically, Article 65 of the 1948 Securities and Exchange Law, which separated the banking and securities businesses in Japan, was modeled after the Glass-Steagall Act. Similarly, the 1992 Financial Institution Reform Act in Japan mirrored the dismantling of the Glass-Steagall Act that started in the U.S. in the late 1980s and allowed banks, securities firms, trust banks, and insurance companies to enter each other's business areas by means of area-specific subsidiaries. The first bank subsidiaries started operations in July of 1993. Initially, security-firm subsidiaries of commercial banks were not allowed to engage in equity brokerage businesses, including equity underwriting. However, with the enactment of the Financial System Reform Law on October 1, 1999, the remaining equity-related restrictions were lifted. This institutional and regulatory history makes Japan an interesting natural laboratory setting to study the effect of bank relationships on capital market competition. A question of particular interest is whether Japanese firms choose their relationship banks with greater propensity than U.S. firms do.

Another noteworthy institutional feature of the Japanese financial system is that banks can own up to 5% of a borrower firm's equity. Thus, it is important to examine bank relationships in terms of both lending and shareholding.[13]

2.2. *Effects of bank relationships on underwriter choice and fees*

When a firm decides to issue a bond, it hires an underwriting bank, which, for a fee, provides two kinds of services: (1) insurance for unsold securities, and (2) assistance in documenting, marketing, pricing, and selling the security. From the bank's perspective, the cost of underwriting the bond is likely to be associated with some features of the bond. For example, the fees are expected to be higher the longer the maturity of the bond because long-maturity bonds are less liquid and their prices are more volatile over the course of their maturities.

The costs of underwriting services are also associated with some characteristics of the issuers. For example, if the issuer is a "hot," well-regarded name in the market, not only is the probability of unsold securities low, but so is the cost of marketing and selling the security. In contrast, it is more expensive to insure (against unsold securities) and to market and distribute a less well-known issuer's bond, as more effort needs to be expended to persuade investors to purchase the bond (even after controlling for its higher yield), which also requires more effort educating the bank's sales force. Thus, borrower reputation characteristics of the issuing firms and bonds are factored into the price of underwriting services. Credit ratings and previous issue experience are examples of such characteristics.

Issuer and bond characteristics are not the only determinants of fees, however. Banks incur costs in assessing the issuer's creditworthiness and certifying information to the investors, that is, in information production. One way that banks become more effective at information production is through maintaining relationships with client firms. Established networks and communication channels with an issuer increase a bank's effectiveness in producing information about that particular issuer. With this informational advantage,

[13]I thank the referee for suggesting this fruitful extension of the research.

banks with prior relationships can build up demand for securities more quickly and face both a lower risk of unsold securities and a lower marginal cost of marketing and sales.

Issuing firms may prefer banks that are better at producing information for two reasons. First, dealing with such banks is less likely to lead to unsold securities or otherwise failed transactions, which could hurt the borrower's reputation in the capital markets and negatively impact future transactions. Second, the ability of these banks to build up demand for the security may indicate that they can negotiate a lower yield for the bond than other underwriting banks can. Thus, the underwriting service is expected to be differentiated along mainly two dimensions—fees and effective information production, which is measured by bank relationships.

The effect of bank relationships on underwriter demand (over and above their effects on fees) depends on the extent to which firms value their relationships. What kinds of firms would value bank relationships with underwriters? Diamond (1991) uses the borrowing firm's reputation to explain its choice between bank loans and bonds. The main result of the paper is that borrower reputation and the need for bank monitoring are inversely related. Young firms and old firms with low borrower reputations do not have any reputational capital to lose and hence bank monitoring is needed to enforce efficient investment decisions. As a result, these firms tend to rely more on bank loans. In contrast, large established firms with high borrower reputations do have valuable reputational capital to lose and therefore have sufficient incentives to choose efficient investment decisions. Since bank monitoring is costly, this class of firms prefers to issue bonds.

This argument (referred to as Diamond's reputation-building argument hereafter) predicts that the degree to which the issuing firm values bank relationships is inversely related to its borrower reputation: firms with low borrower reputation are expected to value bank relationships the most, since they stand to gain the most from choosing an underwriting bank with certification ability, whereas the information production effectiveness of banks is largely redundant for firms with high borrower reputation, since their securities can sell easily in the market regardless of who the underwriter is.

Next, how does a bank relationship between a given firm and a given bank affect the relative likelihoods of other banks to be chosen by that firm? This is of particular interest in the context of comparing U.S. and Japan as two economies with distinct banking systems that have recently experienced major waves of financial deregulation. For example, does the Japanese main bank system affect bank competition in the post-deregulation bond underwriting market,[14] or does the deregulation erase all traces of the old institutional practice in the emerging competitive landscape?

One distinguishing aspect of the main bank system is the visibility and long-term nature of bank relationships; this may be due to the fact that the majority of Japanese banks' clients are mature and established listed firms, which are unlikely to "upgrade" to a higher-reputation bank, as young, post-IPO firms in the U.S. do (see, e.g., Krigman, Shaw, and Womack, 2001). Another distinguishing aspect is the mutual delegation of monitoring to main banks, where other banks that also lend to the firms effectively free-ride on the main banks' monitoring efforts. Given these features of the Japanese banking system, it is more likely that a firm's decision to hire a commercial bank with which it has no prior bank

[14]See Boot and Thakor (2000) for a theoretical analysis of how relationship banking is affected by changes in capital market competition.

relationship is perceived as a "switch" of relationships, and thus a firm is expected to lose all the long-term benefits associated with existing relationships after such a decision.

In contrast, in the U.S., firms that are sufficiently established to access public bond markets are less likely to be constrained in this way. Still, whether Japanese and U.S. bond-issuing firms are constrained by existing bank relationships is an empirical question. While U.S. evidence for small businesses has been reported (see Petersen and Rajan, 1994, 1995; Berger and Udell, 1995), to the best of my knowledge no analysis has been conducted on larger bond-issuing firms.

Finally, the effect of bank relationships on underwriter demand is expected to depend on the strength of bank relationships. Banks that made significant efforts in gathering information about the firm in past loan transactions may be more effective in certifying the firm as underwriters than those banks that passively provided capital. On the other hand, information may be equally shared among all lending banks. I test this question by examining lender-relationship rankings and their effects on underwriter choice.

To summarize, I investigate the following questions in this paper:

1. Are bank relationships significant in determining the firm's underwriter choice? Does the effect of relationships on underwriter choice depend on (i) borrower reputation and/or (ii) the strength of the relationships?
2. How do relationships affect fees? Does this depend on the degree of interbank competition?
3. How do equity holdings interact with lending relationships in determining the firm's underwriter choice and the fees it is charged?
4. Does a bank relationship between a given firm and a given bank affect the relative likelihood of other banks to be chosen by that firm?

3. The data

3.1. Data sources

I constructed the data set using three data sources. First, the Japan Domestic New Issues Database by Thomson Financial Securities Data compiles new-issues information from company filings, press releases, and news sources. Second, the JDB Database of the former Japan Development Bank compiles financial statement information for listed companies in Japan. The comprehensive data are collected from regulatory filings and include all companies (except for those in the financial and insurance industries) listed on the Tokyo, Osaka, and Nagoya Stock Exchanges (both 1st and 2nd Section) as well as over-the-counter companies. Finally, the Compendium of Firm Groupings (*kigyo keiretsu souran*) provides bank equity holdings data.

3.2. Data selection

The sample period is from January 1, 1994 to March 15, 1999—roughly 5 1/4 years. The criteria for setting the period of analysis is as follows. First, the sample begins after July 1993, when the first commercial bank subsidiary started operations.[15] Second, the

[15]The sample period also follows the liberalization of underwriting fees in Japan, which had been set by a common fee matrix up to November 1991 (see Okamura, 2003).

economic and regulatory environment surrounding the underwriters and issuers remained relatively stable during this period. Third, by ending the sample in March 1999, I avoid the effects of the June 1999 closure of Yamaichi Securities, one of the major investment houses in the underwriting market.

Consistent with prior studies, I exclude financial firms and regulated industries from the study. I also concentrate on the top 15 underwriters of nonconvertible fixed-rate corporate debt.[16] In the resulting sample, 11 of the 15 underwriters are subsidiaries of bank holding companies. Using the above criteria, I obtain a sample of 1,302 nonconvertible fixed-rate corporate bond issues.

3.3. Summary statistics

Table 1 reports various sample summary statistics from which several observations can be made. First, commercial bank-underwritten issues are relatively small compared to investment bank-underwritten issues. In addition, their maturity also tends to be slightly shorter, but they are no better or worse in terms of credit ratings. There are a few plausible reasons for this. For example, if a smaller, younger firm is more likely to choose the commercial bank with which it has close ties, issue size might proxy for characteristics of that firm. Alternatively, if commercial banks have a smaller distribution capability relative to investment banks, issue size might reflect supply-side constraints. Note that commercial bank issues are also found to be smaller than investment bank issues in the U.S. (e.g., see Yasuda, 2005).

Panels D and E of Table 1 report previous issue experience and the issuer's industry code, respectively. The proportion of first-time issuers (of domestic bonds) is actually lower among commercial bank issues (12%) than among investment bank counterparts (19%). This finding is interesting because it goes against the characterization of commercial bank clients as smaller, younger firms with little or no previous issue experience. Indeed, first-time issuers are more likely among commercial bank issues in the U.S. bond market. One possible explanation is that the main clients of Japanese commercial banks are blue-chip Japanese companies, most of which gained access to the domestic corporate bond market in the 1980s, when commercial banks were still prohibited from underwriting securities. In contrast, there is little difference between commercial bank and investment bank subsamples in terms of the distribution of issuers across different industries.

4. Methodology

4.1. The firm's underwriter choice model

Previous studies on underwriter choice typically use a dichotomous probit specification, where the dependent variable equals one if a firm uses a commercial bank underwriter, and zero if it uses an investment bank underwriter. In this setup, all commercial banks are treated as homogeneous. Since firms have relationships with some banks and not with others, this approach cannot measure the effect of relationships on underwriter choice. To isolate the relationship effect, we need a multinomial choice setup in which a firm chooses one bank out

[16]The rankings are based on the monetary value of underwritings, and full credit is given to the book-runner(s).

Table 1
Sample summary statistics

This table presents summary statistics for the 1,302 bond issues underwritten in the 1/1/1994–3/15/1999 period. "Issue Size" is the amount of principal reported in the SDC Domestic Japanese New Issues Database. The lead underwriter is given full credit for the deal. "Market Shares" are computed by dividing the subcategory's total number of issues by the category total. "Credit Rating" refers to the average of all credit ratings for a given bond issue by up to six rating agencies. "Commercial Bank Issues" are issues lead-underwritten by subsidiaries of commercial banks (city banks and long-term credit banks).

Panel A: *Issue Size* (¥*billions*)

	< = 75	75< < = 150	150<	Total
All Issues				
No. of Issues	344	623	335	1,302
Market Shares (by No. of Issues)	26%	48%	26%	100%
Transaction Volume (¥billions)	¥1,603.2	¥6,569.5	¥10,026.0	¥18,198.7
Investment Bank Issues				
No. of Issues	120	263	203	586
Market Shares (by No. of Issues)	9%	20%	16%	45%
Transaction Volume (¥billions)	¥547.7	¥2,784.5	¥6,120.0	¥9,452.2
Commercial Bank Issues				
No. of Issues	224	360	132	716
Market Shares (by No. of Issues)	17%	28%	10%	55%
Transaction Volume (¥billions)	¥1,055.5	¥3,785.0	¥3,906.0	¥8,746.5

Panel B: *By Maturity* (*years*)

	< = 5	5<	Total
All Issues			
No. of Issues	633	669	1,302
Market Shares (by No. of Issues)	49%	51%	100%
Transaction Volume (¥billions)	¥7,883.3	¥10,315.4	¥18,198.7
Investment Bank Issues			
No. of Issues	273	313	586
Market Shares (by No. of Issues)	21%	24%	45%
Transaction Volume (¥billions)	¥4,055.8	¥5,396.4	¥9,452.2
Commercial Bank Issues			
No. of Issues	360	356	716
Market Shares (by No. of Issues)	28%	27%	55%
Transaction Volume (¥billions)	¥3,827.5	¥4,919.0	¥8,746.5

Panel C: *By Credit Rating*

	AAA	AA	A	BBB	Total
All Issues					
No. of Issues	35	504	684	79	1,302
Market Shares (by No. of Issues)	3%	39%	53%	6%	100%
Transaction Volume (¥billions)	¥573.3	¥9,416.9	¥7,386.5	¥822.0	¥18,198.7
Investment Bank Issues					
No. of Issues	19	213	308	46	586
Market Shares (by No. of Issues)	1%	16%	24%	4%	45%
Transaction Volume (¥billions)	¥376.3	¥4,852.9	¥3,669.0	¥554.0	¥9,452.2
Commercial Bank Issues					
No. of Issues	16	291	376	33	716

Table 1 (*continued*)

Panel C: *By Credit Rating*

	AAA	AA	A	BBB	Total
Market Shares (by No. of Issues)	1%	22%	29%	3%	55%
Transaction Volume (¥billions)	¥197.0	¥4,564.0	¥3,717.5	¥268.0	¥8,746.5

Panel D: *By Previous Issue Experience*

	First-Time	Seasoned	Total
All Issues			
No. of Issues	196	1106	1,302
Market Shares (by No. of Issues)	15%	85%	100%
Transaction Volume (¥billions)	¥2,546.8	¥15,651.9	¥18,198.7
Investment Bank Issues			
No. of Issues	112	474	586
Market Shares (by No. of Issues)	9%	36%	45%
Transaction Volume (¥billions)	¥1,697.3	¥7,754.9	¥9,452.2
Commercial Bank Issues			
No. of Issues	84	632	716
Market Shares (by No. of Issues)	6%	49%	55%
Transaction Volume (¥billions)	¥849.5	¥7,897.0	¥8,746.5

Panel E: *By Industry*

	Natural resources	Construction	Manufacturing	Wholesale	Retail
All Issues					
No. of Issues	20	49	930	144	77
Market Shares (by No. of Issues)	2%	4%	71%	11%	6%
Transaction Volume (¥billions)	¥150.0	¥612.0	¥13,546.4	¥2,362.0	¥829.0
Investment Bank Issues					
No. of Issues	8	25	429	57	35
Market Shares (by No. of Issues)	1%	2%	33%	4%	3%
Transaction Volume (¥billions)	¥62.0	¥323.0	¥7,043.9	¥1,277.0	¥494.0
Commercial Bank Issues					
No. of Issues	12	24	501	87	42
Market Shares (by No. of Issues)	1%	2%	38%	7%	3%
Transaction Volume (¥billions)	¥88.0	¥289.0	¥6,502.5	¥1,085.0	¥335.0

Table 1 (*continued*)

	Restaurants/ hotels	Personnel and business service	Leisure	Unknown	Total
All Issues					
No. of Issues	10	30	1	41	1,302
Market Shares (by No. of Issues)	1%	2%	0%	3%	100%
Transaction Volume (¥billions)	¥87.0	¥260.0	¥100.0	¥252.3	¥18,198.7
Investment Bank Issues					
No. of Issues	5	10	0	17	586
Market Shares (by No. of Issues)	0%	1%	0%	1%	45%
Transaction Volume (¥billions)	¥41.0	¥138.0	¥0.0	¥73.3	¥9,452.2
Commercial Bank Issues					
No.of Issues	5	20	1	24	716
Market Shares (by No. of Issues)	0%	2%	0%	2%	55%
Transaction Volume (¥billions)	¥46.0	¥122.0	¥100.0	¥179.0	¥8,746.5

of multiple choices. This allows for full variation across banks in terms of the relationships they have with individual firms, both when they are chosen and when they are not.

In particular, I use the nested multinomial logit model, which is a generalization of the multinomial logit model (also called conditional logit model), developed by McFadden (1974, 1978, 1981) and discussed in Maddala (1983, see pp. 41 and 67). The nested logit model relaxes the IIA (Irrelevance of Independence Alternative) property of the logit model by structuring the decision process as a tree or nest structure. The IIA assumption implies that odds ratios in the multinomial logit models are independent of the other choices, which is inappropriate in many instances.[17] The nested multinomial logit model is used by Goldberg (1995) in her study of the effect of tariffs on automobile demand and by MacKie-Mason (1990) in his study of the firm's choice of external financing.

Formally, the model consists of a maximization problem for firm i choosing over banks $1,\ldots,15$ (where banks are indexed by j). Let $V^*_{i,j}$ denote the level of latent value for firm i choosing bank j, and let $V_{i,j}$ equal one if firm i chooses bank j, and zero otherwise.

Further, let the latent underwriter choice equation be specified as

$$\begin{aligned} V^*_{i,j} = {} & \alpha FEE_{i,j} + \beta LOAN_{i,j} \\ & + \delta_j^{LMAT} ln(MATURITY)_i + \delta_j^{ISSUE} ln(NO.ISSUES + 1)_i \\ & + \delta_j^{LAMT} ln(AMOUNT)_i + \delta_j^{INVGRADE} INVGRADE_i \\ & + \delta_j^{YEAR} YEARS_i + \varepsilon_{i,j}, \end{aligned} \tag{1}$$

[17] Maddala (1983) discusses this issue with the famous "red bus, blue bus" example on page 62. Also see Greene (2003, p. 671).

where $FEE_{i,j}$ is the underwriting fee charged by bank j. The fee definition used in the estimation is a gross spread, which is the fee that the underwriter receives as a percentage of the issue proceeds. A typical public bond offering consists of multiple underwriters forming a selling syndicate, where one underwriter serves as the bookrunner. Consistent with prior studies, I identify the bookrunner (or the lead manager) as the underwriter of a given issue.[18]

The relationship variables $LOAN_{i,j}$ (for $j = 1, \ldots, 15$ for 15 underwriting banks in the sample) are constructed using balance sheet data from the JDB database. On any given year's balance sheet, a company typically has loans from more than one bank.[19] Since these loans vary in relative size, it is misleading to count all of these banks as having equally important banking relationships with the firm. The bank relationship definition I use in the baseline model is whether a given bank has served as a top lender for a given firm in a fiscal year. The dummy variable $LOAN_{i,j}$ for bank j is one if it has ever acted as a top lender for firm i between 1980 and 1992, and zero otherwise.[20] These variables capture the presence of loan relationships between a given firm and individual commercial banks that existed before the banks entered into the underwriting market. I treat these relationships as predetermined and exogenous to the competition in the underwriting market.

Summary statistics indicate that issuers and bonds with certain characteristics are more likely to be underwritten by commercial banks than others. The characteristics we control for are as follows: $ln(AMOUNT)_i$ is the natural log of the issue size in ¥billions, $ln(MATURITY)_i$ is the natural log of the bond maturity in years, $ln(NO.ISSUES + 1)_i$ is a dummy that equals the natural log of the number of previous bond issues plus one, $INVGRADE_i$ is one if the issue is rated investment grade based on the average of all credit ratings for a given bond issue and zero otherwise, $YEARS_i$ represents year dummies ($YEAR94 = 1$ if the issue date is in 1994, etc.), and $\varepsilon_{i,(m,j)}$ is the error term, which captures the effects of personal idiosyncrasies, imperfections in maximization, and other random aspects of the firm's choice problem. Note that $FEE_{i,j}$ and $LOAN_{i,j}$ vary across both firms ($i = 1, \ldots, N$) and banks ($j = 1, \ldots, 15$), whereas other explanatory variables, such as $ln(MATURITY)_i$, vary only across issues.

Specifying the Generalized Extreme-Value (GEV) distribution for the error term and the nest structure as given in Fig. 1 yields the nested multinomial logit model. At the lower level of the nest are 15 alternative underwriting banks, indexed by j, and at the upper level of the nest are two alternatives, commercial banks and investment banks, indexed by m.

[18]In a small number of cases in which there were two co-bookrunners, each was counted as if it underwrote separate issues.

[19]Ongena and Smith (1998) report that multiple-bank relationships are commonly found across a number of countries and data samples.

[20]In the JDB loan database, the total bank loans outstanding for a given firm-year are reported separately for short-term loans and long-term loans. Short-term loans refer to loans maturing in less than a year; long-term loans refer to loans with a maturity of a year or longer. For the short-term loan category, bank-firm specific loans outstanding are available for the top two lenders in a given firm-year. For the long-term loan category, bank-firm specific loans outstanding are available for 24 individual banks. To identify a top lender in a given firm-year, I use the sum of the short-term loan and the long-term loan amount. Since 3rd or lower-ranked short-term lenders are not observed (while all long-term lenders are observed), I verified whether this could hinder researchers' ability to correctly identify a top bank. Specifically, I obtained a randomly drawn sample of firms for which the *total* loans outstanding were available and compared the top lenders identified using the variable definition described above using JDB data and the actual top lenders for these firms. The comparison yielded a 100% match, which is reassuring.

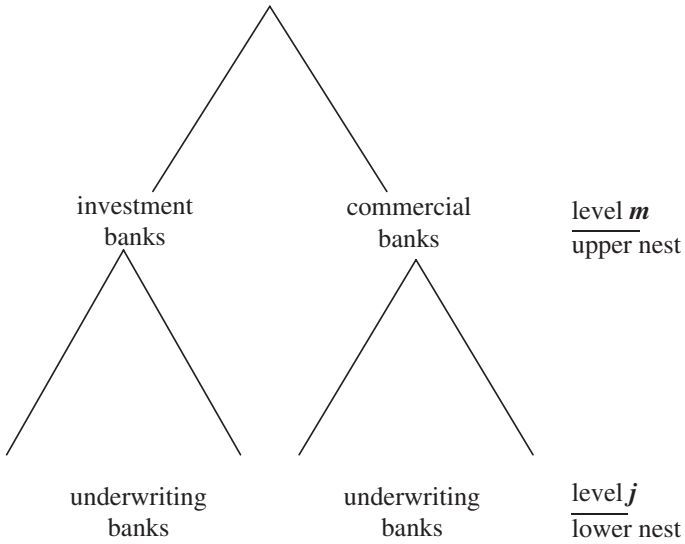

Fig. 1. Firm's choice set. This figure specifies the nest structure used in the demand model.

Given this nest structure, we can write

$$Pr(j) = Pr(j|m) \cdot Pr(m).$$

The choice probability for each of the 15 alternatives at the lower level of the nest (conditional on the upper-level choice) is

$$\Pr(j|m,i) = \frac{e^{\alpha \mathrm{FEE}_{i,j} + \beta \mathrm{LOAN}_{i,j}}}{\sum_{k=1}^{K_m} e^{\alpha \mathrm{FEE}_{i,k} + \beta \mathrm{LOAN}_{i,k}}}. \tag{2}$$

The choice probability for each of the two alternatives (commercial banks and investment banks) at the upper level of the nest is

$$\Pr(m,i) = \frac{e^{w_i^{\top} \delta_m + \lambda I_{i,m}}}{\sum_{t=1}^{2} e^{w_i^{\top} \delta_t + \lambda I_{i,t}}}, \tag{3}$$

where

$$I_{i,t} = log\left(\sum_{l=1}^{L_t} e^{\alpha \mathrm{FEE}_{i,l} + \beta \mathrm{LOAN}_{i,l}}\right), \tag{4}$$

and $w^{\top}\delta$ refers to the bond and issuer characteristics $ln(MATURITY)_i \ldots YEARS_i$ and their corresponding coefficients $\delta^{LAMT} \ldots \delta^{YEARS}$. Since these are chooser-specific (not choice-specific) variables, parameters are estimated separately for each choice (thus δ are now subscripted by m). The inclusive value $I_{i,t}$ measures the expected aggregate value of subset t, and the coefficient λ reflects the dissimilarity of alternatives within a specific subset. Thus, $\lambda = 1$ would imply that there are no differences in substitution patterns between choices within the nest and those across the nests, while $\lambda = 0$ would imply that there is perfect correlation among choices within the nests. Allowing λ to take values other than one generalizes the model; more importantly, it allows us to test for any inherent organizational form-specific differences between commercial banks and investment banks after explicitly controlling for bank relationships. This coefficient essentially indicates whether there are systematic differences between commercial banks and investment banks that are not captured by other control variables.

In addition to estimating this baseline model, I examine how the degree to which a firm values relationships varies with its borrower reputation. As discussed earlier, Diamond's reputation-building argument predicts an inverse relationship. To test this hypothesis, I also estimate specifications in which the borrower reputation characteristics of issuers interact with the relationship and fee variables.[21]

4.2. Fee equations

A data issue arises in studying this market: while fees vary across both issuers and banks, only one fee is observed per issue, namely, the fee offered by the bank that is hired to underwrite the bond. Thus, following the practice of competition studies of other industries (see, e.g., Goldberg, 1995), I impute the fees of unchosen banks for each issue. In doing so, I control for the correlation of fees with the quality of the issue by employing the issue category as the one realized in each observation. For example, if a given observation was a short-maturity, AAA, first-time issue, I impute the fees for that issue category for all banks.

Specifically, I impute the fees in the following multivariate specification:

$$\begin{aligned} FEE_{i,j} = {} & \gamma_j^{CONS} + \gamma_j^{LAMT} ln(MATURITY)_i + \gamma_j^{ISSUE} ln(NO.ISSUES + 1)_i \\ & + \gamma_j^{LAMT} ln(AMOUNT)_i + \gamma_j^{CREDIT} CREDIT\ RATINGS_i \\ & + \gamma_j^{YEAR} YEARS_i + \gamma_j^{LOAN} LOAN_{i,j} + u_{i,j}. \end{aligned} \tag{5}$$

As discussed in Section 2, underwriting fees are determined in part by various costs, including distribution costs, the expected cost of taking market and underwriter reputation risks, and information production costs. The value γ_j^{CONS} is the constant. The variable $ln(MATURITY)_i$ is the natural log of the bond maturity in years. In general, underwriters demand higher underwriting fees for longer-maturity bonds. This makes sense to the extent that a normal yield curve is also upward sloping; in addition, the secondary market for 30-year corporate bonds is much less liquid than that for 30-year government bonds.

The variable $ln(NO.ISSUES + 1)_i$ is the natural log of the number of previous bond issues plus one. The variable $CREDIT\ RATINGS_i$ represents credit rating dummies based on the average of all credit ratings for a given bond issue.[22] Lower credit ratings mean that in general issuers have less financial strength and lower borrower reputation than those with higher credit ratings, increasing the risk-related cost for the underwriter. Lower credit ratings might also mean that it is more costly to distribute these bonds since the company is less well known and hence more effort is needed to persuade investors to purchase the bond (which also feeds back to creating potentially greater market risk). For similar reasons, investors require substantially higher yields for junk bonds. The variable $LOAN_{i,j}$ equals one if a prior loan relationship exists, and zero otherwise. I include loans in the fee equation to evaluate the benefit of relationships net of the effect of loans on fees in the demand model. Finally, $u_{i,j}$ is the error term, which is assumed to be distributed independently and identically normal.

[21]This further relaxes the restrictive nature of traditional discrete choice models by allowing differences between individual choosers (firms) to have a systematic effect on their valuations. This point is discussed in detail in Goldberg (1995).

[22]No one agency dominates the Japanese market and, as a result, no comprehensive sample of ratings by a single agency is available. The six leading credit rating agencies whose ratings I use are: Japan Bond Rating Institute, Japan Credit Rating Agency, Ltd., Nippon Investors Services, Japan Rating and Investment Information, Inc., Moody's Investors Service, and Standard & Poor's.

Note that although the fees are assumed to be exogenous in the model, the observations I use to compute the average fees are not a random subset, but rather are the fees charged when they are chosen. Not controlling for this feature of the data leads to biased estimates of fees. To illustrate this point, let c_i represent the index of the bank chosen by firm i. Since the fee affects the demand for a given bank's underwriting service negatively (assuming downward-sloping demand), the fact that a given bank was chosen over other banks in the choice set implies that the observed fees, $(FEE_{i,j}; j = c_i)$, are on average *lower* than the unconditional distribution of $FEE_{i,j}$. As a result, if I impute unobserved fees by obtaining estimates of γ from Eq. (5) using observed fees as dependent variables, the model will systematically underestimate unobserved fees and bias the fee coefficient α toward zero.

To control for this feature of the data, I use the expectation–maximization (EM) Algorithm to impute the fees conditional on the firm's underwriter choice.[23] The main idea is to obtain fee equation estimates γ and demand equation estimates α and β jointly in an iterative algorithm such that fee imputation is conditional on the information in c_i, $i = 1 \ldots N$ and Maximum Likelihood estimation is straightforward. The demand estimates that obtain from this estimation method are then used to estimate the upper level of the nested logit model. Details of the procedures are described in the appendix.

4.3. Research questions

Using the empirical model specified above, I test the following research hypotheses:

1. Are relationships significant in determining the firm's underwriter choice? This is captured by the coefficient β in Eq. (2). Furthermore, does the effect of relationships on underwriter choice depend on (i) borrower reputation and (ii) the strength of the relationships? This is tested by redefining bank relationship variables and examining how the coefficient β changes.
2. How do relationships affect fees? This is captured by the coefficient γ^{LOAN} in Eq. (5). Furthermore, γ^{LOAN} is separately estimated for single-relationship and multiple-relationship issuers, where the number of relationships is used as a measure of interbank competition.
3. How do bank equity holdings interact with lending relationships in determining the firm's underwriter choice and the underwriting fee it is charged? This is captured by separately estimating β and γ^{LOAN} for (i) loan-only issuers, (ii) loan-and-equity issuers, and (iii) equity-only issuers.
4. Does the presence of bank relationships affect the choice probabilities of other banks without relationships? This is tested by estimating the probit model.

5. Estimation results

5.1. Baseline model

Table 2 reports the estimation results of the baseline underwriter choice model. Panel A presents estimates of the fee equations, γ; Panel B presents estimates of the demand model, α, β, λ, and δ. In Panel A, the estimates of commercial banks and investment banks are

[23] See Dempster, Laird, and Rubin (1977) and McLachlan and Krishnan (1997) for a survey of this method in the literature.

Table 2
Estimation results of firm's underwriter choice model

This table reports the estimation results of the baseline model. Panel A presents estimates of the fee equations; Panel B presents estimates of the demand model. The dependent variables in Panel A are the underwriting fees (gross spread) charged by banks in the given issue. The variable $ln(MATURITY)$ is the natural log of the bond maturity in years, $ln(\#\ OF\ ISSUE\ +1)$ is the natural log of the number of previous bond issues plus one, and $ln(AMOUNT)$ is the natural log of size of the issue in ¥ billions. The variables *Aa* dummy–*Baa* dummy are credit rating dummies based on the average of all credit ratings for a given bond issue. The dummy variable $LOAN_{ij}$ equals one if $bank_j$ was the top lender among banks in any annual period during 1982 to 1992, and zero otherwise. Year dummies are dummies corresponding to the issue date. Point estimates for the constant term and year dummies are not reported, although they are included in the fee equations. The dependent variable in Panel B is a discrete variable corresponding to the choice of bank. Thus, it is a multinomial variable equaling j if the issuing firm chooses $bank_j$ ($j = 1$–12) for the lower-nest choice in Fig. 1, and a binary variable equaling one if the chosen bank is a commercial bank and zero otherwise for the upper-nest choice. The variable $UNDERWRITING\ FEE_{ij}$ is the gross spread charged by $bank_j$ in the given issue. $LOAN_{ij}$ is as defined above. Inclusive value $I_{i,m}$ measures the expected aggregate value of choosing subset m (e.g., commercial banks as a group) for $firm_i$. The dummy variable $INVGRADE$ equals one if the issue's average rating is investment grade and 0 otherwise. Point estimates for year dummies are not reported, although they are included in the demand estimation. The symbols ***, **, * indicate that the coefficient is statistically different from zero at the 1%, 5%, and 10% significance levels, respectively.

Panel A: Fee Estimates

Dependent variable: Underwriting fees

	Commercial bank		Investment bank	
Explanatory variables	Estimate	Std.err.	Estimate	Std.err.
$ln(MATURITY)$	0.0008***	(0.0002)	0.0021***	(0.0007)
$ln(\#\ OF\ ISSUES\ +1)$	0.0012***	(0.0001)	0.0009***	(0.0003)
$ln(AMOUNT)$	0.0039***	(0.0001)	0.0065***	(0.0004)
Aa dummy	0.0265***	(0.0006)	0.0463***	(0.0020)
A dummy	0.0139***	(0.0006)	0.0348***	(0.0020)
Baa dummy	0.0097***	(0.0007)	0.0424***	(0.0022)
LOAN	−0.0081***	(0.0002)		
Constant	Yes		Yes	
Year dummies	Yes		Yes	

Panel B: *Demand Estimates*

Dependent variable: Choice of underwriting bank

Explanatory variables	Estimate	Std.err.
UNDERWRITING FEE	−5.6874**	(2.4016)
LOAN	1.5265***	(0.0646)
Inclusive Value	0.2476**	(0.1170)
$ln(MATURITY)$	−1.5991*	(0.8791)
$ln(\#\ OF\ ISSUES\ +1)$	0.2811***	(0.0590)
$ln(AMOUNT)$	−0.5411***	(0.0932)
INVGRADE	0.1339	(0.2500)
Year dummies	Yes	

Number of observations: 1,302.

aggregated separately. The coefficients on maturity are both positive, which is consistent with the fee determination analysis in Section 2 and with the discussion of the variables entering the fee equations in Section 4.2. The coefficients on the credit rating dummies are also positive and significant for both commercial banks and investment banks, indicating that higher fees are charged for lower-rated issuers. The coefficients on the number of previous issues are positive and significant for both commercial banks and investment banks, which is somewhat surprising. Finally, there is a significant fee discount in the presence of lender relationships between firms and commercial banks.

Panel B shows that both fees and prior loan relationships are significant determinants of the firm's underwriter choice. The fee coefficient α is negative and significant, indicating downward-sloping demand for underwriting service. The relationship coefficient β is positive and significant, which indicates that firms derive a benefit from choosing banks with prior lender relationships.

The coefficients on issuer and bond characteristics included in the upper nest are generally as expected and consistent with the summary statistics in Table 1. Since these are chooser-specific variables, parameters are estimated separately for each choice. The coefficients for one choice (investment banks) are normalized to zero, so the reported coefficients are for the choice of commercial banks. The coefficients on issue amount and maturity are negative and significant, whereas the coefficient on previous issue experience is positive and significant. This is consistent with the prediction that firms issuing large bonds and long bonds are less likely to choose commercial banks (due to their limited operational scale) and that more seasoned issuers are more likely to choose them, potentially due to their prior relationships. The dissimilarity coefficient of the nested logit model, λ, is 0.2476, which is different from one at the 5% significance level. Recall that $\lambda \neq 1$ implies that the nesting as specified in Fig. 1 is not redundant; that is, an investment bank is a closer substitute for another investment bank than for a commercial bank, and vice versa.

5.2. Investment grade vs. noninvestment grade model

Table 3 reports the estimation results for tests in which the fee and relationship coefficients are allowed to vary across the issuer's borrower reputation characteristics, i.e., credit ratings. Specifically, I divide the sample according to whether the issuer's credit rating is investment grade at the time of the issuance. An investment grade rating means that in general issuers have superior financial strength and higher borrower reputation than those with lower ratings.

In Panel B, the fee coefficient α_1 for investment grade issuers is negative and significant at -41.8507, whereas the fee coefficient for low-rated issuers is significant but less steep at -10.9850. The difference is statistically significant. This suggests that investment grade issuers are significantly more fee sensitive than noninvestment grade issuers. The loan coefficients β are positive and significant for both types of issuers. (The difference is not significant.) The upper-nest coefficients are qualitatively similar to those in the baseline model. Firms with smaller issues and more seasoned issuers are more likely to choose commercial bank underwriters. The dissimilarity coefficient λ is again significantly different from one. Fee equation estimates in Panel A are qualitatively (and quantitatively) similar to the baseline model results. Interestingly, significantly deeper fee discounts are offered to low-rated issuers as compared to high-rated issuers.

Table 3
Estimation results of investment grade vs. noninvestment grade model

This table reports the estimation results of the Investment grade vs. noninvestment grade model. Panel A presents estimates of the fee equations; Panel B presents estimates of the demand model. The dependent variables in Panel A are the underwriting fees (gross spread) charged by banks in the given issue. The variable $ln(MATURITY)$ is the natural log of the bond maturity in years, $ln(\#\ OF\ ISSUE\ +1)$ is the natural log of the number of previous bond issues plus one, and $ln(AMOUNT)$ is the natural log of issue size in ¥ billions. The variables *Aa* dummy–*Baa* dummy are credit rating dummies based on the average of all credit ratings for a given bond issue. The dummy variable $LOAN_{ij}$ *(inv. grade)* equals one if (i) $firm_i$'s issue is rated investment grade and (ii) $bank_j$ was the top lender among banks in any annual period during 1982 to 1992, and zero otherwise. $LOAN_{ij}$ (*non-inv. grade*) is similarly defined. Year dummies are dummies corresponding to the issue date. Point estimates for the constant term and year dummies are not reported, although they are included in the fee equations. The dependent variable in Panel B is a discrete variable corresponding to the choice of bank. Thus, it is a multinomial variable equaling j if the issuing firm chooses $bank_j$ ($j = 1$–12) for the lower-nest choice in Fig. 1, and a binary variable equaling one if the chosen bank is a commercial bank and zero otherwise for the upper-nest choice. The variable FEE_{ij} (*inv. grade*) equals the gross spread if $firm_i$'s issue is rated investment grade, and zero otherwise. FEE_{ij} (*non-inv. grade*) equals the gross spread if $firm_i$'s issue is rated noninvestment grade, and zero otherwise. $LOAN_{ij}$ (*inv. grade*) and $LOAN_{ij}$ (*non-inv. grade*) are as before. The inclusive value $I_{i,m}$ measures the expected aggregate value of choosing subset m (e.g., commercial banks as a group) for $firm_i$. The dummy variable *INVGRADE* equals one if the issue's average rating is investment grade and zero otherwise. Point estimates for year dummies are not reported, although they are included in the demand estimation. The symbols ***, **, * indicate that the coefficient is statistically different from zero at the 1%, 5%, and 10% significance levels, respectively.

Panel A: *Fee Estimates*

Dependent variable: Underwriting fees

	Commercial bank		Investment bank	
Explanatory variables	Estimate	Std.err.	Estimate	Std.err.
$ln(MATURITY)$	0.0820***	(0.0001)	0.0609***	(0.0004)
$ln(\#\ OF\ ISSUES\ +1)$	0.0001**	(0.0001)	0.0002	(0.0002)
$ln(AMOUNT)$	−0.0008***	(0.0001)	0.0019***	(0.0003)
Aa dummy	−0.0157***	(0.0004)	0.0260***	(0.0013)
A dummy	−0.0176***	(0.0004)	0.0240***	(0.0012)
Baa dummy	−0.0126***	(0.0004)	0.0348***	(0.0014)
LOAN (*inv. grade*) ($\gamma 1$)	−0.0026***	(0.0002)		
LOAN (*non-inv. grade*)($\gamma 2$)	−0.0080***	(0.0007)		
Constant	Yes		Yes	
Year dummies	Yes		Yes	

Panel B: *Demand Estimates*

Dependent variable: Choice of underwriting bank

Explanatory variables	Estimate	Std.err.
FEE (*inv. grade*) ($\alpha 1$)	−41.8507***	(9.1790)
FEE (*non-inv. grade*) ($\alpha 2$)	−10.9850**	(5.1852)
LOAN (*inv. grade*) ($\beta 1$)	1.4669**	(0.6106)
LOAN (*non-inv. grade*) ($\beta 2$)	1.5459***	(0.0635)
Inclusive Value	0.1472**	(0.0602)
$ln(MATURITY)$	−1.5093*	(0.8731)
$ln(\#\ OF\ ISSUES\ +1)$	0.2824***	(0.0591)
$ln(AMOUNT)$	−0.5232***	(0.0908)
INVGRADE	0.2284	(0.2240)
Year dummies	Yes	

Panel C: *Test Statistics*

Ho:	*p*-value
$\alpha 1 = \alpha 2$	0.0034
$\beta 1 = \beta 2$	0.8976
$\gamma 1 = \gamma 2$	0.0000

Number of observations: 1,302.

5.3. First-time vs. seasoned model

Table 4 reports the estimation results for tests in which the trade-off between the fee and relationship coefficients in the demand equation are allowed to vary along the newness of the issuers in the corporate bond market. Investors are less likely to be familiar with or even to recognize the name of first-time issuers in the market, so these firms are worse off than seasoned issuers in terms of their borrower reputation. Seasoned issuers, in contrast, have a track record of issuing public debt, which contributes positively to their borrower reputation.

In Panel B, the fee coefficient α_1 for seasoned (i.e., "high reputation") issuers is negative and significant at −123.3734, whereas the fee coefficient α_2 for first-time issuers ("low reputation") is not significantly different from zero. The loan coefficients β_1 and β_2 are both positive and significant. The size of the dissimilarity coefficient λ is significantly different from one, as in the two previous specifications. Fee equation coefficients (presented in Panel A) are again similar to the baseline results. Interestingly, a fee premium is charged to first-time issuers with lending relationships, whereas a fee discount is offered to seasoned issuers with lending relationships.

5.4. Alternative measures of relationships

As discussed in Section 4, I use a top lender position (in any given year) as an indicator of a prior banking relationship. In Table 5, I report the results of broadening this relationship definition, allowing for the measurement of relationships using rankings among lending banks for a given firm. Constructing such variables serves two purposes. First, estimating alternative specifications using these variables allows me to check the robustness of the main results for the Japanese data. Second, these alternative specifications allows me to assess whether rankings or strength of bank relationships matter, an interesting empirical question in the broader context of the literature on bank relationships.

The rankings are based on firm-, bank-, and year-specific loan ratio variables. The loan ratio is defined as bank$_j$'s loan to firm$_i$/firm$_i$'s total bank loan. For each bank-firm pair, I take a five-year average (from 1988 to 1992) of these loan ratios. Then, using the resulting loan ratio variables, I identify the top lender, second-largest lender, third-largest lender, and all other lenders among the 11 commercial bank underwriters.[24]

Using these rankings, I construct four alternative measures of relationships, from the most exclusive (= 1 only if a given bank is the top lender) to the most inclusive (= 1 if a given bank has an average loan ratio of greater than zero).[25] I find that there is a monotonically increasing relationship between the significance of lending relationships and its effect on the firm's underwriter choice. As shown, the coefficients are all positive and significant, with the top lender relationship being the largest (1.9328) and all lender

[24]Taking the average seems reasonable because in the data there are some years in which no loans are made by a given bank. Wherever there is a tie, I count each as possessing the given rank, with the next-largest lender as having the rank right below them. For example, both of two banks with a top share of 0.20 each are accorded a top lender position, the next bank with a share of 0.15 is accorded a second-largest lender position, and so on. Ties occur in about 5% of the sample for the top three lenders.

[25]I also try different specifications, where loan ratio variables (both including and excluding the lower-ranked lenders) are used instead of the lender ranking variables. The results do not change.

Table 4
Estimation results of first-time vs. seasoned model

This table reports the estimation results of the first-time vs. seasoned model. Panel A presents estimates of the fee equations; Panel B presents estimates of the demand model. The dependent variables in Panel A are the underwriting fees (gross spread) charged by banks in the given issue. The variable $ln(MATURITY)$ is the natural log of the bond maturity in years, $ln(\#\ OF\ ISSUE\ +1)$ is the natural log of the number of previous bond issues plus one, and $ln(AMOUNT)$ is the natural log of issue size in ¥ billions. The variables *Aa* dummy–*Baa* dummy are credit rating dummies based on the average of all credit ratings for a given bond issue. The dummy variable $LOAN_{ij}$ (seasoned issuers) equals one if (i) $firm_i$ is a seasoned issuer and (ii) $bank_j$ was the top lender among banks in any annual period during 1982–1992, and zero otherwise. $LOAN_{ij}$ (first-time issuers) is similarly defined. Year dummies are dummies corresponding to the issue date. Point estimates for the constant term and year dummies are not reported, although they are included in the fee equations. The dependent variable in Panel B is a discrete variable corresponding to the choice of bank. Thus, it is a multinomial variable equaling j if the issuing firm chooses $bank_j$ ($j = 1$–12) for the lower-nest choice in Fig. 1, and a binary variable equaling one if the chosen bank is a commercial bank and zero otherwise for the upper-nest choice. The variable FEE_{ij} (seasoned issuers) equals the gross spread if $firm_i$ is a seasoned issuer, and zero otherwise. FEE_{ij} (first-time issuers) is similarly defined. $LOAN_{ij}$ (seasoned issuers) and $LOAN_{ij}$ (first-time issuers) are as defined before. The inclusive value $I_{i,m}$ measures the expected aggregate value of choosing subset m (e.g., commercial banks as a group) for $firm_i$. The dummy variable *INVGRADE* equals one if the issue's average rating is investment grade and zero otherwise. Point estimates for year dummies are not reported, although they are included in the demand estimation. The symbols ***, **, * indicate that the coefficient is statistically different from zero at the 1%, 5%, and 10% significance levels, respectively.

Panel A: *Fee Estimates*					*Panel B*: *Demand Estimates*			*Panel C*: *Test Statistics*	
Dependent variable: Underwriting fees					Dependent variable: Choice of underwriting bank				
	Commercial bank		Investment bank						
Explanatory variables	Estimate	Std.err.	Estimate	Std.err.	Explanatory variables	Estimate	Std.err.	Ho:	*p*-value
$ln(MATURITY)$	0.0820***	(0.0001)	0.0608***	(0.0005)	*FEE* (*seasoned*) ($\alpha 1$)	−123.3734***	(5.1711)	$\alpha 1 = \alpha 2$	0.0000
$ln(\#\ OF\ ISSUES\ +1)$	0.0004***	(0.0001)	0.0006***	(0.0002)	*FEE* (*first-time*) ($\alpha 2$)	2.5087	(5.7126)	$\beta 1 = \beta 2$	0.0114
$ln(AMOUNT)$	−0.0009***	(0.0001)	0.0013***	(0.0003)	*LOAN* (*seasoned*) ($\beta 1$)	1.8893***	(0.0751)	$\gamma 1 = \gamma 2$	0.0000
Aa dummy	−0.0130***	(0.0004)	0.0264***	(0.0013)	*LOAN* (*first-time*) ($\beta 2$)	1.4070***	(0.1753)		
A dummy	−0.0147***	(0.0004)	0.0241***	(0.0012)	Inclusive Value	0.2801***	(0.0344)		
Baa dummy	−0.0139***	(0.0004)	0.0348***	(0.0014)	$ln(MATURITY)$	−1.9885**	(0.8915)		
LOAN (*seasoned*) ($\gamma 1$)	−0.0015***	(0.0004)			$ln(\#\ OF\ ISSUES\ +1)$	0.2929***	(0.0603)		
LOAN (*first-time*) ($\gamma 2$)	0.0017***	(0.0002)			$ln(AMOUNT)$	−0.6498***	(0.0964)		
Constant	Yes		Yes		*INVGRADE*	−0.0265	(0.2230)		
Year dummies	Yes		Yes		Yeardummies	Yes			

Number of observations: 1,302.

Table 5
Results with alternative measures of relationships

This table presents estimation results of the baseline model when alternative measures of bank-firm relationships are used. Four alternative measures of relationships are constructed based on the rank of the relationships. Alternative relationship measures are (A) $LOAN_j$ equals one if $bank_j$ had the highest average annual loan share for $firm_i$ in 1988–1992, else zero; (B) $LOAN_j$ equals one if $bank_j$ had either the highest or the second-highest average annual loan share for $firm_i$ in 1988–1992, else zero; (C) $LOAN_j$ equals one if $bank_j$ ranked within the top three in average annual loan shares for $firm_i$ in 1988–1992, else zero; and (D) $LOAN_j$ equals one if $bank_j$ had any nonzero loan share for $firm_i$ in 1988–1992, else zero. Demand estimates are presented. The symbols ***, **, * indicate that the coefficient is statistically different from zero at the 1%, 5%, and 10% significance levels, respectively.

Explanatory variables	*Panel A*: *Top 1*		*Panel B*: *Top 2*		*Panel C*: *Top 3*		*Panel D*: *All loan*	
	Estimate	Std.err.	Estimate	Std.err.	Estimate	Std.err.	Estimate	Std.err.
UNDERWRITING FEE	−85.9447***	(4.3991)	−94.3418***	(4.3042)	−95.5788***	(4.2511)	−95.9330***	(4.1649)
LOAN	1.9328***	(0.0695)	1.6325***	(0.0657)	1.3808***	(0.0650)	0.3738***	(0.0674)
Inclusive Value	0.2184***	(0.0360)	0.1974***	(0.0330)	0.1825***	(0.0322)	0.1295***	(0.0300)
ln(*MATURITY*)	−1.7083*	(0.8808)	−1.7045*	(0.8794)	−1.6827*	(0.8773)	−1.5839*	(0.8716)
ln(*# OF ISSUES* + 1)	0.2849***	(0.0603)	0.2821***	(0.0603)	0.2810***	(0.0602)	0.2866***	(0.0596)
ln(*AMOUNT*)	−0.5849***	(0.0937)	−0.5810***	(0.0935)	−0.5758***	(0.0932)	−0.5489***	(0.0917)
INVGRADE	0.1333	(0.2212)	0.1530	(0.2204)	0.1744	(0.2194)	0.2606	(0.2156)
Year dummies	Yes		Yes		Yes		Yes	

Number of observations: 1,302.

relationships being the smallest (0.3738). I find that the coefficient on the fee variable is negative and significant. The coefficients on the inclusive value variable and on both previous market exposure and issue amount have the predicted signs.

5.5. Interbank competition and fees

In Panel A of Table 2, the loan coefficient γ_j^{LOAN} is negative and significant. This indicates that commercial banks charge lower fees to those firms with which they have relationships than to other firms. Does this result depend in turn on the degree of interbank competition? The theoretical literature on the costs and benefits of lending relationships shows that while banks are better than arm's-length providers of debt at monitoring the quality of internal projects within the firms, this very advantage also gives banks opportunities to extract rents from their relationships, reducing expected profits for the firms implementing the projects. In the context of bond underwriting, this might result in banks charging higher fees to those firms with which they have lender relationships (and thus informational advantages). This hold-up problem might be mitigated, however, by the increase in interbank competition.[26] We hypothesize therefore that firms with greater bargaining power will optimally choose a high degree of interbank competition and obtain reduced fees, whereas firms with low bargaining power will be subject to fee premiums. To capture the degree of interbank competition, we use the number of lender relationships and separately estimate γ_j^{LOAN} for firms with multiple lender relationships and firms with solo relationships.

[26]For theoretical analysis, see, for example, Rajan (1992) and Marquez (2002).

Existing empirical evidence on the impact of multiple-bank relationships on the pricing and quantity of credit extended to the firm is mixed.[27] This may partially be due to differences in the types of firms analyzed across studies. For small, private firms, multiple relationships tend to hurt pricing and availability of credit (as in Petersen and Rajan, 1994), whereas among larger firms, single-relationship firms are found to be more credit-constrained (e.g., see Houston and James, 2001). The Japanese firms I study in this paper are large, publicly traded firms: Thus, the prediction consistent with the extant literature is that multiple-relationship firms enjoy better bargaining power vis-a-vis their banks.

The estimation results of the multiple- versus single-relationship models are presented in Table 6. Panel A presents the results of the fee equations. The coefficient γ^{LOAN} is significantly more negative for firms with multiple lender relationships as compared to firms with a single lender relationship. The results suggest that firms are charged relatively higher fees by commercial bank underwriters when they have only one such relationship, and are consistent with the mitigating effect of interbank competition on banks' monopoly power.

In Panel B, the fee coefficients α for both multiple-relationship issuers and single-relationship issuers are negative and significant. The loan coefficients β_1 and β_2 are both positive and significant and essentially equal in size. The other demand estimates are quantitatively and qualitatively similar to the results in the baseline model.

5.6. *Effects of bank equity holdings*

One of the key institutional differences between the Japanese and American banking systems is that Japanese banks are allowed to own equity in the firms to which they lend, whereas U.S. banks are normally prohibited from doing so. This additional control right might account for part of the drastic gains in market share by Japanese commercial banks. To investigate this question, I classify bank relationships into three mutually exclusive categories: (1) loan only, which is one if bank j has a lending relationship but no equity shareholding relationship with firm i; (2) loan and equity, which is one if the bank has both a lending relationship and an equity shareholding relationship with the firm; and (3) equity only, which is one if the bank has an equity shareholding but no lending relationship with the firm.

The estimation results of the equity-and-lending relationship model are presented in Table 7.

In Panel B, the coefficient β for equity-only relationships is significant and negative, whereas that for equity-and-loan relationships is significant and more positive than that for loan-only relationships. The differences between these coefficients are statistically significant. These results suggest that bank shareholding relationships do not have the same effects on the underwriter choice as lending relationships. Rather than substituting for lending relationships, equity holding relationships appear to complement lending relationships.

In a paper that analyzes the coexistence of commercial bank and investment bank underwriting, Puri (1999) argues that the certification ability of banks is hurt when they use the proceeds of the securities they underwrite to retire their financial claims in their client

[27]See Boot (2000) and Ongena and Smith (1998) for a survey review. See Farinha and Santos (2002) for non-U.S. evidence of small firms. See also Houston and James (1996) for U.S. evidence of large firms.

Table 6
Multiple- versus single-relationship model

This table reports the estimation results of the multiple- versus single-relationship model. Panel A presents estimates of the fee equations; Panel B presents estimates of the demand model. The dependent variables in Panel A are the underwriting fees (gross spread) charged by banks in the given issue. The variable $ln(MATURITY)$ is the natural log of the bond maturity in years, $ln(\#\ OF\ ISSUE\ +1)$ is the natural log of the number of previous bond issues plus one, and $ln(AMOUNT)$ is the natural log of issue size in ¥ billions. The variables *Aa* dummy–*Baa* dummy are credit rating dummies based on the average of all credit ratings for a given bond issue. The dummy variable $LOAN_{ij}$ $*MULTIREL$ equals one if $bank_j$ was the top lender among banks in any annual period during 1982 to 1992 and $firm_i$ has more than one lender relationship, and zero otherwise. The dummy $LOAN_{ij}$ $*SOLOREL$ equals one if $bank_j$ was the top lender among banks in any annual period during 1982 to 1992 and $firm_i$ has only one lender relationship, and zero otherwise. Year dummies are dummies corresponding to the issue date. Point estimates for the constant term and year dummies are not reported, although they are included in the fee equations. The dependent variable in Panel B is a discrete variable corresponding to the choice of bank. Thus, it is a multinomial variable equaling j if the issuing firm chooses $bank_j$ ($j = 1$–12) for the lower-nest choice in Fig. 1, and a binary variable equaling one if the chosen bank is a commercial bank and zero otherwise for the upper-nest choice. The variable FEE_{ij} (*multiple-relationship*) equals the gross spread if $firm_i$ has more than one lender relationship, and zero otherwise; FEE_{ij} (*single-relationship*) is similarly defined. The variable $LOAN_{ij}$ (*multi-relationship*) equals one if $firm_i$ has more than one lender relationship and $LOAN_{ij} = 1$, and zero otherwise; $LOAN_{ij}$ (*single-relationship*) is similarly defined. The inclusive value $I_{i,m}$ measures the expected aggregate value of choosing subset m (e.g., commercial banks as a group) for $firm_i$. The dummy $INVGRADE$ equals one if the issue's average rating is investment grade and zero otherwise. Point estimates for year dummies are not reported, although they are included in the demand estimation. The symbols ***, **, * indicate that the coefficient is statistically different from zero at the 1%, 5%, and 10% significance levels, respectively.

Panel A: *Fee Estimates*					*Panel B*: *Demand Estimates*			*Panel C*: *Test Statistics*	
Dependent variable: Underwriting fees					Dependent variable: Choice of underwriting bank				
	Commercial bank		Investment bank						
Explanatory variables	Estimate	Std.err.	Estimate	Std.err.	Explanatory variables	Estimate	Std.err.	Ho:	*p*-value
$ln(MATURITY)$	0.0819***	(0.0001)	0.0609***	(0.0004)	*FEE* (*multiple-relationship*) (α_1)	−0.6438***	(0.1520)	$\alpha_1 = \alpha_2$	0.0000
$ln(\#\ OF\ ISSUES\ +1)$	0.0002***	(0.0001)	0.0002	(0.0002)	*FEE* (*single-relationship*) (α_2)	−4.7550***	(0.3662)	$\beta_1 = \beta_2$	0.7080
$ln(AMOUNT)$	−0.0007***	(0.0001)	0.0019***	(0.0003)	*LOAN* (*multiple-relationship*) (β_1)	1.6479***	(0.0641)	$\gamma_1 = \gamma_2$	0.0000
Aa dummy	−0.0129***	(0.0004)	0.0261***	(0.0013)	*LOAN* (*single-relationship*) (β_2)	1.5278***	(0.3142)		
A dummy	−0.0149***	(0.0004)	0.0241***	(0.0012)	Inclusive Value	0.2398*	(0.1230)		
Baa dummy	−0.0139***	(0.0004)	0.0349***	(0.0014)	$ln(MATURITY)$	−1.4832*	(0.8797)		
$LOAN*MULTIREL$ (γ_1)	−0.0045***	(0.0002)			$ln(\#\ OF\ ISSUES\ +1)$	0.2796***	(0.0591)		
$LOAN*SOLOREL$ (γ_2)	−0.0024***	(0.0007)			$ln(AMOUNT)$	−0.5338***	(0.0927)		
Constant	Yes		Yes		*INVGRADE*	0.1452	(0.2535)		
Year dummies	Yes		Yes		Year dummies	Yes			

Number of observations: 1,302.

Table 7
The effect of bank equity holdings on the firm's underwriter choice

This table presents estimation results of the augmented base model where firm-bank relationships are defined by a combination of (1) lending and (2) equity holding. Panel A presents estimates of the fee equations; Panel B presents estimates of the demand model. The dependent variables in Panel A are the underwriting fees (gross spread) charged by banks in the given issue. The variable $ln(MATURITY)$ is the natural log of the bond maturity in years, $ln(\#\ OF\ ISSUE\ +1)$ is the natural log of the number of previous bond issues plus one, and $ln(AMOUNT)$ is the natural log of size of the issue in ¥ billions. The variables *Aa* dummy–*Baa* dummy are credit rating dummies based on the average of all credit ratings for a given bond issue. The dummy variable $LOAN_{ij}$ *only* equals one if $bank_j$ was the top lender for $firm_i$ among banks in any annual period during 1982–1992 *and* it held no equity, and zero otherwise. The dummy $LOAN\ and\ EQUITY_{ij}$ equals one if $bank_j$ was the top lender for $firm_i$ among banks in any annual period during 1982–1992 *and* it was among the top three bank shareholders, and zero otherwise. $EQUITY_{ij}$ *only* is similarly defined. Year dummies are dummies corresponding to the issue date. Point estimates for the constant term and year dummies are not reported, although they are included in the fee equations. The dependent variable in Panel B is a discrete variable corresponding to the choice of bank. Thus, it is a multinomial variable equaling j if the issuing firm chooses $bank_j$ ($j = 1$–12) for the lower-nest choice in Fig. 1, and a binary variable equaling one if the chosen bank is a commercial bank and zero otherwise for the upper-nest choice. The variable $UNDERWRITING\ FEE_{ij}$ is the gross spread charged by $bank_j$ in the given issue. $LOAN\ only_{ij}$, $LOAN\ and\ \ EQUITY_{ij}$, and $EQUITY_{ij}$ *only* are as defined above. Inclusive value $I_{i,m}$ measures the expected aggregate value of choosing subset m (e.g., commercial banks as a group) for $firm_i$. The dummy *INVGRADE* equals one if the issue's average rating is investment grade and zero otherwise. Point estimates for year dummies are not reported, although they are included in the demand estimation. The symbols ***, **, * indicate that the coefficient is statistically different from zero at the 1%, 5%, and 10% significance levels, respectively.

Panel A: *Fee Estimates*

Dependent variable: Underwriting fees

	Commercial bank		Investment bank	
Explanatory variables	Estimate	Std.err.	Estimate	Std.err.
$ln(MATURITY)$	0.0818***	(0.0001)	0.0607***	(0.0005)
$ln(\#\ OF\ ISSUES\ +1)$	0.0002***	(0.0001)	0.0004**	(0.0002)
$ln(AMOUNT)$	−0.0010***	(0.0001)	0.0014***	(0.0003)
Aa dummy	−0.0139***	(0.0004)	0.0265***	(0.0013)
A dummy	−0.0157***	(0.0004)	0.0241***	(0.0012)
Baa dummy	−0.0148***	(0.0004)	0.0348***	(0.0014)
LOAN only ($\gamma 1$)	−0.0013***	(0.0002)		
LOAN and EQUITY ($\gamma 2$)	−0.0001	(0.0002)		
EQUITY only ($\gamma 3$)	0.0029***	(0.0001)		
Constant	Yes		Yes	
Year dummies	Yes		Yes	

Panel B: *Demand Estimates*

Dependent variable: Choice of underwriting bank

Explanatory variables	Estimate	Std.err.
UNDERWRITING FEE	−84.5500***	(4.2746)
LOAN only ($\beta 1$)	1.3256***	(0.0818)
LOAN and EQUITY ($\beta 2$)	1.5620***	(0.0910)
EQUITY only ($\beta 3$)	−0.5963***	(0.1261)
Inclusive Value	0.2032***	(0.0360)
$ln(MATURITY)$	−1.6642*	(0.8762)
$ln(\#\ OF\ ISSUES\ +1)$	0.2816***	(0.0601)
$ln(AMOUNT)$	−0.5777***	(0.0932)
INVGRADE	0.1597	(0.2199)
Year dummies	Yes	

Panel C: *Test Statistics*

Ho:	*p*-value
$\beta 1 = \beta 2$	0.0361
$\beta 2 = \beta 3$	0.0000
$\beta 1 = \beta 3$	0.0000
$\gamma 1 = \gamma 2$	0.0000
$\gamma 2 = \gamma 3$	0.0000
$\gamma 1 = \gamma 3$	0.0000

Number of observations: 1,302.

firms. Consistent with this argument, one interpretation of the negative coefficient β for the equity-only relationship is as follows: if the bank is liquidating its financial claim, then its certification ability is likely to be impaired; if so, it is a less credible certifier in which case it makes sense for the firm to hire another underwriter.

In Panel A, the coefficient γ for equity-only relationships is significant and positive, whereas that for loan-only relationships is significant and more negative than that for loan-and-equity relationships. The differences between these coefficients are statistically significant. These results indicate that equity shareholding relationships are associated with higher fees.

To summarize, the fee effects of bank equity holdings are consistent with banks extracting rents from their client firms. This suggests a strong bargaining power of lender banks that also hold equity. On the other hand, the underwriter choice model result suggests that, at least when bank equity holdings are present together with lending, firms appear to derive a benefit from choosing commercial banks with both equity and loan relationships, even when taking into account the relative fee premiums.[28]

5.7. *Are bank relationships (economically) more important in Japan?*

The qualitative baseline results reported in Table 2 mirror the U.S. evidence reported in Yasuda (2005). That is, bank relationships have positive effects on the firm's underwriter choice and negative effects on the fees the firm is charged. While the effects are statistically significant in both countries, are there economically significant differences between them? In this section, I attempt to compare the economic significance of the results in the two countries.

Table 8 presents a comparison of the baseline results reported in Table 2 above for Japan and those reported in Table II of Yasuda (2005) for the U.S.

To gauge the economic significance of the loan coefficients in the fee equations, I divide the absolute value of the coefficients γ by σ, the sample standard deviation of fees. The results indicate that the fee discounts for relationships are modest (approximately 10% of the standard deviation in fees) and are of similar magnitude in the two countries.

To assess the relative economic significance of the loan coefficients in the underwriter choice equations, I first divide the absolute values of the loan coefficients β by the fee coefficients α. Note that the loan coefficient is an indicator variable that takes the value of one if the firm has a relationship with a given bank, and zero otherwise. Since the fee is measured in percentage points, $|\frac{\beta}{\alpha}| = 1$ implies that a 1% reduction in fees is required for a bank with no loan relationships to achieve the same choice probability as a bank with loan relationships, all else equal. As before, I further divide this measure by σ, the standard deviation of fees. The results indicate that the magnitude of the effects of relationships on the firm's underwriter choice is greater in Japan than in the U.S., with a ratio of 3.87 for Japan and 1.37 for the U.S. A plausible interpretation is that on average a bank relationship is more valuable in Japan than in the U.S. and that this induces Japanese firms to hire their banks as underwriters. I further explore this hypothesis in the next subsection.

[28]In a related study, Morck, Nakamura, and Shivdasani (2000) also find a positive relation between bank ownership and firms' interest costs. See also Morck, Shleifer, and Vishny (1998). Clearly this is a rich topic for further research.

Table 8
Economic significance comparison of baseline results, Japan and U.S.

This table presents a comparison of the economic significance of baseline Japanese evidence reported in Table 2 with the U.S. evidence reported in Yasuda (2005). Panel A presents the Japanese evidence; Panel B presents the U.S. evidence.

	Panel A (Japan)	Panel B (US *)
Fee estimates		
LOAN (γ)	−0.0081	−0.083
Demand estimates		
FEES (α)	−5.6874	−0.6441
LOAN (β)	1.5265	0.7975
Standard deviation in fees (σ)	0.07	0.91
Economic significance of estimates		
($\lvert\gamma\rvert/\sigma$)	0.12	0.09
($\lvert\beta/\alpha\rvert/\sigma$)	3.87	1.37

* Source: Yasuda (2005, Table II).

5.8. Do existing relationships discourage switching?

As discussed earlier, this paper mainly focuses on how a given bank relationship affects the likelihood that a particular bank will be chosen. As an extension, I also examine whether the presence of bank relationships affects the relative likelihood that other banks will be chosen. That is, does the existing practice of the Japanese main bank system affect bank competition in the post-deregulation bond underwriting market, or does the deregulation erase all traces of the old institutional practice in the emerging competitive landscape? To address this question, I report the results using Japanese and U.S. data side by side.

Table 9 reports the sample breakdown of the firm's choice between commercial banks and investment banks conditional on (i) whether there are any prior relationships with commercial banks and (ii) whether the relationship commercial bank is chosen. Panel A reports the sample breakdown for the Japanese data, Panel B reports a similar sample breakdown for the U.S. data, and Panel C reports a similar sample breakdown for the U.S. data but conditioning on (i) whether there are any prior relationships with investment banks and (ii) whether the relationship investment bank is chosen. Note that Japanese investment banks are not active in the corporate lending market.

Note that in both Panel A and Panel B, the existence of a prior lending relationship with a commercial bank appears to reduce the probability that a firm will choose a new commercial bank underwriter (relative to the case in which there are no prior relationships). In contrast, there appears to be no such pattern in the data in Panel C, where the choice probability (between commercial banks and investment banks) is conditioned on the existence of prior lending relationships between investment banks and firms.

To examine this further, I estimate a probit model where the sample is chosen to consist of (1) issues such that firms have no prior lending relationships and (2) issues such that

Table 9
Do existing lending relationships discourage switching? (1): Sample statistics

This table presents sample statistics on switching behavior by firms. Panel A presents the Japanese sample statistics; Panels B and C present the U.S. sample statistics for switching to a new commercial bank and investment bank, respectively. NOB indicates the number of observations. Note that there are no investment bank loans in the Japanese data.

Panel A: *Japan* (*Switching to a new CB*)

Description	NOB	(%)
There is at least 1 CB loan but a CB other than the bank with the loan is chosen	132	10
There is at least 1 CB loan and an IB is chosen	516	40
There are no CB loans and a CB is chosen	85	7
There are no CB loans and an IB is chosen	70	5
There is at least 1 CB loan and a CB with the loan is chosen	499	38
	1,302	100

Panel B: *U.S.* (*Switching to a new CB*)

Description	NOB	(%)
There is at least 1 CB loan but a CB other than the bank with the loan is chosen	20	1
There is at least 1 CB loan and an IB is chosen	267	17
There are no CB loans and a CB is chosen	166	11
There are no CB loans and an IB is chosen	1,045	68
There is at least 1 CB loan and a CB with the loan is chosen	37	2
	1,535	100

Panel C: *U.S.* (*Switching to a new IB*)

Description	NOB	(%)
There is at least 1 IB loan but an IB other than the bank with the loan is chosen	68	4
There is at least 1 IB loan and a CB is chosen	12	1
There are no IB loans and an IB is chosen	1,223	80
There are no IB loans and a CB is chosen	211	14
There is at least 1 IB loan and an IB with the loan is chosen	21	1
	1,535	100

firms have at least one lending relationship with a commercial bank but a bank other than the lender bank(s) is chosen. Specifically, I model the binary underwriter choice model (between commercial banks and investment banks) as follows:

$$V_{i,j} = \delta_j^{LMAT} ln(MATURITY)_i + \delta_j^{ISSUE} ln(NO.ISSUES + 1)_i + \delta_j^{LAMT} ln(AMOUNT)_i + \delta_j^{INVGRADE} INVGRADE_i + \delta_j^{YEAR} YEARS_i + \delta_j^{CBLOAN} CBLOAN_i + \varepsilon_{i,j}. \quad (6)$$

The explanatory variables $ln(MATURITY)_i \ldots YEARS_i$ are as defined before in the base model. The new variable of interest, $CBLOAN_i$, equals one if $firm_i$ has at least one lending relationship with a commercial bank, and zero otherwise.

The effects of lending relationships on switching are analyzed in prior studies.[29] Ljungqvist, Marston, and Wilhelm (2006) study the relative importance of bank relationships and analyst recommendations as determinants of the firm's underwriter choice using U.S. equity and bond underwriting data. In their study, the strength of a bank's relationship with a given firm is measured as the bank's share of the issuer's total past deals. They find that this coefficient is generally positive and significant for prior lending relationships. Since a strong relationship between firm X and bank A would, ceteris paribus, lower bank B's share of X's total past deals, the prediction consistent with the result of their study is that the coefficient on $CBLOAN_i$ is negative, that is, the existence of a lending relationship reduces a firm's switching probability.

Drucker and Puri (2005) study the effects of concurrent lending and underwriting on the firm's underwriter choice, the pricing of fees, and loan yields using post-deregulation U.S. data. In their study, they use a nested logit model similar to the main specification used in Yasuda (2005) to study the effects of prior bank relationships on the firm's switching choice and find that concurrent lending significantly decreases the firm's probability of switching to another underwriter. Their finding would also support a negative coefficient on $CBLOAN_i$. However, since both studies focus on the U.S. market, it remains an empirical question as to whether the result extends to countries other than the U.S., and, even more interestingly, whether the effect is stronger in bank-oriented economies such as Japan as compared to the U.S.

The estimation results are presented in Table 10. Panel A reports the estimates using the Japanese data. The coefficient δ_j^{CBLOAN} is negative and significant. This indicates that the presence of an existing lending relationship reduces the probability that a Japanese firm will choose a new commercial bank underwriter by 32%. The economic magnitude of this effect is quite large compared to the analogous estimate using the U.S. data, reported in Panels B and C. As shown in Panel B, the presence of lending relationships with commercial banks reduces the probability that a U.S. firm will choose a new commercial bank underwriter as well, but the economic magnitude is much smaller, at only 6%. In contrast, the coefficient δ_j^{IBLOAN} is not significantly different from zero in Panel C, where the probit model is estimated to measure the effect of relationships with investment banks on the firm's switching probability.[30] This indicates that the presence of lender relationships between investment banks and firms has no effect on the probability that a firm will choose a new investment bank underwriter. The results together provide evidence that there is something special about commercial bank relationships (as opposed to investment bank relationships) and that firms are discouraged from hiring new banks in the presence of existing relationships. Furthermore, this effect is more pronounced in Japan, where banking relationships are arguably more valuable to firms as sources of external financing than they are in the U.S.

[29] Krigman, Shaw, and Womack (2001) and Burch, Nanda, and Warther (2005), among others, also examine the effects of *underwriting* relationships on the switching behavior of firms.

[30] For this model, the sample consists of (i) issues such that firms have no prior lending relationships with investment banks and (2) issues such that firms have at least one lending relationship with an investment bank but a bank other than the relationship bank(s) is chosen.

Table 10
Do existing lending relationships discourage switching? (2): Estimation results

This table presents estimation results of the binary probit model for the firm's choice of underwriter bank in bond issues. The dependent variable is a binary variable equaling one if the chosen bank is a commercial bank, and zero otherwise. Panel A presents the results using the Japanese data, where the sample consists of (1) issues where firms had no prior lending relationships and (2) issues where firms had at least one lending relationship but a bank other than the lender bank(s) was chosen. Panel B presents the results using the U.S. data, where the sample consists of (1) issues where firms had no prior lending relationships with commercial banks and (2) issues where firms had at least one lending relationship with a commercial bank but a bank other than the lender bank(s) was chosen. Panel C presents the results using the U.S. data, where the sample consists of (1) issues where firms had no prior lending relationships with investment banks and (2) issues where firms had at least one lending relationship with an investment bank but a bank other than the lender bank(s) was chosen. The variable $ln(MATURITY)$ is the natural log of the bond maturity in years, $ln(\#\ OF\ ISSUE\ +1)$ is the natural log of the number of previous bond issues plus one, and $ln(AMOUNT)$ is the natural log of size of the issue in ¥ billions (for Panel A) or $ millions (Panel B and C). The variable *MTN dummy* equals one if the issue is under the medium-term notes program and zero otherwise. The dummy *INVGRADE* equals one if the issue's rating is investment grade and zero otherwise. $CBLOAN_i$ equals one if $firm_i$ has at least one lending relationship with a commercial bank, and zero otherwise. $IBLOAN_i$ equals one if $firm_i$ has at least one lending relationship with an investment bank, and zero otherwise. The symbols ***, **, * indicate that the coefficient is statistically different from zero at the 1%, 5%, and 10% significance levels, respectively.

Dependent variable: CB vs. IB choice of underwriter bank (binary)

Explanatory variables	*Panel A*: *Japan*		*Panel B*: *US* (*CB Loan*)		*Panel C*: *US* (*IB Loan*)	
	Estimate	Std.err.	Estimate	Std.err.	Estimate	Std.err.
$ln(MATURITY)$	−0.1724	(0.1244)	−0.1671**	(0.0705)	−0.1370**	(0.0649)
$ln(\#\ OF\ ISSUES\ +1)$	0.3227 ***	(0.0542)	−0.1608 ***	(0.0431)	−0.1651 ***	(0.0405)
MTN dummy			−0.2300	(0.1707)	−0.0308	(0.1531)
$ln(AMOUNT)$	−0.2897 ***	(0.0672)	−0.2825***	(0.0496)	−0.2596 ***	(0.0446)
INVGRADE	0.1062	(0.2450)	0.0296	(0.1083)	−0.0654	(0.1018)
CBLOAN	−1.1685 ***	(0.1333)	−0.3280 **	(0.1305)		
IBLOAN					0.1066	(0.1908)
Year dummies	Yes		Yes		Yes	
dP/dX for *LOAN*	−0.3153		−0.0611		0.0226	
Number of observations	803		1,498		1,514	

6. Conclusion

This paper empirically examines the determinants of the Japanese commercial banks' successful entry into the corporate bond underwriting market following deregulation in 1993. In comparison with the Japanese banks' phenomenal gain in market shares, the U.S. banks' success in their domestic market has been more muted. Thus, why were Japanese commercial banks such successful entrants into the underwriting business?

The literature suggests three explanations, related to bank relationships, fee discounts, and bank equity holdings. While the relative importance of these three determinants has significant policy implications, to the best of my knowledge this question has not been examined in the literature. I investigate a series of empirical questions using a rich sample of data on bank-firm relationships and the firm's choice of underwriting banks for bond issues. Using a framework that allows for the imputation of unobserved fees conditional

on the choice of underwriter, I directly model the firm's underwriter choice problem and measure the effect of relationships on the choice of underwriter, both when the relationship bank is chosen and when it is not. The methodology allows me to disentangle the effects of relationships on the underwriter choice and the effects of relationships on fees, thereby reconciling the discrepancies in the literature that examines the post-deregulation Japanese market. My main findings are as follows.

First, I find that lending relationships have significantly *positive* effects on a firm's underwriter choice, *over and above* their effects on fees. Moreover, this result is sharply stronger for lower-rated issuers and for top lenders. This indicates that firms derive a benefit from choosing banks with prior bank relationships, all else equal.

Second, I find that there is a significant fee discount in the presence of lending relationships between firms and commercial bank underwriters. When I examine whether the fee discount derives from bank competition, I find that significantly deeper fee discounts are offered to firms with multiple relationships than to single-relationship firms. This is consistent with the view that multiple banking relationships mitigate potential bank information monopolies.

Third, I find that bank equity holdings alone have significantly *negative* effects on a firm's underwriter choice, whereas equity holdings together with lending relationships have significantly more positive effects than lending relationships alone. These findings suggest a complementary relation between bank equity holdings and bank lending. One interpretation of this result is that equity holdings alone (without loans) indicate the past retirement of financial claims by banks using proceeds from prior issues, hurting their certification ability. As for the fee effects, equity holdings alone are associated with a *fee premium*, whereas lending relationships alone are associated with a *deeper fee discount* than lending relationships together with equity holdings. These results reflect strong bargaining power of lender banks that also hold equity.

Finally, comparing the economic significance of relationships and fee discounts in the Japanese market (reported in this paper) and the U.S. market (reported in Yasuda, 2005), I find evidence that the relative success of Japanese banks' entry into the underwriting business owes more to their bank relationships than to the fee discounts they give their client firms.

Building on the above finding, I examine whether the existence of prior relationships affects a firm's switching probability in the two markets. I find that the presence of existing lending relationships with commercial banks reduces a Japanese firm's switching probability by 32%, in contrast to only 6% for U.S. firms. These results indicate that, ceteris paribus, Japanese firms are more reluctant to hire a new commercial bank underwriter in the presence of lending relationships than U.S. firms. A plausible interpretation of this result is that on average a bank relationship is more valuable in Japan than in the U.S., making it more costly for a Japanese firm to hire a new commercial bank in the underwriting market. Alternatively, in Japan loyalty pays more: by continuing with the same bank underwriter, a Japanese firm enjoys greater benefits such as lower fees in future transactions, greater access to capital, or a more cooperative creditor in the event of financial distress. Clearly, a better understanding of the nature of these benefits is needed, and is an interesting subject for further research.

The evidence presented in this paper shows that bank relationships are very important in shaping bank competition in the corporate bond underwriting market in Japan. Firms derive a benefit from choosing a bank with prior bank relationships, over and above their

effects on fees. This explains the successful entry of commercial banks into this market, since they had relationships with many of the issuing firms in the lending market. While another benefit of continuing with the same bank underwriter is a fee discount, the underwriter choice model shows that the benefit goes beyond the fee discount. Indeed, this benefit is not uniformly distributed among the firms, but rather is positively related to the information sensitivity of the issuing firm. In addition, not all relationships are beneficial: firms value more highly those relationships in which banks play a pivotal informational role.

Finally, commercial banks do not have a generic advantage over investment banks. Rather, these firms appear to carefully maintain a few key bank relationships, and their exclusiveness persists in the new market when the scope of the existing relationships widens. Thus, far from concluding that deregulation has erased all traces of the decades-old relationships between banks and firms, these results indicate that bank relationships continue to affect firms' and banks' choices in the post-deregulation intermediation process. Importantly, the results reported in this paper also suggest that the differences between Japan and the U.S. derive mainly from differences in the value placed on relationships in the two countries rather than from differences in the fee discounts offered to firms.

Appendix

In the expectation–maximization (EM) Algorithm framework, the observed data are viewed as being "incomplete" and are augmented by unobserved data to make up the "complete" data. Each EM iteration involves an E-step, where the conditional expectation of the complete-data log likelihood given the observed data is computed using the previous estimates $\theta_{(0)}$, and an M-step, where the conditional expectation is maximized over θ. This procedure is repeated iteratively until convergence is achieved.

Let c_i represent the index of the bank chosen by firm i. Further, let $\theta = \{\alpha, \beta, \gamma, \sigma\}$, let z represent the explanatory variables entering the fee equations, let $p_{i,j}$ represent the underwriting fees, and let $x_{i,j}$ represent the relationship variables.

We observe c_i and p_{i,c_i}, as well as $x_{i,j}$ and z_i. The task is to estimate θ according to the maximum likelihood principle. I do so using an EM-type algorithm, assuming that p_{-c_i} is the "hidden" data and hence that $\{c_i, p_{c_i}, p_{-c_i}\}$ is the complete data. Thus, I need to establish $\Pr(c_i, p_{c_i}, p_{-c_i}|\theta)$,

$$\Pr(c, p_c, p_{-c}|\theta) = \Pr(c|p_c, p_{-c}, \theta)\Pr(p_c, p_{-c}|\theta),$$

by Bayes's rule. According to the logit demand model,

$$\Pr(c|p_c, p_{-c}, \theta) = \frac{e^{\alpha p_c + \beta x_c}}{\sum_{k=1}^{K} e^{\alpha p_k + \beta x_k}}.$$

In addition, according to the independently and identically distributed normal distribution of u_k, we know that each $p_k \sim \mathrm{N}(z^T\gamma_k, \sigma^2)$ independently. Hence,

$$\Pr(p_c, p_{-c}|\theta) = \prod_{k=1}^{K} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{1}{2\sigma^2}(p_k - z^T\gamma_k)^2}.$$

It therefore follows that the log likelihood of the complete data (of a single firm) is given as

$$\ln \Pr(c, p_c, p_{-c}|\theta) = -\frac{1}{2\sigma^2}\sum_{k=1}^{K}(p_k - z^T\gamma_k)^2 - \frac{K}{2}\ln 2\pi\sigma^2 + \ln\frac{e^{\alpha p_c+\beta x_c}}{\sum_{k=1}^{K} e^{\alpha p_k+\beta x_k}}.$$

In order to implement the E-step, I compute

$$\begin{aligned}
&E_{\theta^{(0)}}(\ln \Pr(c, p_c, p_{-c}|\theta) \mid c, p_c)\\
&\quad = \int \ln(\Pr(c, p_c, p_{-c}|\theta)) \Pr(p_{-c}|c, p_c, \theta^{(0)})\, \mathrm{d}p_{-c}\\
&\quad = \left(\int \frac{\prod_{k\neq c} e^{-\frac{1}{2\sigma^{2,(0)}}(p_k - z^T\gamma_k^{(0)})^2}}{e^{\alpha^{(0)}p_c+\beta^{(0)}x_c} + \sum_{k\neq c} e^{\alpha^{(0)}p_k+\beta^{(0)}x_k}}\, \mathrm{d}p_{-c}\right)^{-1}\\
&\qquad \times \int \ln(\Pr(c, p_c, p_{-c}|\theta)) \left(\frac{\prod_{k\neq c} e^{-\frac{1}{2\sigma^{2,(0)}}(p_k - z^T\gamma_k^{(0)})^2}}{e^{\alpha^{(0)}p_c+\beta^{(0)}x_c} + \sum_{k\neq c} e^{\alpha^{(0)}p_k+\beta^{(0)}x_k}}\right) \mathrm{d}p_{-c}.
\end{aligned}$$

Note that the first integral term is irrelevant in the M-step because it is a function only of the old parameters $\theta^{(0)}$ and therefore is invariant with respect to new θ. Thus, for the rest of this section I drop this term from the analysis. What remains inside the second integral term is the product of a log of complete-data likelihood (evaluated at the new θ) and the remaining part of the conditional probability $\Pr(p_{-c}|c, p_c, \theta^{(0)})$ which is to be evaluated at the old θ.

The resulting integrals are high-dimensional ($K = 15$) integrals over hybrid distributions consisting of normal and logit components. As such, they are computationally nontrivial. Neither numerical integration nor Monte Carlo EM (where the E-step is replaced by a Monte Carlo process) is trivial or immediately promising given the high dimensionality. Instead I use what is commonly referred to as an "EM-type algorithm," where the single most likely value p_{-c} that maximizes the conditional density above (i.e., only $\Pr(c, p_c, p_{-c}|\theta^{(0)})$) is computed and a probability of one is placed on these data. In terms of the underlying economic problem, this part can be described as adjusted fee imputation, where, instead of using unconditionally imputed fees for unobserved fees, I replace them with fees that are adjusted to maximize the joint likelihood $\Pr(c_i, p_c, p_{-c})$, using estimates of θ from the previous iteration.

To monitor convergence, we need to evaluate the observed data likelihood function $L(\theta^{(k)})$ in each (kth) iteration. In my model the incomplete data likelihood function is expressed as

$$\begin{aligned}
\Pr(c, p_c|\theta) &= \int \Pr(c, p_c, p_{-c}|\theta)\, \mathrm{d}p_{-c}\\
&= \int \prod_{k=1}^{K} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{1}{2\sigma^2}(p_k - z^T\gamma_k)^2} \left(\frac{e^{\alpha p_c+\beta x_c}}{\sum_{k=1}^{K} e^{\alpha p_k+\beta x_k}}\right) \mathrm{d}p_{-c}.
\end{aligned}$$

As discussed above, these integrals are computationally challenging. Laplace's method provides a useful way of approximating integrals that take the form

$$I(\lambda) = \int_D e^{-\lambda g(x)} f(x)\,\mathrm{d}x,$$

where λ is a large parameter (see Judd, 1996, pp. 545–547). I apply this approximation method to evaluate the observed data likelihood function.

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