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Bank entry, competition, and the market for corporate securities underwriting☆

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Abstract

This paper examines the competitive effects of commercial bank entry into the corporate debt underwriting market, particularly with respect to underwriter spreads, ex-ante yields, and market concentration. We find that underwriter spreads and ex-ante yields have declined significantly with bank entry, consistent with the market becoming more competitive. This effect is strongest among the lower-rated and smaller debt issues of which banks have underwritten a relatively greater share. The early evidence also indicates that bank entry has tended to decrease market concentration. Overall, our results suggest that bank entry has had a pro-competitive effect. © 1999 Elsevier Science S.A. All rights reserved.

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1. Introduction

The corporate bond market is a major source of financing for companies. During 1996–1997, more than $1970 billion was raised by way of public debt, generating underwriting fees of $4.6 billion. Despite the size and importance of the corporate bond market, the competitive structure of this market has been inadequately investigated.[1] Perhaps one reason for the paucity of studies on the competitive structure of the corporate debt underwriting market is the fact that for many years the investment banking industry has been protected by the 1933 Glass–Steagall Act (and in particular Section 20 of the Act) which for all intents and purposes prevents commercial banks from underwriting corporate bonds and equities.

Although Glass–Steagall remains on the books, regulators have reinterpreted Section 20 of the Act to allow banks to expand their underwriting activities. Specifically, in 1987, the Federal Reserve permitted banks, on a case-by-case basis, to establish special Section 20 investment banking subsidiaries engaged in certain "ineligible" securities activities. Section 20 subsidiaries (referred to as *banks* in this paper) are subject to a substantial set of *firewalls* limiting information, resource, and financial linkages between them and their respective parent holding companies as well as with their commercial banking affiliates. They are also subject to a limit (or cap) on revenue generation from their "ineligible" securities activities.

At the end of 1996, however, the Federal Reserve raised the limit on revenue generation from "ineligible" securities activities of commercial bank holding companies from 10% to 25% of total Section 20 revenues (it had initially been set at 5% in 1987); it also dropped some of the most restrictive firewalls. These relaxations made it feasible for banks to acquire investment banking firms, a phenomenon which we have witnessed from 1997 onwards. It seems likely that banks will be allowed to expand their securities underwriting activities even further in the future, raising questions regarding the public benefits and costs of relaxing the Glass–Steagall provisions (and other regulations limiting the ability of U.S. banking organizations to expand their nonbank activities).

This paper contributes to the debate by examining the competitive effect of commercial bank entry into the market for corporate debt underwriting. We take advantage of the unique conditions created by deregulation to evaluate the

[1] Indeed, one has to go back to the 1970s and early 1980s to find relevant research on this issue. For example, Ederington (1976) finds that, in general, competitive bidding by securities firms to underwrite a particular issue results in lower underwriting costs for the issuer than when a single underwriter is chosen under a negotiated underwriting. Similarly, Sorensen (1979) finds that the larger the number of bidders in a competitive underwriting, the smaller the underwriter spread, the interest cost, and the yield of the issue.

net benefits of Section 20 subsidiaries' entry into investment banking. Specifically, our paper addresses the following issues: (i) the effect of bank entry on corporate debt underwriting spreads and ex-ante yield spreads, (ii) which segments of the market these effects are most pronounced, (iii) the extent to which commercial bank and investment house corporate debt underwriting spreads differ, and (iv) the effect of commercial bank entry on concentration in the market for corporate debt underwriting. To the best of our knowledge, ours is the first paper to address these issues.

Underwriter spread is defined as the difference between the offered amount and the proceeds to the issuer, expressed as a percentage of the offered amount. A recent article in the *Economist* (June 27, 1998, pp. 73–74) argues that equity underwriting spreads in the U.K. and the U.S. have not budged for a decade and claims that underwriting spreads are "excessive". This raises the question of how these spreads are determined. In general, underwriter spreads are determined by two major factors. The first factor relates to distribution costs, information production costs, and other costs including compensation for the risk carried in underwriting a security issue. The second factor is the competitive element in the market, i.e., whether markets are fully competitive or whether there are some "monopoly" rents to underwriters. On the one hand, bank entry can make markets more competitive, leading to reduced underwriter spreads. On the other hand, large, well-capitalized banks could monopolize the debt underwriting market, especially in the long run, leading to increased underwriter spreads. This is the subject of our first test. We find that bank entry has significantly reduced underwriter spreads in the corporate debt market. This finding could, however, arise from changes in debt issue characteristics over the pre- and post-Section 20 periods. We control for issue characteristics and find our results are robust to such changes.

Further, we find that the reduction in underwriter spreads is strongest among lower-rated and smaller debt issues, with banks underwriting a relatively larger proportion of such issues. To further ensure that other factors are not contributing to these declines in underwriter spreads, such as greater ease of distribution, lower information production costs, etc., we compare and contrast the trends in the corporate bond market, where banks now have a significant market share, to that in equity markets, where banks have not yet made major inroads. We examine the trends in both the initial public offerings (IPOs) of equities and the seasoned equity offerings (SEOs) markets. Interestingly, we find that while Section 20 deregulation appears to have resulted in a significant decline in underwriting spreads in the corporate bond market, similar declines are not apparent in equity markets.

A related issue is the impact of bank entry on ex-ante yield spreads of corporate bond issues, where, ex-ante yield spread is defined as the ex-ante yield of a debt security minus the ex-ante yield of a U.S. Treasury security of comparable maturity. While underwriter spreads have decreased, underwriters

might have sought to offset this effect on their expected profits by raising yields (and lowering the prices paid to the issuer) at the time of a firm-commitment offering. Lowering the bid (and offer) price lowers the proceeds to the issuer, but increases the probability that the underwriter will sell out an issue, albeit at a lower spread. This issue is also important from another perspective. Banks differ from investment houses in that they can obtain private information about a firm through their loan monitoring activities. If banks are more credible certifiers than investment houses, e.g., because of better information at their disposal, then bank-underwritten securities will have better prices (lower yields) than will securities underwritten by investment houses, as long as bank entry does not increase the degree of market concentration and banks' power over issuers. Bank entry can therefore force investment houses to expend more resources and produce more information about issuing firms. An important reason for better prices (and lower yields) for the market as a whole is the improved information flow. We test whether bank entry affects ex-ante yield spreads of corporate bond issues. We find that ex-ante yield spreads have declined (rather than increased) with bank entry, and this decline is most apparent in the smaller issues.

There is also the question of whether banks and investment houses have similar or different underwriter spreads at any moment in time. For example, banks might charge lower spreads to obtain market share on entry. Alternatively, if banks can secure better prices for firms through their underwriting activities, these benefits can be offset through higher underwriter spreads. We test if banks and investment houses have had significantly different underwriting spreads post-bank entry and find no significant differences in spreads. This evidence suggests that any differences in underwriter spreads on bank versus investment house underwritings (due to banks undercutting investment houses' spreads) have not persisted over time, perhaps due to investment houses' matching bank spreads on an immediate basis.

Finally, there is the question of the impact of bank entry on the competitive structure of the market, particularly on market concentration. Opponents of universal banking have argued that banks, with their superior information about firms, will monopolize the market (e.g., Benston, 1994). We find that bank entry into the corporate debt underwriting market has lowered market concentration. However, we must be cautious in interpreting this result since it is somewhat early to assess the long-term impact of bank underwriting on market concentration. Our sample ends in 1996, prior to the relaxation of the revenue cap (from 10% to 25%) which made it feasible for banks to acquire investment banks since 1997. Whether bank entry will have an anticompetitive long-term effect, pushing traditional investment banking firms out of the market, poses an interesting issue for future research.

Overall, our results suggest that bank entry into the corporate debt underwriting market has had a pro-competitive effect in reducing underwriter spreads,

yield spreads, and market concentration. The reduction in underwriter spreads and yield spreads has been greatest in the smaller and lower-rated issues, where bank underwritings have been most concentrated. This evidence tends to refute the contention that bank entry into the market for underwriting of corporate securities would result in banks monopolizing the market, adversely affecting the availability of finance to smaller and lower-rated firms.

The remainder of the paper is organized as follows. Section 2 describes the regulatory changes that allowed bank entry into the corporate securities underwriting market. We describe the data and our sample selection process in Section 3. Section 4 develops the testable hypotheses. Section 5 explains the test methodology and presents the major empirical results. Section 6 concludes.

2. Regulatory changes and bank entry into the corporate securities underwriting market

The Glass–Steagall Act of 1933, particularly Section 20 of the Act, effectively prohibits commercial banks from underwriting corporate securities. There have been many attempts to get Congress to amend or remove the Act. However, these attempts have, by and large, been unsuccessful. While the Glass–Steagall Act remains on the books, regulators and banks have effectively bypassed many provisions of the Act by reinterpreting Section 20 of the Act. In 1987, the Federal Reserve permitted banks to set up special Section 20 investment banking subsidiaries. Not all banks can establish Section 20 affiliates, and special permission must be received from the Federal Reserve. These Section 20 subsidiaries are allowed to engage in certain "ineligible" securities activities. In 1987, the Federal Reserve gave the first permission to a bank to underwrite commercial paper, municipal revenue bonds, and securitization issues. In 1989, corporate bond underwriting was permitted for the first time as was corporate equity underwriting in 1990.

The Federal Reserve initially posted a gross revenue cap of 5% on the ineligible securities activities. The spirit of a revenue cap is to avoid violation of the Section 20 of the Act. By keeping the revenue cap below 50%, a majority of the subsidiaries' revenues are generated from eligible securities activities such as government bond underwriting, swaps origination, etc. The gross revenue cap limit was subsequently raised to 10% and then to 25% at the end of 1996.

The number of Section 20 affiliates has expanded from five in the late 1980s to over 40 today, representing the largest U.S. and international banks. Table 1 gives a list of Section 20 subsidiaries and their related debt and equity underwriting powers. Until recently, these Section 20 subsidiaries, and their bank holding company parents, were subject to a substantial set of firewalls limiting information, resource, and financial linkages between the subsidiaries and their

Table 1
Section 20 subsidiaries[a] (as of May 31, 1997)

This table presents the Section 20 subsidiaries as of May 31, 1997.

	Initial order
Boston District	
Fleet Financial Group	10/88
Bank of Boston Corporation[b]	11/96
New York District	
Banco Santander, S.A.[b]	3/95
The Bank of New York Company, Inc.[b]	6/96
The Bank of Nova Scotia[b]	4/90
Bankers Trust N.Y. Corp.[b]	4/87
Barclays Bank PLC[c]	1/90
Canadian Imperial Bank of Commerce[b]	1/90
Chase Manhattan Corp.[b]	5/87
Citicorp[b]	4/87
Deutsche Bank AG[b]	12/92
Dresdner Bank AG[b]	7/96
HSBC Holdings PLC[b]	2/96
J.P. Morgan & Co.[b]	4/87
National Westminster Bank Plc	9/96
The Royal Bank of Canada[b]	1/90
Saban/Republic New York Corp.[b]	1/94
Swiss Bank Corporation[b]	12/94
The Toronto-Dominion Bank[b]	5/90
Philadelphia District	
Dauphin Deposit Corp.[b,d]	6/91
Cleveland District	
Banc One Corp.[b]	7/90
Huntington Bancshares, Inc.	12/92
KeyCorp	2/96
Mellon Bank Corporation	4/95
National City Corporation[b]	2/94
PNC Bank Corp.	7/87
Richmond District	
Crestar Financial Corporation	4/97
First Union Corp.[b]	8/89
NationsBank Corp.[b]	5/89
Atlanta District	
Barnett Banks, Inc.[e]	1/89
SouthTrust Corp.[b]	7/89
SunTrust Banks, Inc.	8/94
Synovus Financial Corp.	9/91

Table 1 (*continued*)

	Initial order
Chicago District	
ABN AMRO Bank N.V.[b]	6/90
The Bank of Montreal[b,f]	5/88
First of America Bank Corp.[c]	10/94
First Chicago NBD Corp.[c]	8/88
Minneapolis District	
Norwest Corp.[b]	12/89
Kansas City District	
BOK Financial Corporation	4/97
San Francisco District	
Bank America Corp.[b]	3/92
Dai-Ichi Kangyo Bank Ltd.	1/91
The Sanwa Bank, Ltd.	5/90

[a]Authorized to underwrite and deal in certain municipal revenue bonds, mortgage related securities, commercial paper and asset-backed securities (Tier I authority).

[b]Also has corporate debt and equity underwriting and dealing powers (Tier II authority).

[c]Also has corporate debt securities powers.

[d]By Order dated May 19, 1997, the Board approved the applications and notices submitted by Allied Irish Banks plc and First Maryland Bancorp to acquire Dauphin Deposit Corporation, and thereby all of its banking and nonbanking subsidiaries.

[e]As of June 30, 1995, the Section 20 subsidiary of this organization was dormant.

[f]Currently has two Section 20 subsidiaries.

Source: Board of Governors of the Federal Reserve System, Washington, D.C.

respective parent holding companies as well as with their commercial banking affiliates. GAO (1990) provides a complete discussion of the scope and limitations of firewalls on activities of Section 20 subsidiaries. The Federal Reserve has dropped some of the most restrictive firewalls (*Wall Street Journal*, August 1, 1996, p. A2), and all indications point to the likelihood of further relaxations, allowing banks to expand their securities underwriting activities in the future.

Table 2 shows the percent of dollar volume and percent of issues underwritten by Section 20 subsidiaries of commercial bank holding companies on a year-by-year basis. The proportion of corporate debt issues underwritten has risen to over 20% (as of 1996) while the proportion of corporate equity has risen to approximately 2%. Thus, given their traditional role as credit or loan monitors and certification agents (e.g., James, 1987; Puri, 1996) the Section 20 subsidiaries of commercial banks have largely specialized in competing with traditional investment banks in the market for underwriting corporate debt issues. To

Table 2
Market share of bank underwritings

This table presents the bank share (in percentage terms) of the annual dollar volume and number of issues of corporate debt underwritings in the following segments: (1) nonfinancial and nonregulated fixed-rate U.S. debt issues and (2) nonfinancial and nonregulated U.S. equity issues.

Year	Debt		Equity	
	$ Volume	# Issues	$ Volume	# Issues
1985	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00
1991	4.40	5.78	0.00	0.00
1992	6.44	8.47	0.37	0.14
1993	6.76	9.41	1.13	0.44
1994	7.29	8.65	1.32	0.58
1995	10.15	21.13	1.18	0.96
1996	16.28	20.42	2.15	1.88
Overall	5.36	7.25	0.93	0.51

date, commercial banks have made little inroads into the equity underwriting market.

3. Data and sample selection

We employed the following criteria in the selection of the sample period. First, the sample period must include underwritings of corporate securities in a time prior to bank entry. Second, to ensure that the test results of the competitive effect of commercial bank entry are representative, the sample must have a nontrivial number of issues underwritten by banks. Third, in devising econometric tests examining the effect of bank entry on underwriter spreads and yield spreads, it is necessary to control for other factors such as the issuer's credit rating, size of the issue, industry, and maturity. Data on these variables must also be available for the entire sample period.

Based on these considerations, we define our sample period as the 12 years from January 1, 1985 to December 31, 1996. Thus, our sample period ends just prior to the Fed's raising of the Section 20 revenue cap from 10% to 25% and the concurrent lowering of firewalls. We exclude financial firms (one-digit SIC

code 6) and firms in regulated industries (one-digit SIC code 4) from our study. The absence of regulation contrasts firms in nonregulated industries from those in regulated industries, and many regulated firms, such as public utilities, have historically relied on negotiated rather than competitive underwritings. Additionally, we focus on U.S. fixed-rate nonconvertible debt. Our sample consists of 2992 fixed-rate U.S. nonconvertible debt issues for which all the required data was available, e.g., no missing information on gross spread, issue size, credit rating, maturity, etc. Approximately 7% of the debt issues in our sample are underwritten by Section 20 subsidiaries.

We obtain information about these issues, such as date of issuance, the yield to maturity, credit rating, industry, the size of the issue, the maturity of the debt, etc., from the Securities Data Company, Inc. (SDC). The sample is constructed from the U.S. domestic public new-issues database of SDC. The SDC database is compiled from regulatory filings, news sources, company press releases, and prospectuses.

3.1. Variables

The principal dependent variable is GROSS SPREAD, the underwriting spread of a debt issue measured as the difference between the offered amount and the proceeds to the issuer, expressed as a percentage of the offered amount (issue size). The other dependent variable is YIELD SPREAD, the ex-ante yield of the debt security minus the ex-ante yield of a U.S. Treasury security of comparable maturity. The independent variables are as follows:

BANK ENTRY: A dummy variable that equals one in 1989 and succeeding years (based on the year of the debt issue) and zero otherwise.

LN(MKT SHARE): The natural log of bank share (in percentage terms) of the annual dollar volume of corporate debt underwritings.

TIME: This variable is based on the year of the debt issue. For example, if the issue date is September 12, 1986, TIME takes the value 86.

LN(AMOUNT): The natural log of the size of the issue (in millions of dollars).

NEW ISSUE: A dummy variable that is one if the issue is a first-time issue by the firm (a debt IPO). If the company did not have a debt issue during the 15 years prior to the sample period, the issue is assumed to be a first-time issue.

INDUSTRY: Stands for a set of industry dummy variables based on one-digit primary SIC codes. For example, if the primary SIC code is 861, the one-digit primary SIC code is 8. The corresponding dummy variable is one and all other industry dummy variables are zero.

INVGRADE: A dummy variable that is one if the debt issue is an investment grade issue, i.e., has a Moody's debt rating in the range Baa1–Aaa.

CREDIT RATING: Stands for a set of seven credit rating dummy variables (Caa–C, B1–B3, Ba1–Ba3, Baa1–Baa3, A1–A3, Aa1–Aa3, Aaa) based on Moody's credit rating for the debt issue. For example, B1–B3 is a dummy

variable which is one if Moody's credit rating for the issue is B1, B2, or B3. The dummy variable is zero otherwise.
MATURITY: Stands for three dummy variables based on the maturity of the debt security. LOWMAT is one if the security matures in less than five years. MEDMAT is one if it matures in five to 15 years. HIMAT is one if the maturity is greater than 15 years. The dummy variables are zero otherwise.

3.2. Discussion of variables

The relevant competitive variable is BANK ENTRY or, as we discuss below, LN(MKT SHARE). Because 1989 marks the year in which the first approval was given to a bank (J.P. Morgan) to undertake corporate debt underwriting activities through its Section 20 subsidiary, BANK ENTRY has a value of one in 1989 and succeeding years and zero otherwise. The credit rating of a debt issue reflects the greater cost and difficulty underwriters have in placing non-investment-grade issues (e.g., Sorensen, 1979). Thus, the lower the credit rating, the larger should be the underwriter spread. Lower-credit rated issues should also have higher yield spreads over U.S. Treasury securities. The log of issue size is included to measure potential economies of scale to the underwriter in placing larger issues. That is, the larger the issue size, the smaller should be the underwriter spread. In addition, as larger offerings are likely to be associated with less uncertainty than smaller offerings, be more liquid, and have more public information associated with them, one would also expect larger issues to have lower yields. A new (debt IPO) issue is potentially associated with greater uncertainty than a seasoned issue and should result in relatively higher underwriter spreads and yield spreads. Maturity is another variable potentially affecting underwriter spreads and yield spreads, which we address via two maturity dummies: LOWMAT (reflecting issues with less than five years to maturity) and HIMAT (reflecting issue with maturity of 15 years or over). We have three maturity dummies, but only two can be included to avoid linear dependence. We exclude the MEDMAT dummy in this regression (similarly, of the seven credit rating dummies, we exclude the Aaa dummy, and, of the eight industry dummies, we exclude the industry dummy variable corresponding to the one-digit SIC code 9 in all our linear regressions). Longer-maturity debt issues are potentially subject to greater interest-rate risk exposure over the offer period and can have a higher default risk (Flannery, 1986). This may be reflected in higher spreads being demanded by underwriters as well as investors on longer-maturity issues. Finally, the effect of bank entry on the underwriter spreads is measured by the magnitude and the significance of the coefficient on the BANK ENTRY or, alternatively, the LN(MKT SHARE) variable. In the absence of any effect of bank entry on underwriter spreads and yield spreads, this variable should be statistically insignificant.

4. Test hypotheses

In this section, we develop test hypotheses pertaining to the impact of bank entry into the corporate debt underwriting market on underwriter spreads, yield spreads, differences in underwriter spreads between banks and investment houses, and on market concentration.

4.1. Underwriter spreads

Given banks' entry and their substantial market share in the corporate debt market, bank competition, to the extent that such competition is material, should have a direct effect on the underwriter spreads. Specifically, the underwriter spread has two components. One component covers the marketing, distributional, financing, and other operating costs involved in a firm-commitment underwriting. The second component is a function of the competitive structure of the market. To the extent that the market for underwriting services is less than fully competitive, the underwriter spread could well reflect economic rents in addition to the distributional and other costs related to the issue.

We hypothesize that to the extent that competition, as a result of bank entry into the corporate debt underwriting market (in 1989) is material, underwriter spreads should have declined in the post-1989 period. We also hypothesize that this decline in spreads is positively related to the market share of the banks in the corporate debt underwriting market. In other words, the decline in underwriter spreads should be most significant in those segments of the corporate debt underwriting market in which banks have made the most significant strides in gaining market share.

4.2. Yield spreads

The ex-ante yield spread over a U.S. Treasury security of comparable maturity reflects the market's assessment of the risk of the security. If the underwriter produces accurate and credible information about a security, then for the same observable characteristics, investors will be willing to pay higher prices (earn lower yields) for the security. For firms to which banks lend, banks potentially have better information about the firm than investment houses because banks have access to private information obtained from the loan monitoring and customer relationship process. Prior empirical evidence by Gande et al. (1997) finds that corporate securities underwritten by Section 20 subsidiaries have lower yields (higher prices) than comparable securities underwritten by investment houses, and that this differential is higher for the non-investment-grade segment in which bank underwritings are concentrated. Puri (1996) finds similar evidence from pre-Glass–Steagall bank and investment house underwritings. A potential implication of this evidence is that the presence of banks can force

investment houses to expend more resources and produce better information about firms. Consequently, as long as bank entry is pro-competitive, the net result should be a decline in yield spreads for debt securities, post-bank entry, after taking credit ratings and other observables into account. Again, the decline in yield spreads should be most significant in those segments of the corporate debt market in which banks have made the most significant strides in gaining market share.

4.3. Differences in underwriter spreads between banks and investment houses

To obtain market share, banks may undercut investment houses' underwriting spreads and charge lower fees. Such undercutting of the market can help improve penetration in new markets and increase long-run market share and power. On the other hand, the theoretical literature (see Puri, 1999) suggests that if banks are able to secure better prices for underwritten securities, then banks might try to extract rents from firms and charge higher underwriter spreads. Given that prior empirical literature documents banks' success in getting lower yields (higher prices), particularly for some segments such as non-investment-grade firms (Gande et al., 1997; Puri, 1996), the question arises as to whether the gains to the firms from higher security prices at issuance are offset by higher underwriter spreads. An interesting and important question is whether commercial banks and investment houses differ significantly in the gross spread that they charge to firms at any moment in time.

4.4. Market concentration

Opponents of universal banking have long argued that banks, with prior access to superior information about the quality of issuing firms through their loan monitoring activities, will force specialized investment houses out of the market. However, it is possible that bank entry into corporate debt market has a pro-competitive effect. Accordingly, we hypothesize that bank entry into corporate debt markets reduces market concentration, especially in segments in which banks have made the most significant strides in gaining market share.

5. Methodology and results

Since our hypotheses relating to the effect of bank entry on underwriter spreads and yield spreads suggest that the effects will be more pronounced in those segments of the market in which banks have underwritten relatively more issues, we need to identify those segments. We find that banks are more likely than investment houses to underwrite smaller issues. For example, 21% (46 out of 217 cases) of bank underwritings in our sample are less than \$75 million in

size, whereas only 11% (301 out of 2775 cases) of investment house underwritings are less than $75 million in size. We also find evidence that banks bring a larger proportion of lower-rated (Caa–Ba3) issuers to the market than do investment houses (38% of issues as compared to 30%). Univariate chi-square tests confirm the significance of these differences, i.e., banks underwrite a relatively larger proportion of lower-rated issues and smaller issues than do investment houses. For example, banks underwrite 82 lower-rated issues, significantly more than the expected 62 issues (based on probabilities in a 2×2 χ^2 test of independence of underwriter type and credit rating). Similarly, banks underwrite 46 smaller issues, significantly more than the expected 25 issues (based on probabilities in a 2×2 χ^2 test of independence of underwriter type and issue size).

The probit results in Table 3 supplement the univariate chi-square tests. The dependent variable for the probit regression is BANK, a dummy variable that takes the value of one if the lead underwriter is a bank (Section 20 subsidiary) and zero otherwise (an investment house). The independent variables for the probit regression are as described earlier. The probit tests show that the

Table 3
Probit estimations – bank versus investment house underwritings

This table presents results of the probit regression. The dependent variable is a dummy variable, BANK, assigned the value one if the lead underwriter is a Section 20 subsidiary. The independent variables are: LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (debt IPO). INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. INVGRADE is a dummy variable if the debt issue is rated in the range Baa1–Aaa (i.e., investment-grade debt). MATURITY stands for dummy variables based on the maturity of the security. LOWMAT is one if the issue matures in less than five years, and HIMAT is one if the maturity is greater than 15 years. All dummy variables are zero otherwise. Pseudo R^2 is the likelihood ratio computed as $R^2 = 1 - \log L/\log L_0$ where $\log L$ is the maximized value of the log-likelihood function, $\log L_0$ is the log-likelihood computed only with a constant term. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test).

Variable	Coeff.	T ratio
INTERCEPT	0.31	0.75
INVGRADE	− 0.18	− 2.00[b]
LN(AMOUNT)	− 0.34	− 7.49[a]
LOWMAT	− 0.12	− 0.83
HIMAT	− 0.21	− 2.06[b]
NEW ISSUE	− 0.12	− 1.36
p-value	0.0000	
Observations	2992	
Pseudo R^2	0.0561	

probability that a bank is the underwriter varies inversely with both issue size (at the 1% level) and credit quality (at the 5% level). Overall, our univariate and probit results suggest that, to date, bank underwritings have been most concentrated in smaller and lower-rated issues.

5.1. Underwriter spreads

We examine the variable GROSS SPREAD, the underwriting spread of a debt issue measured as the difference between the offered amount and the proceeds to the issuer, expressed as a percentage of the offered amount [see Lee et al. (1996) for average underwriter spreads for debt and equity issues of U.S. corporations]. Preliminary evidence that commercial bank entry into the corporate bond underwriting market has reduced spreads can be seen from Table 4, which plots the trends in average underwriting spreads for investment and non-investment-grade securities over the sample period. Corporate debt underwriting spreads fall 25% from 2.99% to 2.24% for non-investment-grade debt and from 0.77% to 0.66% or 14% for investment-grade debt over the 12-year period.

Univariate tests for differences in underwriter spreads between the pre-1989 and post-1989 periods in corporate debt markets show that underwriter spreads have declined significantly from an average of 1.61% in the pre-1989 period to 1.19% in the post-1989 period. The decline in underwriter spreads is higher for non-investment-grade corporate debt securities, for which underwriter spreads were 3.28% in the pre-1989 period as compared to 2.47% in the post-1989 period. Both these declines are statistically significant at the 1% level.

We also run the following regression to examine the effect of bank entry on underwriter spreads:

$$\begin{aligned}\text{GROSS SPREAD} = {} & \beta_0 + \beta_{\text{cr}}\,\text{CREDIT RATING} \\ & + \beta_{\text{mat}}\,\text{MATURITY} + \beta_{\text{ind}}\,\text{INDUSTRY} \\ & + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} \\ & + \beta_3\,\text{BANK ENTRY}. \end{aligned} \tag{1}$$

The regression results are presented in Table 5. For the overall sample, the control variables have the expected signs, i.e., larger issues generally have lower underwriter spreads, new (debt IPO) issues have larger underwriter spreads, and longer-maturity issues have higher underwriter spreads. For our purposes, the important coefficient is that of the BANK ENTRY variable which is negative (-24 basis points) and statistically significant at the 1% level. As a measure of economic significance, the effect of the BANK ENTRY variable is three times that of the A1–A3 rating. The results are consistent with bank entry into corporate debt markets significantly reducing underwriter spreads.

Table 4
Average gross spread

This table presents the average gross spread, measured as a percentage of the issue size. Panel A classifies the sample of nonfinancial and nonregulated fixed-rate U.S. debt issues based on credit rating into two segments (Caa–Ba3, Baa1–Aaa). Panel B presents the average gross spread for nonfinancial nonregulated U.S. equity issues into two segments: initial public offerings (IPOs) and seasoned equity offerings (SEOs).

Panel A: Debt issues

Year	All issues		Caa–Ba3		Baa1–Aaa	
	# Issues	Spread (%)	# Issues	Spread (%)	# Issues	Spread (%)
1985	198	1.51	66	2.99	132	0.77
1986	348	1.62	114	3.34	234	0.78
1987	235	1.65	83	3.34	152	0.73
1988	183	1.64	65	3.37	118	0.68
1989	166	1.44	53	3.26	113	0.59
1990	103	0.67	3	2.38	100	0.62
1991	225	0.83	27	2.11	198	0.65
1992	354	1.25	130	2.31	224	0.63
1993	404	1.45	166	2.56	238	0.68
1994	208	1.44	88	2.63	120	0.56
1995	284	0.98	64	2.15	220	0.64
1996	284	1.08	76	2.24	208	0.66
Overall	2992	1.32	935	2.76	2057	0.67

Panel B: Equity issues

Year	All issues		IPOs		SEOs	
	# Issues	Spread (%)	# Issues	Spread (%)	# Issues	Spread (%)
1985	457	7.41	236	8.40	221	6.36
1986	721	7.32	453	8.29	268	5.69
1987	555	7.46	360	8.30	195	5.91
1988	227	7.52	143	8.37	84	6.08
1989	290	7.41	151	8.42	139	6.30
1990	260	7.07	131	8.11	129	6.00
1991	626	6.61	304	7.56	322	5.71
1992	702	6.88	387	7.60	315	6.00
1993	903	6.78	480	7.65	423	5.80
1994	692	6.97	423	7.85	269	5.58
1995	835	6.62	442	7.66	393	5.43
1996	1116	6.71	640	7.59	476	5.52
Overall	7384	6.96	4150	7.89	3234	5.78

Table 5
Multivariate regressions of gross spread of debt issues

This table gives the OLS estimates of the following equation:

$$\text{GROSS SPREAD} = \beta_0 + \beta_{cr}\,\text{CREDIT RATING} + \beta_{mat}\,\text{MATURITY} + \beta_{ind}\,\text{INDUSTRY} + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} + \beta_3\,\text{BANK ENTRY}.$$

The dependent variable GROSS SPREAD is the gross spread of a debt issue measured as a percentage of the issue size. The independent variables are: CREDIT RATING is a set of credit rating dummy variables. For example, B1–B3 is a dummy variable which is one if Moody's credit rating for the issue is B1, B2, or B3. MATURITY stands for dummy variables based on maturity of the security. LOWMAT is one if the issue matures in less than five years, and HIMAT is one if the maturity is greater than 15 years. INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (debt IPO). BANK ENTRY is a dummy variable which is one in 1989 and succeeding years (based on the year of the debt issue) and zero otherwise. All dummy variables are zero otherwise. The T ratios are adjusted for heteroskedasticity using White's (1980) variance–covariance matrix. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions. The sample is also classified into small (less than \$75 million) and others (not less than \$75 million) segments based on the issue size (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test).

Variable	All issues		Credit rating				Issue size			
	Coeff.	T ratio	Caa-Ba3		Baa1-Aaa		Small		Others	
			Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio
INTERCEPT	0.86	11.40[a]	2.83	13.92[a]	0.64	9.06[a]	1.54	5.63[a]	0.50	5.69[a]
Caa–C	2.52	21.28[a]	0.95	7.73[a]			2.59	13.68[a]	2.53	16.97[a]
B1–B3	2.37	59.30[a]	0.86	16.74[a]			2.33	13.11[a]	2.39	69.74[a]
Ba1–Ba3	1.40	24.03[a]					1.31	5.50[b]	1.44	25.50[a]
Baa1–Baa3	0.13	3.95[a]			0.11	3.76[a]	− 0.02	− 0.14	0.18	6.79[a]
A1–A3	0.08	2.35[b]			0.06	1.93[c]	− 0.04	− 0.20	0.11	4.47[a]
Aa1–Aa3	0.07	2.05[b]			0.06	1.97[b]	− 0.07	− 0.41	0.10	4.05[a]
LOWMAT	− 0.26	− 11.12[a]	− 0.48	− 1.43	− 0.26	− 17.68[a]	− 0.33	− 3.79[a]	− 0.23	− 11.78[a]
HIMAT	0.24	16.10[a]	− 0.07	− 0.50	0.24	21.54[a]	0.20	1.73[b]	0.23	19.58[a]
LN(AMOUNT)	− 0.04	− 3.50[a]	− 0.05	− 1.82[c]	− 0.03	− 2.34[b]	− 0.18	− 3.89[a]	0.01	0.88
NEW ISSUE	0.18	8.22[a]	0.32	7.62[a]	0.05	2.69[a]	0.22	2.50[b]	0.17	8.00[a]
BANK ENTRY	− 0.24	− 15.50[a]	− 0.58	− 15.49[a]	− 0.08	− 7.05[a]	− 0.40	− 4.97[a]	− 0.20	− 13.64[a]
Observations	2992		935		2057		347		2645	
Adjusted R^2	0.8782		0.5233		0.4237		0.8587		0.8886	

5.1.1. Trends in non-investment-grade and smaller issues

Table 5 also examines investment-grade and non-investment-grade issues separately to assess the impact of bank entry in these segments. For both the investment-grade and non-investment-grade issues, the coefficient on the BANK ENTRY variable is significantly negative, although its size (in absolute value) is much larger for the non-investment-grade issues (i.e., -0.58 versus -0.08). The difference is statistically significant at the 1% level.

Table 5 further divides the sample into small and other issues, with small issues consisting of those under \$75 million. From Table 5 it can be seen that the largest decline in underwriter spreads is for small issues (-0.40 versus -0.20). Again, this difference is statistically significant at the 1% level. The results of Table 5 support that bank entry into corporate debt markets has resulted in a reduction of underwriter spreads in those segments in which bank underwriting is most concentrated.

While the first bank permission to underwrite corporate debt was given in 1989, banks started to underwrite corporate debt only in 1991 (see Table 2). Hence one could argue that actual bank competition only started in 1991. To address this concern we rerun the regression in Table 5 with the BANK ENTRY variable defined as one in 1991 and succeeding years (based on the year of debt issue) and zero otherwise. The results are qualitatively unchanged.

We also use LN(MKT SHARE), the natural log of the market share of bank underwritings based on the annual dollar volume of corporate debt underwritings, as an alternative measure of the effect of bank entry on corporate debt underwriting. Additionally, we need to control for any time trend in the data. For example, information-gathering costs might have declined over time because of technology advances and greater access to public information. To control for any such time trends, we employ the TIME variable, which represents the year of the debt issue in question.

Specifically, we run the following regression:

$$\begin{aligned}\text{GROSS SPREAD} = {} & \beta_0 + \beta_{\text{cr}}\,\text{CREDIT RATING} \\ & + \beta_{\text{mat}}\,\text{MATURITY} + \beta_{\text{ind}}\,\text{INDUSTRY} \\ & + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} \\ & + \beta_3\text{TIME} + \beta_4\,\text{LN(MKT SHARE)}. \end{aligned} \tag{2}$$

The regression results are presented in Table 6. The coefficient on the LN(MKT SHARE) variable is negative and statistically significant at the 1% level. The (other) control variables also have the expected signs. In addition, the coefficient on LN(MKT SHARE) is significantly negative for non-investment-grade issues and larger (in absolute terms) than for the investment-grade issues (i.e., -0.38 versus 0.01), with the difference significant at the 1% level. Finally, the decline in underwriter spreads is larger for the smaller issues (i.e., -0.18

versus −0.12), with the difference significant at the 1% level. Overall, the results are qualitatively similar to the univariate results and the regression results in Table 5.

5.1.2. Robustness checks

We conducted the following robustness checks. First, the nominal issue size may have grown over time due to inflation. To account for this, we adjust the issue size for inflation using the average Consumer Price Index (CPI) for each year and run the regressions in this paper with LN(AMOUNT) measured in real terms. The results are qualitatively unchanged. Second, Table 4 of our paper suggests that proportionately more higher-rated bonds came to the market during 1990 and 1991, coinciding with the collapse of Drexel and the subsequent credit crunch. We examine whether the events in 1990–1991 explain the lowering of underwriter spreads in two ways. First, we augment our regression in Table 6 with a dummy variable, YRDUM9091, which takes a value of one if a debt security is issued in 1990 or 1991 and zero otherwise. The results are qualitatively similar. The YRDUM9091 variable is generally negative, although statistically significant only for small issues. Second, we run the regression in Table 6 after excluding debt issues underwritten during 1990 and 1991. Again, the results are qualitatively similar. Finally, it is possible that initial engagement discounting could lead to lower spreads when banks enter a market (James, 1992). That is, banks charge a lower spread the first time that they underwrite and then subsequently increase their spreads. We test for this by examining all issuers with multiple debt issues underwritten by the same bank. We found 25 such issuers. Clearly, the sample is small and hence the results must be interpreted with caution. The mean underwriter spread for initial issues is 0.83% as compared to 0.73% for subsequent issues, although this difference is not statistically significant at any meaningful level. Since new issues are likely to have larger spreads than seasoned issues, we remove all debt IPOs leaving 18 issuers with multiple seasoned debt issues underwritten by the same bank. The initial average underwriter spread for the seasoned debt issuers is 0.65% versus 0.59% for subsequent issues. Again, this difference is not statistically significant at any meaningful level.

5.1.3. Equity markets as a control group

We next compare and contrast the markets for equity underwritings, in which banks have not yet made major inroads, with the corporate debt markets. While the trends in Table 4 suggest that underwriter spreads in both the IPO and seasoned equity markets have declined significantly over time, similar to debt issues, it is important to control for changes in issue characteristics over time. Hence we run multivariate regressions for our control sample of 7384 non-regulated, nonfinancial equity issues during 1985–1996, similar to those run for debt. The dependent and independent variables in our regressions are defined

Table 6
Multivariate regressions of gross spread of debt issues

This table gives the OLS estimates of the following equation:

$$\text{GROSS SPREAD} = \beta_0 + \beta_{cr}\,\text{CREDIT RATING} + \beta_{mat}\,\text{MATURITY} + \beta_{ind}\,\text{INDUSTRY} + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} + \beta_3\,\text{TIME} + \beta_4\,\text{LN(MKT SHARE)}.$$

The dependent variable GROSS SPREAD is the gross spread of a debt issue measured as a percentage of the issue size. The independent variables are: CREDIT RATING is a set of credit rating dummy variables. For example, B1–B3 is a dummy variable which is one if Moody's credit rating for the issue is B1, B2, or B3. MATURITY stands for dummy variables based on maturity of the security. LOWMAT is one if the issue matures in less than five years, and HIMAT is one if the maturity is greater than 15 years. INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (debt IPO). TIME is based on the year of the debt issue, e.g., if the issue date is September 12, 1986, TIME takes the value 86. LN(MKT SHARE) is the natural log of the bank share (in percentage terms) of the annual dollar volume of corporate debt underwritings. All dummy variables are zero otherwise. The T ratios are adjusted for heteroskedasticity using White's (1980) variance–covariance matrix. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions. The sample is also classified into small (less than \$75 million) and others (not less than \$75 million) segments based on the issue size (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test).

Variable	All Issues		Credit rating				Issue size			
	Coeff.	T ratio	Caa–Ba3		Baa1–Aaa		Small		Others	
			Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio
INTERCEPT	0.83	1.62	−1.45	−0.98	1.74	4.39[a]	0.52	0.26	−0.13	−0.28
Caa-C	2.54	21.03[a]	0.95	7.47[a]			2.55	14.17[a]	2.55	16.83[a]
B1-B3	2.37	59.68[a]	0.81	15.92[a]			2.32	14.08[a]	2.38	69.80[a]
Ba1-Ba3	1.41	24.52[a]					1.30	5.79[a]	1.45	25.90[a]
Baa1-Baa3	0.13	3.95[a]			0.11	3.75[a]	−0.05	−0.33	0.18	6.66[a]
A1-A3	0.06	1.98[b]			0.05	1.86[c]	−0.09	−0.56	0.10	3.99[a]
Aa1-Aa3	0.05	1.56			0.05	1.82[c]	−0.13	−0.77	0.09	3.48[a]
LOWMAT	−0.28	−11.64[a]	−0.40	−1.26	−0.26	−17.66[a]	−0.33	−4.02[a]	−0.26	−12.04[a]
HIMAT	0.25	17.13[a]	−0.04	−0.30	0.24	21.81[a]	0.25	2.15[b]	0.25	20.48[a]
LN(AMOUNT)	−0.05	−4.22[a]	−0.07	−2.49[b]	−0.03	−2.59[a]	−0.24	−4.52[a]	0.01	0.87
NEW ISSUE	0.19	8.59[a]	0.31	7.72[a]	0.05	2.84[a]	0.23	2.57[a]	0.18	8.45[a]
TIME	0.00	0.09	0.05	2.96[a]	−0.01	−2.91[a]	0.01	0.63	0.01	1.31
LN(MKT SHARE)	−0.11	−6.35[a]	−0.38	−8.43[a]	0.01	0.69	−0.18	−3.25[a]	−0.12	−7.10[a]
Observations	2992		935		2057		347		2645	
Adjusted R^2	0.8803		0.5658		0.4245		0.8617		0.8910	

similarly to those defined for our sample of debt issues. First, we regress GROSS SPREAD on LN(AMOUNT), NEW ISSUE, INDUSTRY, TIME, and LN(MKT SHARE). As can be seen from Table 7, for the overall sample, the coefficient on LN(MKT SHARE) is -0.05 and is not statistically significant ($t = -0.69$). Also, for seasoned issues, we include an additional variable STOCKVOL, defined as the volatility of daily stock returns for the issuing firm in the year prior to the offer date. We compute this variable as the standard deviation of daily stock returns for seasoned issues for those firms in our sample with daily stock return data available through the Center for Research in Security Prices (CRSP).[2] The coefficient on LN(MKT SHARE) for seasoned issues is 0.05 and is not statistically significant ($t = 0.64$). Second, we replace the LN(MKT SHARE) variable in the above regression with a BANK ENTRY variable. For equity issues, as suggested by the referee, we define BANK ENTRY as a dummy variable which takes a value one during the period 1991–1996 and zero otherwise. For the overall sample, the coefficient on BANK ENTRY is -0.04 and is not statistically significant ($t = -0.63$). Similarly, the coefficient on BANK ENTRY for seasoned issues is -0.07 and is also not statistically significant ($t = -0.83$). As a robustness check, we also run the above regressions with YRDUM9091 as an additional independent variable. The results are qualitatively similar. Thus, in equity market underwritings (where banks have made little headway to date), we find no evidence that bank participation has been associated with a significant decline in equity market underwriting spreads. In a related paper, Chen and Ritter (1999) present evidence that at least 90% of the IPO deals raising between \$20 and \$80 million during 1985–1997 have gross spreads of exactly 7% and attribute this finding to 'strategic pricing' by investment bankers. Viewed as a backdrop to our results, this lack of variation is consistent with the view that commercial banks have not yet made significant inroads into this market segment.

5.2. Yield spreads

We run the following regression to examine the effects of bank entry on ex-ante yield spreads:

$$\text{YIELD SPREAD} = \beta_0 + \beta_{\text{cr}}\,\text{CREDIT RATING} + \beta_{\text{mat}}\,\text{MATURITY} + \beta_{\text{ind}}\,\text{INDUSTRY}$$

[2] The rationale for including the STOCKVOL variable in the regression for seasoned issues is that the underwriter spread is analogous to a put premium. That is, a firm-commitment underwriting is analytically equivalent to writing a put option on the firm's assets, and an increase in the volatility of assets (proxied by the stock volatility) increases the required put premium (spread). As can be seen from Table 7, the coefficient on STOCKVOL variable has the correct (positive) sign and is statistically significant at the 1% level. We thank the referee for this suggestion.

Table 7
Multivariate regressions of gross spread of equity issues

This table give the OLS estimates of the following equation:

$$\text{GROSS SPREAD} = \beta_0 + \beta_{\text{ind}}\,\text{INDUSTRY} + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} + \beta_3\,\text{TIME} + \beta_4\,\text{LN(MKT SHARE)}.$$

The dependent variable GROSS SPREAD is the gross spread of a equity issue measured as a percentage of the issue size. The independent variables are: INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (IPO). TIME is based on the year of the equity issue, e.g., if the issue date is September 12, 1986, TIME takes the value 86. LN(MKT SHARE) is the natural log of the bank share (in percentage terms) of the annual dollar volume of corporate equity underwritings. All dummy variables are zero otherwise. The T ratios are adjusted for heteroskedasticity using White's (1980) variance–covariance matrix. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions. The sample is classified into initial public offerings (IPOs) and seasoned equity offerings (SEOs) based on the issue type. In addition, for SEOs, we include an additional variable STOCKVOL, defined as the volatility of daily stock returns during the year prior to the offer date. We compute this variable as the standard deviation of daily stock returns for seasoned issues for those firms in our sample that have daily stock returns data available on CRSP. The sample is also classified into small (less than \$25 million) and others (not less than \$25 million) segments based on the issue size (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test).

Variable	All issues		Issue type				Issue size			
	Coeff.	T ratio	IPOs		SEOs		Small		Others	
			Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio
INTERCEPT	3.96	4.94[a]	6.70	12.03[a]	4.40	4.04[a]	3.17	3.90[a]	2.63	3.08[a]
LN(AMOUNT)	− 1.19	− 78.60[a]	− 1.08	− 64.15[a]	− 1.08	− 35.70[a]	− 1.63	− 51.70[a]	− 0.77	− 38.63[a]
NEW ISSUE	1.36	47.42[a]					1.01	21.03[a]	1.77	88.61[a]
TIME	0.06	7.38[a]	0.05	7.74[a]	0.05	4.14[a]	0.08	9.76[a]	0.06	6.61[a]
STOCKVOL					0.23	12.54[a]				
LN(MKT SHARE)	− 0.05	− 0.69	− 0.03	− 0.65	0.05	0.64	− 0.21	− 1.40	− 0.02	− 0.31
Observations	7384		4150		2788		3925		3459	
Adjusted R^2	0.7036		0.5797		0.6175		0.5169		0.7678	

$$+ \beta_1 \text{ LN(AMOUNT)} + \beta_2 \text{ NEW ISSUE}$$

$$+ \beta_3 \text{ TIME} + \beta_4 \text{ LN(MKT SHARE)}. \quad (3)$$

The regression results are presented in Table 8. The LN(MKT SHARE) variable has a negative coefficient of -0.18, significant at the 1% level. This is also economically significant as measured by the coefficient of Baa1–Baa3 (which is 0.06). This suggests that the increasing market share of banks in the corporate debt market has led to a reduction in yield spreads over time. The data for the yield on comparable U.S. Treasury issues is not available for 64 issues in our sampe and hence we can not compute the ex-ante yield spread for those 64 issues. As a robustness check, we run the regressions in this paper using the observations for which the data on both the gross spread and ex-ante yield spreads are available (2928 observations). The results are qualitatively similar.

We next test if this reduction in yield spreads has taken place in the segments in which bank underwritings are concentrated, that is, in non-investment-grade and small issues. Table 8 suggests that the increasing bank market share in debt underwritings has had a greater impact on lowering the yield spreads of smaller issues than of larger issues (and the difference is statistically significant at the 1% level).

5.3. Impact of competition on investment house underwritings

To further test for the source of reduction in underwriter spreads and yield spreads over time, we first examine if investment houses lowered their underwriter spreads over time in response to competition from commercial banks. We run the multivariate regression in Table 6 using only investment house underwritten securities, and examine if the increasing market share of banks results in lower underwriter spreads over time. Interestingly, we find this to be the case and the effect is strongest in segments in which bank underwriting is most pronounced, i.e., smaller and lower-rated issues (see Table 9). Second, while bank underwritings are known to reduce yield spreads in some segments (Gande et al., 1997; Puri, 1996), we examine whether competition from banks forced investment houses to lower yields (have higher offering prices) over time. We run the multivariate regression in Table 8 using only investment house underwritten securities, and examine if the growing market share of banks results in lower yields over time. As before, banks' increasing market share significantly reduces offering yields for investment house underwritten securities. This effect is strongest in segments in which bank underwriting is most prevalent, i.e., smaller and lower-rated issues (see Table 10).

Collectively, the results so far are consistent with commercial bank affiliates having a pro-competitive impact on underwriter spreads and yield spreads. This

Table 8
Multivariate regressions of yield spread of debt issues

This table gives the OLS estimates of the following equation:

$$\text{YIELD SPREAD} = \beta_0 + \beta_{cr}\,\text{CREDIT RATING} + \beta_{mat}\,\text{MATURITY} + \beta_{ind}\,\text{INDUSTRY} + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} + \beta_3\,\text{TIME} + \beta_4\,\text{LN(MKT SHARE)}.$$

The dependent variable YIELD SPREAD is the ex-ante yield spread (in percentage terms) of a debt issue, i.e., ex-ante yield of debt security minus the ex-ante yield of a U.S. Treasury security of comparable maturity. The independent variables are: CREDIT RATING is a set of credit rating dummy variables. For example, B1–B3 is a dummy variable which is one if Moody's credit rating for the issue is B1, B2, or B3. MATURITY stands for dummy variables based on maturity of the security. LOWMAT is one if the issue matures in less than five years, and HIMAT is one if the maturity is greater than 15 years. INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (debt IPO). TIME is based on the year of the debt issue, e.g., if the issue date is September 12, 1986, TIME takes the value 86. LN(MKT SHARE) is the natural log of the bank share (in percentage terms) of the annual dollar volume of corporate debt underwritings. All dummy variables are zero otherwise. The T ratios are adjusted for heteroskedasticity using White's (1980) variance–covariance matrix. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions. The sample is also classified into small (less than \$75 m) and others (not less than \$75 million) segments based on the issue size (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test).

Variable	All issues		Credit rating				Issue size			
	Coeff.	T ratio	Caa–Ba3		Baa1–Aaa		Small		Others	
			Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio
INTERCEPT	1.20	1.12	1.86	0.64	2.44	2.20[b]	− 4.02	− 0.92	1.92	2.00[b]
Caa–C	4.35	10.43[a]	2.39	11.28[a]			− 0.20	− 0.14	4.82	14.04[a]
B1–B3	3.43	9.88[a]	1.54	17.65[a]			− 1.13	− 0.84	3.98	19.86[a]
Ba1–Ba3	1.80	5.15[a]					− 3.02	− 2.23[b]	2.37	11.34[a]
Baa1–Baa3	0.06	0.17			0.21	0.72	− 4.54	3.41[a]	0.63	3.19[a]
A1–A3	− 0.38	− 1.09			− 0.28	− 0.93	− 4.80	3.59[a]	0.19	0.95
Aa1–Aa3	− 0.47	− 1.29			− 0.39	− 1.25	− 3.82	− 2.58[a]	0.01	0.06
LOWMAT	0.55	3.65[a]	1.11	2.18[b]	0.54	3.47[a]	2.42	5.08[a]	0.06	0.66
HIMAT	0.26	11.42[a]	− 0.23	− 1.14	0.27	13.86[a]	− 0.05	− 0.25	0.27	12.42[a]
LN(AMOUNT)	− 0.07	− 2.80[a]	− 0.09	− 1.84[c]	− 0.05	− 1.65	0.62	3.69[a]	− 0.05	− 1.58
NEW ISSUE	0.23	5.11[a]	0.56	7.25[a]	− 0.04	− 0.91	0.20	1.07	0.22	5.20[a]
TIME	− 0.00	− 0.29	0.02	0.44	− 0.02	− 1.45	0.00	0.03	− 0.01	− 1.14
LN(MKT SHARE)	− 0.18	− 4.96[a]	− 0.17	− 1.91[c]	− 0.17	− 4.82[a]	− 0.29	− 2.33[b]	− 0.12	− 3.72[a]
Observations	2928		912		2016		321		2607	
Adjusted R^2	0.7510		0.4123		0.1477		0.6689		0.8257	

Table 9
Multivariate regressions of gross spread of debt issues underwritten by investment banks

This table gives the OLS estimates of the following equation:

$$\text{GROSS SPREAD} = \beta_0 + \beta_{cr}\,\text{CREDIT RATING} + \beta_{mat}\,\text{MATURITY} + \beta_{ind}\,\text{INDUSTRY} + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} + \beta_3\,\text{TIME} + \beta_4\,\text{LN(MKT SHARE)}.$$

The dependent variable GROSS SPREAD is the gross spread of a debt issue measured as a percentage of the issue size. The independent variables are: CREDIT RATING is a set of credit rating dummy variables. For example, B1–B3 is a dummy variable which is one if Moody's credit rating for the issue is B1, B2, or B3. MATURITY stands for dummy variables based on maturity of the security. LOWMAT is one if the issue matures in less than five years, and HIMAT is one if the maturity is greater than 15 years. INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (debt IPO). TIME is based on the year of the debt issue, e.g., if the issue date is September 12, 1986, TIME takes the value 86. LN(MKT SHARE) is the natural log of the bank share (in percentage terms) of the annual dollar volume of corporate debt underwritings. All dummy variables are zero otherwise. The T ratios are adjusted for heteroskedasticity using White's (1980) variance–covariance matrix. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions. The sample is also classified into small (less than \$75 million) and others (not less than \$75 million) segments based on the issue size (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test).

Variable	All issues		Credit rating				Issue size			
	Coeff.	T ratio	Caa–Ba3		Baa1–Aaa		Small		Others	
			Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio
INTERCEPT	0.79	1.53	−1.91	−1.24	1.71	4.30[a]	−0.46	−0.23	−0.09	−0.20
Caa–C	2.54	21.05[a]	0.97	7.55[a]			2.59	14.58[a]	2.55	16.92[a]
B1–B3	2.38	59.06[a]	0.82	15.54[a]			2.32	13.41[a]	2.40	68.65[a]
Ba1–Ba3	1.41	23.98[a]					1.43	6.32[a]	1.44	24.88[a]
Baa1–Baa3	0.12	3.70[a]			0.11	3.57[a]	−0.07	−0.45	0.17	6.41[a]
A1–A3	0.06	1.72[c]			0.05	1.71[c]	−0.08	−0.50	0.09	3.67[a]
Aa1–Aa3	0.04	1.34			0.05	1.69[c]	−0.13	−0.79	0.08	3.17[a]
LOWMAT	−0.27	−11.03[a]	−0.28	−0.85	−0.27	−16.84[a]	−0.36	−3.53[a]	−0.26	−11.73[a]
HIMAT	0.25	16.61[a]	−0.04	−0.27	0.24	20.91[a]	0.22	1.70[c]	0.25	19.98[a]
LN(AMOUNT)	−0.06	−4.18[a]	−0.09	−3.06[a]	−0.04	−2.75[a]	−0.30	−4.73[a]	0.01	0.66
NEW ISSUE	0.18	7.73[a]	0.29	6.91[a]	0.04	2.43[b]	0.21	2.16[b]	0.17	7.76[a]
TIME	0.02	0.26	0.06	3.22[a]	−0.01	−2.67[a]	0.03	1.25	0.01	1.27
LN(MKT SHARE)	−0.11	−6.34[a]	−0.40	−8.68[a]	0.01	0.67	−0.21	−3.60[a]	−0.12	−7.04[a]
Observations	2775		853		1922		301		2474	
Adjusted R^2	0.8820		0.5779		0.4183		0.8560		0.8935	

Table 10
Multivariate regressions of yield spread of debt issues underwritten by investment banks

This table gives the OLS estimates of the following equation:

$$\text{YIELD SPREAD} = \beta_0 + \beta_{cr}\,\text{CREDIT RATING} + \beta_{mat}\,\text{MATURITY} + \beta_{ind}\,\text{INDUSTRY} + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} + \beta_3\,\text{TIME} + \beta_4\,\text{LN(MKT SHARE)}.$$

The dependent variable YIELD SPREAD is the ex-ante yield spread (in percentage terms) of a debt issue, i.e., ex-ante yield of debt security minus the ex-ante yield of a U.S. Treasury security of comparable maturity. The independent variables are: CREDIT RATING is a set of credit rating dummy variables. For example, B1–B3 is a dummy variable which is one if Moody's credit rating for the issue is B1, B2, or B3. MATURITY stands for dummy variables based on maturity of the security. LOWMAT is one if the issue matures in less than five years, and HIMAT is one if the maturity is greater than 15 years. INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (debt IPO). TIME is based on the year of the debt issue, e.g., if the issue date is September 12, 1986, TIME takes the value 86. LN(MKT SHARE) is the natural log of the bank share (in percentage terms) of the annual dollar volume of corporate debt underwritings. All dummy variables are zero otherwise. The T ratios are adjusted for heteroskedasticity using White's (1980) variance–covariance matrix. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions. The sample is also classified into small (less than \$75 million) and others (not less than \$75 million) segments based on the issue size (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test).

Variable	All issues		Credit rating				Issue size			
	Coeff.	T ratio	Caa–Ba3		Baa1–Aaa		Small		Others	
			Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio	Coeff.	T ratio
INTERCEPT	0.66	0.60	−0.33	−0.11	2.39	2.09[b]	−7.68	−1.67[c]	1.31	1.36
Caa–C	4.36	10.55[a]	2.43	11.27[a]			0.42	0.33	4.85	14.07[a]
B1–B3	3.42	9.96[a]	1.53	16.89[a]			−0.43	−0.36	3.97	19.79[a]
Ba1–Ba3	1.79	5.20[a]					−2.23	−1.82[c]	2.34	11.20[a]
Baa1–Baa3	0.08	0.24			0.21	0.71	−3.83	−3.17[a]	0.65	3.26[a]
A1–A3	−0.39	−1.12			−0.30	−1.00	−4.37	−3.66[a]	0.19	0.94
Aa1–Aa3	−0.46	−1.28			−0.40	−1.26	−3.25	−2.41[b]	0.01	0.05
LOWMAT	0.63	3.80[a]	1.60	5.20[a]	0.59	3.52[a]	3.44	5.63[a]	0.07	0.70
HIMAT	0.26	11.19[a]	−0.22	−1.09	0.27	13.33[a]	0.02	0.10	0.26	12.04[a]
LN(AMOUNT)	−0.11	−3.55[a]	−0.11	−2.27[b]	−0.09	−2.42[b]	0.88	4.02[a]	−0.04	−1.21
NEW ISSUE	0.19	4.16[a]	0.52	6.49[a]	−0.06	−1.25	0.31	1.59	0.20	4.55[a]
TIME	0.01	0.38	0.04	1.23	−0.01	−1.18	0.02	0.39	−0.01	−0.56
LN(MKT SHARE)	−0.20	−5.34[a]	−0.25	−2.79[a]	−0.17	−4.54[a]	−0.36	−2.45[b]	−0.14	−4.32[a]
Observations	2719		832		1887		281		2438	
Adjusted R^2	0.7449		0.4244		0.1480		0.6748		0.8239	

impact is greatest for the smaller and lower-quality end of the corporate debt new issue market.

Our findings of the effect on underwriter spreads and yields in the corporate debt securities market is similar in spirit to those obtained in the literature on the municipal revenue bond market in the 1970s, when banks were allowed to underwrite certain types of these bonds for the first time. In an excellent survey of the studies of that time, Silber (1979) summarized the empirical evidence concerning the effects of bank underwriting in the municipal revenue bond market and cites '… overwhelming evidence that number of bids affects borrowing costs and that bank eligibility affects borrowing costs either directly or indirectly through the number of bids. The impact on borrowing costs stems from reductions in both reoffering yields and underwriting spreads. All of these impacts are statistically significant … (p. 29)'. Silber concludes that 'The weight of the evidence clearly rejects the position that expected savings from permitting banks to underwrite is trivial (p. 8)'.[3]

5.4. *Differences in underwriting spreads post-1989*

An important issue is the effect of bank entry on the comparative realized underwriting spreads of banks and investment houses in the post-1989 period. There are two distinct possibilities. First, banks (to gain long-term market share) undercut investment houses' spreads and charge lower spreads than investment houses at any moment in time. Alternatively, banks as better and more credible certifiers are able to help obtain higher prices (lower yields) than investment houses and take advantage of this to charge higher underwriter spreads. We test which (if any) of these phenomenon has occurred.

We run a regression of post-1989 underwriter spreads on characteristics of the issue such as issue size, whether a new issue, time (year), industry dummies, credit rating, and maturity. We also include a dummy variable, BANKUND, which equals one if a bank underwrites the issue and zero otherwise. Specifically, we run the following regression:

$$\text{GROSS SPREAD} = X_i'\beta + \gamma\,\text{BANKUND}_i + u_i \tag{4}$$

[3] Related studies in this municipal bond literature, (e.g., Hopewell and Kaufman, 1977; Frankle, 1979) find that reoffering yields and/or net interest costs are significantly reduced by an increase in the number of bids. Kessel (1971) presents evidence that bank eligibility increases the number of bids and that the number of bids is inversely related to the underwriter spread. Rogowski (1980) establishes more directly that bank eligibility results in a significant reduction in municipal bond underwriting spreads. In other related work exploring the effects of global competition on equity underwriter spreads, consistent with our paper, Beatty et al. (1998) find that foreign issuers, who face a more competitive underwriting market than US issuers, have significantly lower underwriting costs.

where X_i is the vector of factors considered significant in determining gross spread, such as LN(AMOUNT), CREDIT RATING dummies, MATURITY dummies, the NEW ISSUE variable and the TIME variable.

We find that BANKUND is not a significant determinant of post-1989 underwriter spreads. We also examine the more recent subperiod 1993–1996 (about four years after the granting of debt underwriting powers, giving Section 20 subsidiaries sufficient time to establish distributional channels for underwriting new issues by themselves) and the results are qualitatively unchanged (see Table 11). The result suggest that any differences in underwriter spreads (or rents) on bank versus investment house underwritings due to banks undercutting investment houses have not persisted over time, perhaps because investment houses match bank spreads on an immediate basis. In fact, there have been no significant underwriter spread differentials in recent years (see Table 11). We further test if any differentials exist in the smaller and lower-rated segments in which bank underwriting has been most concentrated, and find no evidence of spread differentials in bank versus investment house underwritten issues.

In the multivariate regressions in Eq. (4), we have implicitly assumed that BANKUND is exogenous. However, the decision to underwrite a particular issue can be endogenous, based on the information the bank has. The bank's private information is $z_i'b + \eta_i$, where z_i is the vector of factors considered significant in determining the bank's underwriting decision. The bank will underwrite (BANKUND$_i = 1$) if $z_i'b + \eta_i \geqslant 0$. The market cannot observe the bank's latent information but can partially extract this information. In particular, the market uses the bank's underwriting decision to update its expectations of the bank's private information. This endogeneity of the bank underwriting decision induces a correlation between u_i and η_i. The coefficient estimates in the linear regression in Eq. (4) are inconsistent (Maddala, 1983). Under the assumption that η_i is distributed normally $N(0, \sigma^2)$, Eq. (4) now becomes

$$\text{GROSS SPREAD} = X_i'\beta + \phi\lambda_{\text{B}}\text{BANKUND}_i + \phi\lambda_{\text{NB}}(1 - \text{BANKUND}_i) + v_i, \tag{5}$$

where $\lambda_{\text{B}} = n(z_i'b|\sigma)/N(z_i'b|\sigma)$; $\lambda_{\text{NB}} = -n(z_i'b|\sigma)/(1 - N(z_i'b|\sigma))$, $\lambda \in \{\lambda_{\text{B}}, \lambda_{\text{NB}}\}$ is the Inverse-Mills Ratio and represents the private information revealed by the bank underwriting decision $\phi = \pi\sigma$, where $\pi = \text{cov}(u_i, \eta_i)/\text{var}(\eta_i)$. The significance and sign of the coefficient of λ tell us whether the information revealed by the bank underwriting significantly affects gross spreads.

We use a two-stage methodology advocated by Heckman (1979) to obtain consistent estimates. The first step is to estimate a probit of the likelihood of the bank underwriting, and from this step we obtain estimates of λ. The second step involves plugging the estimates of λ into Eq. (5), which can now be estimated by ordinary least squares. The standard errors are corrected for heteroskedasticity and for the errors-in-variables problem caused by using estimates of λ rather

Table 11
Multivariate regressions of gross spread of debt issues with Heckman's correction

This table give the OLS estimates of the following equation:

$$\text{GROSS SPREAD} = \beta_0 + \beta_{cr}\,\text{CREDIT RATING} + \beta_{mat}\,\text{MATURITY} + \beta_{ind}\,\text{INDUSTRY} + \beta_1\,\text{LN(AMOUNT)} + \beta_2\,\text{NEW ISSUE} + \beta_3\,\text{TIME} + \beta_4\,\text{BANKUND}.$$

The dependent variable GROSS SPREAD is the gross spread of a debt issue measured as a percentage of the issue size for debt issues during the years 1993–96 in our sample. The independent variables are: CREDIT RATING is a set of credit rating dummy variables. For example, B1–B3 is a dummy variable which is one if Moody's credit rating for the issue is B1, B2, or B3. MATURITY stands for dummy variables based on the maturity of the security. LOWMAT is one if the issue matures in less than five years, and HIMAT is one if the maturity is greater than 15 years. INDUSTRY is a set of industry dummy variables constructed based on one-digit SIC codes. LN(AMOUNT) is the natural logarithm of the offered dollar amount of the issue (in millions of dollars). NEW ISSUE is a dummy variable which is one if the issue is a first-time issue (debt IPO). TIME is based on the year of the debt issue, e.g., if the issue date is September 12, 1986, TIME takes the value 86. BANKUND takes the value one if the lead underwriter is a Section 20 subsidiary. All dummy variables are zero otherwise. The T ratios are adjusted for heteroskedasticity using White's (1980) variance–covariance matrix. The point estimates and T ratios for the industry dummy variables are not reported though they are included in the regressions. The second-step regression of the Heckman's two-step estimation procedure involves using estimates of the inverse-mills ratio LAMBDA from the first-step (probit regression — not shown here) instead of BANKUND (a, b, and c stand for significance at the 1%, 5%, and 10% levels using a two-tailed test), as in Eq. (5).

Variable	OLS		Heckman's correction	
	Coeff.	T ratio	Coeff.	T ratio
INTERCEPT	1.94	2.15[b]	2.06	2.48[b]
Caa–C	2.32	14.10[a]	2.33	13.37[a]
B1–B3	2.13	30.84[a]	2.13	18.45[a]
Ba1–Ba3	1.09	11.26[a]	1.09	9.32[a]
Baa1–Baa3	0.07	1.08	0.07	0.58
A1–A3	0.05	0.80	0.05	0.43
Aa1–Aa3	0.08	1.31	0.08	0.69
LOWMAT	− 0.29	− 6.26[a]	− 0.29	− 6.50[a]
HIMAT	0.23	11.11[a]	0.23	8.69[a]
LN(AMOUNT)	− 0.03	− 1.95[c]	− 0.02	− 1.81[c]
NEW ISSUE	0.17	5.57[a]	0.17	6.87[a]
TIME	− 0.02	− 1.59	− 0.02	− 1.90[c]
BANKUND	− 0.04	− 1.15		
LAMBDA			− 0.02	− 0.93
Observations	1180		1180	
Adjusted R^2	0.8725		0.8725	

than true values by using an appropriate asymptotic covariance matrix developed in Heckman (1979) and Greene (1981). Based on this estimation, we find that the coefficient of λ is insignificant (see Table 11). A similar result obtains when we run the regressions for the smaller and lower-rated subsamples in which bank underwritings are concentrated. These results suggest that differences in underwriter spreads on bank versus investment house underwritings (due to banks undercutting investment houses' by charging lower underwriter spreads) have not persisted over time, perhaps because investment houses' match the bank spreads on an immediate basis. In other words, increased market competition appears to have resulted in a similar lowering of spreads among banks and investment houses.

5.5. Market concentration

Given that banks have been acquiring investment banks since 1997, it is somewhat early to assess the long-term impact of bank entry on market concentration. However, it is interesting to assess the short-term impact of bank entry on market concentration. For this purpose we use two measures of concentration: a five-firm concentration index and a Herfindahl index [see Tirole (1990) for an explanation of these indices]. Table 12 presents these measures for our sample of debt issues. In Table 12 we also break down these measures to look at concentration in different segments of the corporate debt market reflected by credit rating.

Both measures show that the market for corporate debt securities is less concentrated post-1989 (see Table 12). In addition, for our sample, the share of the top five underwriters declines from 72.45% in the pre-1989 period to 69.25% in the post-1989 period, statistically significant at the 10% level. Similarly, the Herfindahl index also declines from 1217.82 in the pre-1989 period to 1179.57 in the post-1989 period for our sample. The decline is particularly pronounced for non-investment-grade debt, where the share of the top five underwriters declines from 81.07% in the pre-1989 period to 59.21% in the post-1989 period. This decline is statistically significant at the 1% level. Similarly, the Herfindahl index declines from 2626.86 in the pre-1989 period to about a third of its magnitude (910.10) in the post-1989 period for non-investment-grade debt. Both these measures suggest that the decline in market concentration, in the short-run, has been particularly pronounced in the lower-rated corporate debt issues market.

6. Conclusions

The results of our paper are consistent with the post-1989 entry of Section 20 commercial banking subsidiaries into corporate debt underwriting having a favorable (pro-competitive) effect on corporate debt underwriting costs to

Table 12
Measures of concentration of underwritings of debt issues

This table presents two measures of concentration of underwriters, namely a five-firm concentration index (in percentage terms) and a Herfindahl index (in squared-percentage terms) in our sample of nonfinancial and nonregulated fixed-rate U.S. debt issues. Further, this table also classifies the sample of nonfinancial and nonregulated fixed-rate U.S. debt issues based on credit rating into two segments (Caa–Ba3, Baa1–Aaa).

Year	All issues		Caa–Ba3		Baa1–Aaa	
	Five-firm	Herfindahl	Five-firm	Herfindahl	Five-firm	Herfindahl
1985	75.62	1506.38	86.40	3786.98	82.89	1879.03
1986	73.44	1297.52	83.25	3306.14	74.85	1366.86
1987	73.05	1271.88	87.24	2316.27	80.20	1418.88
1988	68.02	1130.30	80.37	2148.46	70.55	1213.66
1989	75.84	1338.89	84.23	2061.29	83.08	1547.66
1990	94.30	1999.83	100.00	5061.73	94.17	1971.49
1991	79.25	1631.36	80.68	2595.55	80.52	1685.06
1992	72.51	1325.09	63.49	1035.62	80.18	1557.92
1993	67.52	1120.86	68.51	1202.02	81.49	1480.60
1994	65.63	1087.08	68.33	1103.41	83.54	1551.86
1995	64.63	1170.84	65.13	1223.82	74.13	1399.27
1996	61.69	1175.43	47.88	754.71	71.93	1588.80
Overall	67.72	1102.92	60.42	940.50	76.55	1390.15

issuers. Specifically, bank entry appears to have resulted in reduced underwriter spreads and yields. Our results are also consistent with bank entry resulting in lower market concentration in the market for corporate debt underwriting. Interestingly, the results of our paper also suggest that the pro-competitive effect of declining underwriting spreads, yield spreads, and market concentration has been strongest in the smaller, lower-quality end of the corporate debt market where banks do a relatively larger proportion of their underwriting. Thus the main beneficiaries of the passage of the Section 20 Act and the subsequent modifications have been relatively smaller issuers of below-investment-grade quality.

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