Drexel Burnham Lambert's bankruptcy and the subsequent decline in underwriter fees ☆

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Abstract

In the 1980s, Drexel Burnham Lambert dominated the underwriting of junk bonds with close to a 50% market share. In 1990, Drexel went bankrupt and was liquidated, and the percentage underwriting fees for junk bonds subsequently dropped dramatically. We present strong evidence that the exit of Drexel Burnham Lambert and the resulting increase in competition for market share were major contributing factors to the decline in junk bond underwriter fees.
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1. Introduction

By far the most dramatic change in underwriting fees in recent history occurred in the junk bond market in 1990. In the 1980s the average underwriting fee for junk (often called high-yield) bonds was approximately 3.5%, and in the 1990s the average fee was approximately 2.5%. The drop in percentage fees following the bankruptcy and liquidation

of Drexel Burnham Lambert in 1990 was sudden, dramatic, and permanent.[1] During the same time period, underwriter fees for investment-grade bonds did not change.

Our evidence suggests that the sudden drop in fees was largely a result of the increase in competition in the underwriting of junk bonds resulting from the liquidation of Drexel Burnham Lambert in 1990. During the 1980s, Drexel Burnham Lambert dominated the market for high-yield bonds through non-price competition and achieved a market share close to 50%. Non-price competition included Drexel's superiority as a market maker for junk bonds, provision of additional services to junk bond issuers, and side payments to investors. Following the exit of Drexel from underwriting, price competition became dominant, resulting in lower percentage underwriter fees and markedly reduced market concentration.

Some academic research has argued that the decline in underwriter fees in the junk bond market in the early 1990s was the result of the entry of commercial banks into underwriting of corporate bonds. An extensive literature concludes that commercial banks play a unique role in underwriting because of their monitoring ability (see Diamond, 1984; Fama, 1985; James, 1987). The greater monitoring ability of commercial banks could give commercial banks an advantage in underwriting corporate bonds, especially junk bonds, when informational asymmetries perhaps are common (Gande, Puri, and Saunders (GPS), 1999).

We show that the results from earlier tests suggesting that underwriting of junk bonds by commercial banks pushed down underwriter fees are a statistical artifact. While the additional market competition from commercial banks could have contributed to increased competition, or increased potential competition, there are several reasons to conclude that the exit of Drexel Burnham Lambert was the primary force increasing competition and driving down underwriter fees. First, little actual competition from commercial banks in underwriting junk bonds exists before 1992. There were no junk bond issues by commercial banks between 1987 and 1990; there were only four issues by commercial banks in 1991; and there were 16 commercial bank issues out of the total of 134 junk bond issues in 1992. Second, until 1996 a commercial bank's underwriter fees were limited to 10% of its subsidiary's total revenues. Third, as of 1990, a sizable number of investment banks had a long history of underwriting both investment-grade and high-yield corporate bonds. This history presented enormous competitive disadvantages for commercial banks entering the market for underwriting corporate bonds.

Our evidence also shows that during the late 1980s the underwriter fees charged by non-Drexel investment banks for junk bond issues gradually moved up to the level charged by Drexel Burnham Lambert. The reason appears to be that the increasing legal scrutiny faced by Drexel during the period immediately preceding its bankruptcy created an environment in which other investment bankers did not have to lower fees to compete with Drexel.

The rest of this paper proceeds as follows. In Section 2, the dominance of Drexel Burnham Lambert in the market for junk bonds is discussed. Section 3 describes the role of

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[1] The word "permanent" indicates that the typical underwriter fee dropped significantly and did not return to previous high levels. But it does not necessarily mean constant. From year to year the median fees change, partly from changing market conditions, but also from the simple fact that the median fee contains bonds of many different ratings. As the proportion of bonds in a particular rating category changes, the median fee could change somewhat. The alternative of reporting fees for all rating categories individually leads to the same results, but it is cumbersome.

commercial banks in bond underwriting. Summary statistics for our corporate bond sample are shown in Section 4. In Section 5, we examine market concentration and underwriting fees in the junk bond market from 1977 to 1999. We test the impact of bank entry on underwriting fees in Section 6, and Section 7 concludes.

2. The market power of Drexel Burnham Lambert

Later in this paper, we present evidence that underwriter fees for junk bonds were higher in the 1980s because of the unique influence wielded by Michael Milken and his firm, Drexel Burnham Lambert. Essentially, our argument is that Drexel was able to maintain a dominant position in the market for high-yield bonds and keep underwriter fees high by using several techniques of non-price competition. Now we examine a brief history of the junk bond market from 1977 through 1989.

From 1977 to 1989, Milken showed what Tellis, Golder, and Christensen (2002) called the "will and vision" to develop and then to dominate the new issue junk bond market. The book by Tellis and Golder presents many examples of industries dominated by a single firm. These industry leaders are characterized by five elements: vision, persistence, innovation, commitment, and asset leverage (typically called economies of scope in the finance literature). The last four factors are summarized by the term "will." Milken and Drexel Burnham Lambert exhibited all of these elements.

Milken's vision was to perceive the potential for the reemergence of original issue junk bonds. Firms had stopped issuing junk bonds in the 1930s after a period of widespread defaults. In the 1970s, there were so-called fallen angel junk bonds trading. Fallen angels were originally issued as investment-grade bonds and became junk bonds as their ratings were downgraded.

Milken became the dominant market maker for these fallen angels in the 1970s. His actions provided the firm with enormous knowledge about the buyers and sellers of junk bonds. Stewart (1992, p. 54) points out how Milken's knowledge advantage of the junk bond market developed relationship capital with his clients:

> By early 1977, Milken's operation controlled a remarkable 25% of the market in high-yield securities. It was really the only firm maintaining an active market-making operation with an eye toward enhancing the liquidity of the market. So Milken became, in effect, the market for high-yield bonds. He had an incredible memory, and he knew who owned what issues, what they had paid, their yield to maturity, and who else wanted them. Increasingly, his clients developed such confidence in his research and market acumen that when he urged them to invest in a particular issue, they did.

After becoming the dominant secondary market dealer in fallen angels, Milken entered the original issue junk bond market. He used his knowledge as a secondary market dealer to assist in issuing original issue junk bonds.

Following his vision in resurrecting the junk bond market, Milken used his will to dominate it. Milken became legendary for his willingness to assist issuers by maintaining a strong secondary market for their securities. Bruck (1989, p. 287) provides an example of this by relating the experience of an investor trying to sell People Express bonds and finding that Milken was the only dealer willing to buy these bonds. Milken's willingness to provide this liquidity in the secondary market translated into advantages in the primary

market, because issuers believed Milken was more likely to provide assistance to his loyal clients. [See Bruck (1989, p. 286) for an anecdotal example.]

Several authors claim that Milken used side payments to attract a sizable number of willing buyers for his junk bond issues. Stein (1992) argues that Milken had "captive buyers." Milken is alleged to have offered clients opportunities to invest in warrants (that would be detachable from some of his issues) and in initial public offerings (IPOs) at favorable prices through limited partnerships that would resell securities at large profits. In the stock IPO market, Chen and Ritter (2000) and Loughran and Ritter (2004) offer evidence that side payments to issuers had an important influence on the underpricing of initial public offerings of stock. The opportunity to make large profits from these side payments could have attracted many ready buyers in the junk bond market. The implication is that by enriching others, Milken developed a loyal following willing to invest in his junk bond offerings. Bruck (1989, p. 362) described trading records subpoenaed in 1988 supporting this view.

A search of the Securities Data Company (SDC) database reveals few cases in which junk bonds have had warrants, and, even though the Justice Department investigated him extensively, Milken was never convicted of any crimes resulting from these alleged side payments.[2] Milken served two years in jail, but his admitted crimes do not have anything to do with illegal side payments. (Allegations also arose that Milken used his position to enrich himself and relatives, but, again no legal actions have ever been taken regarding them.)

Milken has justified his higher fees by claiming that he provided more services than other investment banking firms. One of the important services provided was assisting issuers in getting subsequent financing, either through additional public security issues or from banks. Because firms issuing junk bonds are typically in difficult, or even precarious, financial circumstances, this guarantee by Drexel Burnham Lambert had great value to issuers. Milken's claims indicate that Drexel did not compete by lowering its fees, but by various forms of non-price competition.[3]

The result of all these advantages was that Drexel issued almost half of the entire junk bond principal issued in the 1980s. An extensive academic literature argues that concentrated markets are linked with higher prices.[4] In the case of Drexel, it appears that non-price competition (Drexel's knowledge and market-making ability as a security dealer, providing additional services to clients, and side payments) allowed Drexel to charge higher prices and to create a large market share.

Milken's junk bond operation reached its peak in 1986, controlling 53% of the market and issuing more than twice as much junk bond principal in 1986 than it did in 1985 (in our

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[2]In the sample of non-convertible, rated bonds issued from 1977 to 1989, we found 63 bonds that SDC identified as having warrants attached. Twenty-eight of these bonds (44%) were underwritten by Drexel. Of these 63 bonds, only four have yield data available, so the rest are not included in our sample. As a robustness check, we ran our tests again with these bonds included, and the results are not changed.

[3]Livingston, Pratt, and Mann (1995) examined a sample of Drexel's debt issues and find that, while Drexel's underwriting fees were higher, it was able to issue junk bonds at lower yields than its competitors. Brewer and Jackson (2000) find that Drexel provided liquidity and monitoring services in the junk bond market that could not easily be duplicated after Drexel's collapse.

[4]See Bain (1951), Tirole (1988), Berger, Demsetz, and Strahan (1999), Berger and Hannan (1989), Fang (2005), Gilbert (1984) and Hannan (1991). See also Chemmanur and Fulghieri (1994), Gilbert (1989), Shapiro (1983), Urban, Carter, Gaskin, and Mucha (1986), Tellis Golder, and Christensen (2002), Mueller (1977), and Spence (1977), and Benveniste, Singh, and Wilhelm Jr. (1993).

sample of non-convertible, fixed coupon issues). Following Ivan Boesky's guilty plea in November 1986, however, Milken's legal problems began to mount, and Milken and Drexel began to receive special negative coverage in the financial press. The effect of all this on Milken's junk bond operation was dramatic. In 1987–1989, junk bond issues declined from 1986 levels, and Drexel's market share fell to about 40%. Milken's legal woes meant it was more difficult for him to bring in new clients. (See Bruck, 1989, p. 334.)

The result was a divided market. Drexel was able to maintain Milken's base of loyal clients, but other issuers now had good reason to look elsewhere. Drexel still charged the same fees, meaning other investment banks now had no incentive to compete with Drexel by lowering fees. Milken's base of loyal clients continued to pay his high fees, while other issuers were willing to pay not to be involved with Milken. The median underwriting fees for junk bonds followed this pattern, as the median fee at non-Drexel investment banks was lower than Drexel's until 1987. In 1987, as Milken and Drexel's legal problems were growing, the fees of other investment banks moved closer to Drexel's median fee of 3.5% and continued to do so through 1989.[5]

In 1989 Drexel filed for bankruptcy. The firm was liquidated and the junk bond market collapsed in 1990.[6] As the market recovered in 1991, however, junk bond underwriters faced a different competitive environment; the market shifted to price competition.[7] With Milken and Drexel now out of the picture, there was an enormous amount of market share available and no dominant underwriter. Consequently, competing on price to gain business became much more attractive.[8] We show that most investment banks experienced large increases in revenue from junk bond fees from 1991 to 1993, even at substantially lower fees, because they divided the market share of Drexel in the 1980s.

3. Commercial bank entry into underwriting corporate bonds

Since the 1930s, the Glass-Steagall Act had forbidden the underwriting of most securities by commercial banks. In 1986, the Federal Reserve began to relax this restriction and permitted securities subsidiaries of bank holding companies to underwrite and deal in bank ineligible securities provided that underwriting revenues were less than 5% of the subsidiaries' gross revenues. The initial ineligible securities consisted of commercial paper,

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[5]We rely mostly on anecdotal evidence of a divided new issue market from 1987 to 1989. We also note Brewer and Jackson (2000) find that Drexel-underwritten bonds experienced a larger price decline in the months leading up to Drexel's liquidation than junk bonds underwritten by other investment banks. We take this as evidence of a difference between Drexel's set of issues and investors and those of other investment banks.

[6]The dramatic collapse of new issue junk in 1990 coincided with Drexel's liquidation, but it was also exacerbated by enormous selling pressures in the market. This pressure was the result of new regulations requiring savings and loans to divest of junk bond holdings and a reevaluation of junk bond default risk prompted by the publication of Asquith, Mullins, and Wolff (1989).

[7]It could be argued that other banks could duplicate Milken's arrangement of side payments and special deals in junk offerings to develop their own loyal base of investors. On the heels of Milken's guilty plea and ten-year jail sentence for making such arrangements, however, other investment banks had to be wary of following in Milken's footsteps.

[8]Although Milken and Drexel were out of the junk bond market in the 1990s, all the other Drexel employees were free to join another underwriting firm. Still, while the former Drexel employees carried considerable advantages in junk bonds with them, they were no longer concentrated in a single firm. The 1990s junk bond market also came on the heels of significant legal action against Milken and Drexel, so any advantages Drexel had from side payments and special favors were unlikely to be continued by former Drexel employees. See New York Times (2005) for more information on former Drexel employees.

mortgage and other asset-backed securities, and revenue bonds. In 1989 the Fed increased the revenue ceiling on ineligible security underwriting to 10% and added corporate bonds to the list of ineligible securities. In 1990, the Fed added equity securities to the list of ineligible securities. In 1996 (effective 1997), the Fed raised the limit from 10% to 25% and relaxed the firewalls. On November 12, 1999, the Glass-Steagall Act was repealed and the restrictions on commercial bank underwriting were eliminated.

Gande, Puri, and Saunders (1999) examine debt issues from 1985 to 1996 and conclude that commercial bank entry in 1991 resulted in lower underwriting spreads, lower yields, and reduced concentration in the bond market. They find that fees charged by Section 20 subsidiaries of banks were not lower than investment bank fees; fees charged by all underwriters were lower following commercial bank entry in 1991. The authors note that the reduction in fees was most prevalent in the junk bond market.

Roten and Mullineaux (2002) study bonds issued from 1995 to 1998. They find that underwriting fees charged by Section 20 subsidiaries of banks during this time period were lower for junk bond issues, but they uncover no difference in yield spreads between Section 20 banks and investment banks. The authors note:

> Our results also fail to confirm earlier evidence that collective Section 20 underwritings produce a favorable competitive effect on gross spreads and yield spreads. We find substantial evidence that both the underwriting mix and the underwriting process are relevant to the behavior of gross spreads and yield spreads over the sample period.

Song (2004) examines the industrial organization of bond underwriting markets from 1991 to 1999 and finds evidence that bond markets were difficult to penetrate and that the revenue limits on commercial banks prior to 1997 inhibited their competitive power. She concludes that investment banks did not fully respond to commercial bank entry until the revenue limitations were relaxed in 1997.

Following the liquidation of Drexel Burnham Lambert in 1990, underwriter fees for junk bonds experienced a sudden, dramatic, and permanent decline. This decline in junk bond underwriter fees was virtually coincidental with the disappearance of Drexel Burnham Lambert. The main goal of our study is to test whether the sudden drop in junk bond underwriting fees in 1990 and 1991 can plausibly be attributed to a shift to price competition following Drexel's liquidation.

4. Summary data

In this section, we discuss our sample selection and present summary data about the bond underwriting market. We also examine market concentration and median underwriting fees.

4.1. Data

Our sample includes all fixed-coupon, non-convertible public debt issues from 1977 to 2004 for which data are available from the Securities Data Corporation database. Our focus is on the junk bond market, but we include investment-grade bonds in our sample to be sure that our results are unique to the junk bond market and not driven by macroeconomic factors affecting the bond market as a whole. We choose 1977 as the start

of the study period because that is the year Drexel first issued a junk bond. Bonds rated Ba (BB) or lower by either Moodys or Standard & Poor's (S&P) are classified as junk bonds. If the bond is not rated by either agency, it is not included in the sample. Following the previous literature, we eliminate firms in regulated or financial industries [single digit Standard industrial classification (SIC) codes 4 and 6]. This results in a sample of 5,835 issues, with 4,237 investment-grade bonds and 1,598 junk bonds.[9]

4.2. Summary statistics

Summary statistics showing the number of issues, average size, total size, and median underwriter fees for our sample of junk bonds are shown in Table 1 and for investment-grade bonds in Table 2. The junk bond market experienced tremendous growth in the 1980s. From 1980 to 1989, the amount of junk bonds issued in each year increased over 15 times. By contrast, the amount of investment-grade bonds issued doubled during this time. Also note the sudden growth in our sample of junk bonds issued in 1983, from $761 million in 1982 to almost $2 billion in 1983.[10] The amount of junk bond principal peaked in 1986 at just over $17 billion in our sample, declined to less than $16 billion in 1987 and to about $12 billion in 1988 and 1989. The market was virtually nonexistent in 1990, with only about $550 million in principal issued, coincident with Drexel's bankruptcy filing and liquidation that year. The market recovered quickly, however, with over $19 billion in new junk bond principal issued in 1992.

From 1977 to 1989, Drexel's market share of junk bond principal issued averaged 44%. In 1981, and 1984–1986, Drexel underwrote more junk bond principal than all other investment banks combined. At the height of the market in 1986, Drexel's market share was 53%, and then declined to 37% in 1987, 40% in 1988 and 38% in 1989. In the investment-grade bond market, Drexel had virtually no presence, issuing only 11 of the 1,167 investment-grade bonds in our sample from 1977 to 1989.

Commercial banks' share of junk bond principal issued averaged approximately 13% for the 1990s. Commercial banks had a market share for junk bonds of 7% in 1991 and 10% in 1992. After that, their market share remained near 10% until 1996, when it grew to 24%. Commercial bank share of junk issues in the 1990s peaked in 1997, at 34% of principal issued, before falling to 17% in 1998 and 15% in 1999. For investment-grade bonds, the commercial banks' share grew through the decade from 5% in 1992 to 18% in 1999.

The dramatic gains in commercial bank market share and the large reduction in fees following the 1999 repeal of Glass-Steagall are noteworthy, and could be evidence of pro-competitive pressures from completely unconstrained commercial banks. The equally dramatic drop in junk bond principal issued during this time, however, suggests caution in interpreting these results. Because we are most concerned with Drexel's impact of fees in the early 1990s, we leave the fee reduction following Glass-Steagall's repeal to future research and focus on the data prior to 2000.

Tables 1 and 2 indicate that the dollar volume of issues of investment-grade bonds by commercial banks usually was greater, and sometimes substantially greater, than the dollar

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[9]If we include regulated (SIC code 4) bonds, we add 478 junk bonds and 3,557 investment bonds. As a robustness check, we repeated our tests with these bonds included in our sample and our results are unchanged.

[10]For the junk bond market as a whole in 1983, New York times (1984) reported that "…Wall Street underwrote more than $7 billion of the low-rated, high-yielding bonds, more than in the previous four years combined."

Table 1
Summary statistics for junk bond issues

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1977 to 2004 rated as junk by Moody's or Standard and Poor's with data available in the Securities Data Company database. Total principal issued and median size are in millions of dollars. Median underwriter spread is the total underwriting fees for the issue as a percent of total principal issued. A dash (–) indicates a value of zero.

Year	Number of issues			Total principal issued			Median size			Median underwriter spread		
	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks
1977	5	6	–	105	193	–	20	30	–	3.0	2.4	–
1978	11	14	–	370	373	–	25	26	–	3.0	2.9	–
1979	5	12	–	115	364	–	20	25	–	3.3	3.0	–
1980	7	13	–	285	460	–	30	30	–	3.3	2.9	–
1981	8	4	–	480	290	–	63	80	–	2.7	2.4	–
1982	8	8	–	205	556	–	20	58	–	2.7	2.9	–
1983	13	12	–	770	1,105	–	60	83	–	3.0	2.5	–
1984	20	15	–	1,865	785	–	78	35	–	3.5	3.0	–
1985	33	32	–	3,553	2,195	–	75	50	–	3.3	2.8	–
1986	48	66	–	9,125	8,051	–	85	100	–	3.4	3.3	–
1987	31	54	–	5,923	9,923	–	100	125	–	3.5	3.5	–
1988	31	34	–	4,883	7,375	–	105	175	–	3.5	3.5	–
1989	18	33	–	4,366	7,254	–	158	200	–	3.5	3.5	–
1990	–	3	–	–	550	–	–	200	–	–	1.1	–
1991	–	27	4	–	7,109	575	–	200	150	–	2.0	2.7
1992	–	118	16	–	19,696	2,318	–	137	133	–	2.4	2.5

Table 1 (*continued*)

Year	Number of issues			Total principal issued			Median size			Median underwriter spread		
	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks
1993	–	157	24	–	29,192	3,803	–	125	133	–	2.7	2.6
1994	–	89	11	–	15,085	1,512	–	125	100	–	2.8	3.0
1995	–	49	12	–	9,858	1,901	–	150	118	–	2.4	2.9
1996	–	63	19	–	12,228	3,945	–	150	150	–	2.6	2.8
1997	–	64	38	–	12,300	6,435	–	150	128	–	2.5	3.0
1998	–	143	34	–	29,590	6,215	–	160	140	–	2.8	2.8
1999	–	56	13	–	14,122	2,565	–	200	150	–	2.5	2.0
2000	–	7	6	–	1,047	2,700	–	150	413	–	1.0	1.4
2001	–	12	12	–	2,917	2,954	–	200	200	–	1.0	1.1
2002	–	10	14	–	2,099	4,142	–	199	263	–	2.0	1.2
2003	–	11	17	–	2,080	5,066	–	150	250	–	1.8	1.8
2004	–	9	19	–	1,380	5,538	–	150	200	–	1.8	1.1
Totals 1977–1989	238	303	0	32,043	38,925	0						
Totals 1990–1999	0	769	171	0	149,728	29,268						
Totals 1997–1999	238	1,072	171	32,043	188,653	29,268						
Totals 2000–2004	0	49	68	0	9,523	20,400						
Totals 1977–2004	238	1,121	239	32,043	198,175	49,667						

Table 2

Summary for investment-grade bond issues

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1977 to 2004 rated as investment-grade by Moody's or Standard and Poor's with data available in the Securities Data Company database. Total principal issued and median size are in millions of dollars. Median underwriter spread is the total underwriting fees for the issue as a percent of total principal issued. A dash (–) indicates a value of zero.

Year	Number of issues			Total principal issued			Median size			Median underwriter spread		
	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks
1977	–	36	–	–	4,376	–	–	100	–	–	0.9	–
1978	–	23	–	–	2,790	–	–	100	–	–	0.9	–
1979	–	32	–	–	5,035	–	–	125	–	–	0.9	–
1980	–	86	–	–	11,093	–	–	100	–	–	0.7	–
1981	–	61	–	–	11,405	–	–	175	–	–	0.7	–
1982	–	85	–	–	9,512	–	–	100	–	–	0.7	–
1983	–	49	–	–	5,195	–	–	100	–	–	0.8	–
1984	–	61	–	–	8,880	–	–	100	–	–	0.7	–
1985	–	130	–	–	18,149	–	–	100	–	–	0.7	–
1986	5	230	–	2,700	34,272	–	600	100	–	1.8	0.7	–
1987	1	152	–	50	21,800	–	50	115	–	0.7	0.7	–
1988	2	122	–	200	21,303	–	100	150	–	0.7	0.7	–
1989	3	100	–	825	18,101	–	175	150	–	0.7	0.7	–
1990	–	101	–	–	19,580	–	–	175	–	–	0.7	–
1991	–	202	8	–	40,301	1,225	–	200	138	–	0.7	0.8
1992	–	205	14	–	44,343	2,350	–	200	175	–	0.7	0.6

Table 2 (*continued*)

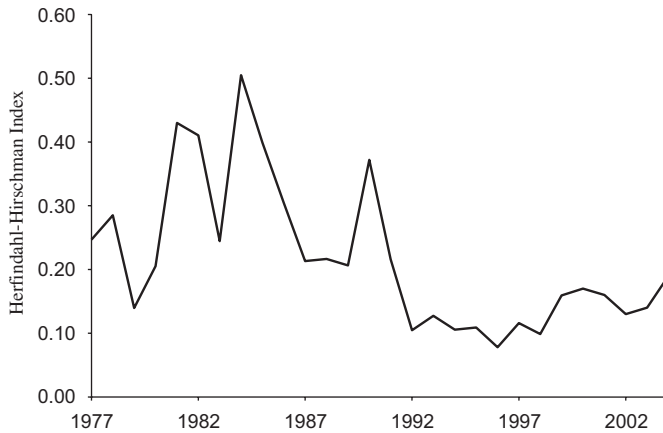| Year	Number of issues			Total principal issued			Median size			Median underwriter spread		
	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks	Drexel	Non-Drexel investment banks	Commercial banks
1993	–	219	17	–	44,154	2,825	–	175	150	–	0.7	0.7
1994	–	97	6	–	15,715	955	–	150	150	–	0.7	0.7
1995	–	171	46	–	33,223	3,430	–	150	38	–	0.7	0.6
1996	–	162	37	–	39,398	5,560	–	200	150	–	0.7	0.7
1997	–	227	68	–	38,259	6,264	–	150	100	–	0.7	0.6
1998	–	347	101	–	64,981	10,865	–	150	38	–	0.6	0.6
1999	–	226	69	–	62,626	14,165	–	200	150	–	0.6	0.6
2000	–	75	42	–	24,852	19,587	–	250	325	–	0.6	0.6
2001	–	92	113	–	43,906	63,613	–	397	400	–	0.6	0.6
2002	–	96	104	–	24,943	52,784	–	236	399	–	0.6	0.6
2003	–	39	118	–	18,230	54,927	–	200	349	–	0.6	0.6
2004	–	14	43	–	5,229	16,757	–	249	399	–	0.6	0.7
Totals 1977–1989	11	1,167	0	3,775	171,911	0	–	–	–	–	–	–
Totals 1990–1999	0	1,957	366	0	402,581	47,638	–	–	–	–	–	–
Totals 1997–1999	11	3,124	366	3,775	574,491	47,638	–	–	–	–	–	–
Totals 2000–2004	0	316	420	0	117,160	207,668	–	–	–	–	–	–
Totals 1977–2004	11	3,440	786	3,775	691,650	255,307	–	–	–	–	–	–

Fig. 1. The figure plots the Herfindahl-Hirschman Index in the junk bond market for each year from 1977 to 2004.

volume of junk bonds issued by commercial banks. This fact would seem to contradict the view of Gande, Puri, and Saunders (1999) that the monitoring advantage of commercial banks would tend to make them concentrate their underwriting efforts in the high-yield bond market.

Tables 1 and 2 show that investment banks had a long history of underwriting both junk bonds and investment-grade bonds before 1990. Investment banks also engaged in a large amount of underwriting of junk and investment-grade bonds during the early 1990s. This extensive experience in underwriting of corporate bonds provided a reputation advantage, as well as an extensive network of contacts among both issuers of bonds and buyers of bonds. When commercial banks began to underwrite corporate bonds in the early 1990s, the reputation and contact advantages of investment banks were a significant obstacle.

4.3. Market concentration

Our major point is that the underwriting of junk bonds changed suddenly and dramatically in 1990. Examining the change in market concentration shows this shift more clearly.

A commonly used measure of market concentration, the Herfindahl-Hirschman (Herf) Index,[11] is shown for each year from 1977 to 1999 in Fig. 1. In the case of a monopoly, the Herfindahl-Hirschman Index is equal to 1.0 and in the case of perfect competition with n firms in the industry the index approaches $1/n^2$. It is clear from Fig. 1 that the junk bond market was clearly more concentrated prior to Drexel's bankruptcy in 1990.

To see the extent of the change in market concentration after Drexel's bankruptcy, we compute the Herfindahl-Hirschman Index for the period 1977–1989 and the period 1991–1999. The Herfindahl-Hirschman Index averaged 0.29% from 1977 to 1989 versus an annual average of 0.14% from 1991 to 1999. To highlight Drexel's impact on market concentration, we sort our sample by descending market share, and then calculate the

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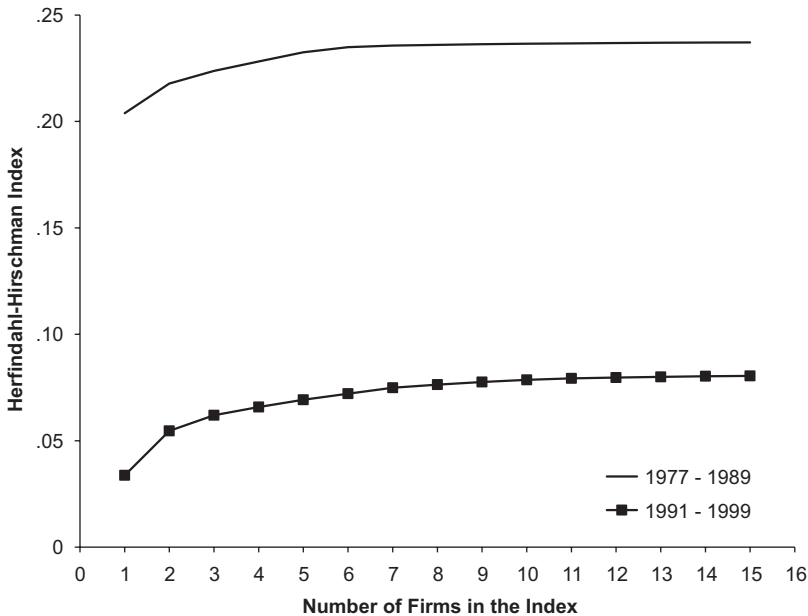[11]The Herf index is calculated as $\text{Herf} = \sum \text{share}_i^2$.

Fig. 2. The figure plots the Herfindahl-Hirschman Index in the junk bond market as a function of the number of firms included in the index for the periods 1980–1989 and 1991–1999

Herfindahl-Hirschman Index as a function of the number of firms in the index, based on the highest firm's market share, and then the highest two firms, and so on.[12] The results, shown in Fig. 2, show the striking difference between the 1980s market, dominated by a single firm, and the less concentrated 1990s market.

4.4. Median fees

Median underwriter fees for junk bonds follow the same time pattern as the change in junk bond market concentration. Fig. 3 is a graph of the median underwriter fee (as a percent of principal) in the junk bond and investment-grade bond markets from 1977 to 2002. The median fee fell dramatically in the junk market after Drexel's bankruptcy and liquidation in 1990, from 3.50% in 1989 to 2.00% in 1991 and 2.39% in 1992. For investment-grade issues, however, the decline in underwriter fees began earlier, falling from 0.88% in 1979 to 0.68% in 1981, and then to 0.65% in 1988. The median investment-grade fee remained at 0.65% from 1988 to 1997, and then fell to 0.63% in 1998.

Evidence that Drexel's market dominance affected other underwriters' fees is shown in Fig. 4, which plots the median fee charged by Drexel versus those charged by other investment banks. Drexel's median fee for junk bond issues was consistently higher than other underwriters' fees from 1983 to 1986. From 1987 to 1989, however, other underwriters matched Drexel's median fee of 3.5%. This result is also apparent in the last two columns of Table 1.

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[12]Formally $\text{Herf}_i = \sum_1^i (\text{share}_i^2)$, where i is the number of firms included in the index, sorted from highest to lowest market share.
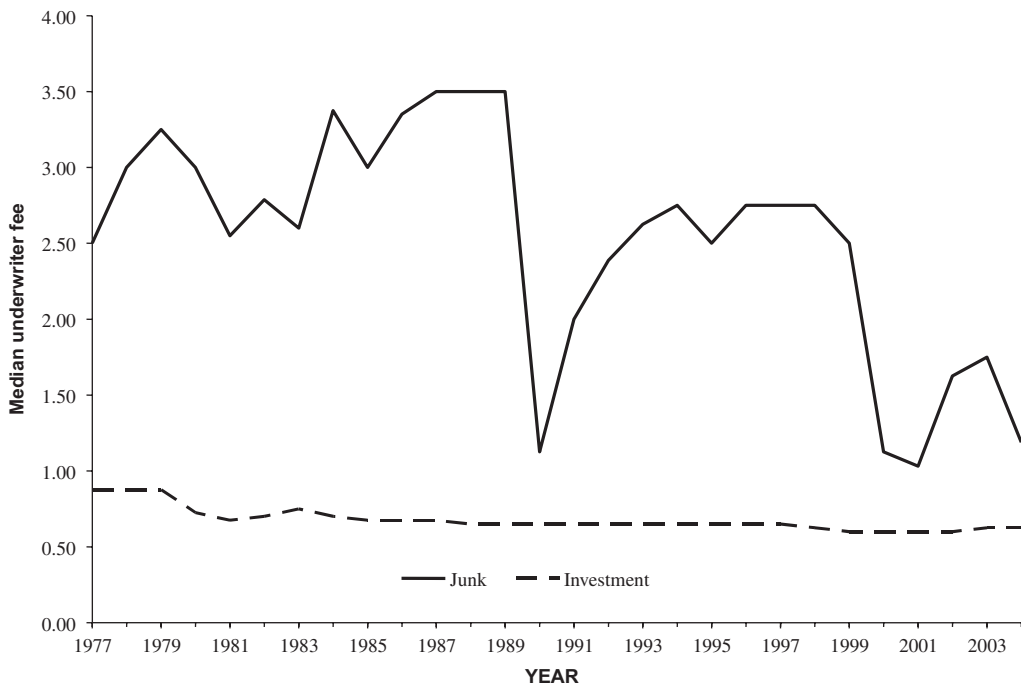
Fig. 3. The figure plots the median underwriter fee as a percent of principal for junk bond issues and investment-grade issues.

Fig. 4. The figure plots the median underwriting fee for junk bond Drexel Burnham Lambert issues versus the median fee of junk bond issues from all other underwriters, 1977–1989.

5. Underwriting fee analysis

This section uses regression analysis to examine the changes in underwriting fees over time from 1977 to 1999 for both junk bonds and investment-grade bonds. We want to see whether there was a significant and permanent drop in underwriter fees for junk bonds when Drexel went bankrupt in 1990 and whether a parallel change occurred in underwriter fees for investment-grade bonds.

5.1. Fee regressions

The regression in Eq. (1) uses well-known control variables to analyze underwriter fees.

$$
\begin{aligned}
\text{UnderwriterSpread} = {} & \alpha_0 + \beta_{cr}\text{RatingDummies} \\
& + \beta_{split}\textit{SplitDummiess} + \beta_1\text{Log(Maturity)} + \beta_2\text{Log(Size)} \\
& + \beta_3\text{IPO\_Flag} + \beta_{ind}\text{IndustryDummies} + \beta_{year}\text{YearDummies}
\end{aligned}
$$

$$(1)$$

We define our control variables as follows:

RatingDummies	a dummy variable for each bond rating. For example, DummyB equals one if the issue is rated B and equals zero otherwise.
SplitDummies	a dummy variable indicating that Moody's rating of the issue is not the same as the S&P rating. For example, SplitBB_B equals one when the bond received a BB rating from one agency and a B rating from the other, and it equals zero otherwise.
Log(Maturity)	the natural log of the years to maturity of the issue
Log(Size)	the natural log of the principal amount of the issue
IPO_Flag	a dummy variable that equals one if the issue is the first debt issue by the issuer since 1970; equals zero otherwise
IndustryDummies	a dummy variable for each single-digit SIC code. For example, SIC3 equals one if the issuer has a single-digit SIC code of 3 and equals zero otherwise
YearDummies	a dummy variable for each year. For example, Dummy80 equals one if the bond was issued between January 1, 1980 and December 31, 1980, and it equals zero otherwise. The base case is 1999, so that a positive coefficient indicates higher fees compared with 1999

The results of Eq. (1) are reported in Table 3 for junk bonds and Table 4 for investment-grade bonds.

The change in the level of underwriting fees through the time period is the most pertinent variable for our paper. Because the omitted year dummy is year99, all of the coefficients on the year dummies are relative to the fee level in 1999.

In the junk bond sample, the coefficients on the year dummies show that fees were above 1999 levels for most of the sample period. The highest fees occurred in the period from 1986 to 1989, while the lowest fees (after 1983) occurred in 1992, 1997, and 1998. Fees dropped significantly at the time of Drexel's exit. In Drexel's final year, 1989, the

Table 3

Ordinary least squares regression of underwriting spreads of junk bonds 1977–2004

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1977 to 2004 rated as junk by Moody's or Standard and Poor's with data available in the Securities Data Company database. The regression takes the following form:

$$\text{UnderwriterSpread} = \alpha_0 + \beta_{cr}\text{RatingDummies} + \beta_{split}\text{SplitDummies} + \beta_1\text{Log(Maturity)} + \beta_2\text{Log(Size)}$$
$$+ \beta_3\text{IPO\_Flag} + \beta_{ind}\text{IndustryDummies} + \beta_{year}\text{YearDummies}.$$

UnderwriterSpread is the total underwriting fee as a percent of the total principal amount issued. RatingDummies are dummy variables for each Moody rating level. SplitDummies are dummy variables indicating the bond was rated differently by each agency. Log(Maturity) is the natural log of time to maturity of the bond in years. Log(Size) is the natural log of the principal size of the issue, in millions of dollars. IPO_Flag is a dummy variable equal to one if the issue was the first debt issue by the firm since 1970 and equals zero otherwise. IndustryDummies are dummy variables (not reported) for each one-digit standard industrial classification code. YearDummies are dummy variables for each year from 1977 to 2004. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively. The omitted dummies are SplitBBB_BB, SIC0, and Year1999.

Parameter	Estimate	t-Statistic
Intercept	0.66	2.79***
DummyBa	0.97	17.46***
SplitBa_B	1.44	22.92***
DummyB	1.72	34.01***
SplitB_CCC	1.87	23.20***
DummyC	2.14	16.02***
Log(Maturity)	0.17	3.88***
Log(size)	−0.06	−3.17***
IPO_Flag	0.20	6.84***
Year77	0.14	0.80
Year78	0.52	3.94***
Year79	0.55	3.67***
Year80	0.30	2.12**
Year81	0.07	0.42
Year82	0.06	0.42
Year83	0.29	2.29**
Year84	0.63	5.69***
Year85	0.53	5.70***
Year86	0.70	8.62***
Year87	0.84	9.88***
Year88	0.85	9.31***
Year89	0.88	9.18***
Year90	0.17	0.56
Year91	0.26	2.27**
Year92	0.08	0.98
Year93	0.23	3.07***
Year94	0.27	3.38***
Year95	0.25	2.77***
Year96	0.22	2.56**
Year97	0.13	1.63*
Year98	0.10	1.39
Year00	−0.41	−2.62***
Year01	−0.35	−2.82***
Year02	−0.12	0.96
Year03	0.01	0.10
Year04	−0.47	−3.95***
Number of observations		1,598
R^2		0.68

Table 4

Ordinary least squares regression of underwriting spreads of investment grade bonds 1977–2004

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1977 to 2004 rated as investment-grade by Moody's or Standard and Poor's with data available in the Securities Data Company database. The regression takes the following form:

$$\text{UnderwriterSpread} = \alpha_0 + \beta_{cr}\text{RatingDummies} + \beta_{split}\text{SplitDummies} + \beta_1\text{Log(Maturity)} + \beta_2\text{Log(Size)}$$
$$+ \beta_3\text{IPO\_Flag} + \beta_{ind}\text{IndustryDummies} + \beta_{year}\text{YearDummies}.$$

UnderwriterSpread is the total underwriting fee as a percent of the total principal amount issued. RatingDummies are dummy variables for each Moody rating level. SplitDummies are dummy variables indicating the bond was rated differently by each agency. Log(Maturity) is the natural log of time to maturity of the bond in years. Log(Size) is the natural log of the principal size of the issue, in millions of dollars. IPO_Flag is a dummy variable equal to one if the issue was the first debt issue by the firm since 1970 and equals zero otherwise. IndustryDummies are dummy variables (not reported) for each one-digit standard industrial classification code. YearDummies are dummy variables for each year from 1977–2004. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively. The omitted dummies are SplitBBB_BB, SIC0, and Year1999.

Parameter	Estimate	t-Statistic
Intercept	0.10	1.77*
DummyAaa_Aa	0.08	1.54
DummyAa	0.01	0.25
DummyAaa_A	0.08	0.58
DummyAa_a	0.00	0.02
DummyAa	0.03	1.10
DummyAa_Baa	−0.07	−0.59
DummyA_Baa	0.06	2.24**
DummyBaa	0.08	3.50***
Log(Maturity)	0.22	45.53***
Log(Size)	−0.01	−1.71*
IPO_Flag	0.01	1.41
Year77	0.12	2.85***
Year78	0.10	1.96**
Year79	0.10	2.28**
Year80	0.09	3.19***
Year81	−0.02	−0.64
Year82	0.05	1.78*
Year83	0.03	0.87
Year84	0.15	4.64***
Year85	0.09	3.58***
Year86	0.08	3.96***
Year87	0.10	4.43***
Year88	0.05	1.89*
Year89	0.02	0.96
Year90	0.06	2.36**
Year91	0.02	0.76
Year92	0.01	0.31
Year93	0.01	0.53
Year94	0.00	−0.11
Year95	−0.01	−0.53
Year96	−0.02	−0.83
Year97	−0.01	−0.59
Year98	−0.01	−0.46
Year00	0.02	0.74

Table 4 (*continued*)

Parameter	Estimate	*t*-Statistic
Year01	0.09	4.31***
Year02	0.01	0.57
Year03	0.03	1.26
Year04	0.08	2.44**
Number of observations		4,205
R^2		0.42

coefficient for the year dummy variable is 0.89. As the junk bond market recovered from collapse in 1990, fee levels were suddenly and dramatically lower, with a coefficient of 0.26 for the year 1991, indicating a drop of 63 basis points from 1989 to 1991. Fees stayed well below the 1989 level throughout the 1990s, ranging from a coefficient of 0.07 on the 1992 year dummy (and not significantly different from zero, i.e., not different from 1999 levels) to a coefficient of 0.28 for the 1994 year dummy.

We also report investment-grade bond fee levels in Table 4. In general, investment-grade fees changed only slightly over our sample period, with coefficients ranging from 0.15 for the 1984 year dummy variable to −0.01 (and not significant) for the 1981 and 1996 year dummy variables. Fees for investment-grade bonds dropped in 1988, from a coefficient of 0.11 for the 1987 year dummy to 0.05 for the 1989 year dummy. After 1988, the coefficients are significantly different from zero only for the 1990 year dummy variable (0.06), indicating that fees from 1991 through 1998 are not different from 1999 levels.

Thus, a major difference occurred in the time pattern of fees for junk bonds versus investment-grade bonds. The underwriter fees for junk bonds experienced a sudden, dramatic, and permanent decline following the bankruptcy and liquidation of Drexel Burnham Lambert in 1990. In contrast, the underwriter fees for investment-grade bonds were virtually the same for the entire time period from 1988 through 1999.

5.2. Fees by individual underwriters

To show more clearly the sudden change in pricing of junk bond underwriting by investment banks in the early 1990s, Table 5 analyzes the fees charged by the leading investment banks for each year from 1987 to 1993. Commercial bank entrants are reported in boldface in the table. The sudden change in pricing is evident, as all of the investment banks' median fees fell from around 3.5% in 1989 to about 2.5% in 1991.[13]

To be sure that we are properly accounting for issue characteristics between underwriters, the difference between the actual median fee charged by the underwriter and the predicted median fee based on 1980s pricing is reported at the bottom of Table 5. We calculate the predicted median fee as follows. First, we run Eq. (1) on our sample of bonds from 1977 to 1989. We use the coefficients from that regression to calculate the

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[13]The JP Morgan median fee in 1991 could suggest commercial bank pressure to lower fees. In 1991, however, JP Morgan issued only a single bond in our sample of junk bonds, and the bond is split rated, so one agency rated it as investment-grade (BBB). The JP Morgan bond's median fee minus predicted fee (shown in the bottom panel of Table 5) is not unusually different than those from investment banks in 1991.

Table 5

Median junk bond underwriting fees 1987–1993

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1987 to 1993 with data available in the Securities Data Company database. Investment bank underwriters are in normal type; commercial bank underwriters are in boldface. Panel A reports the median underwriter fee in percent of principal. Panel B reports the actual median fee – the predicted fee. Predicted fee is the predicted value based on the following regression of the junk bonds issued from 1977 to 1989

$$UnderwriterSpread = \alpha_0 + \beta_{cr}RatingDummies + \beta_{split}SplitDummies + \beta_1 Log(Maturity) + \beta_2 Log(Size)$$
$$+ \beta_3 IPO\_Flag + \beta_{ind}IndustryDummies + \beta_{year}YearDummies.$$

UnderwriterSpread is the total underwriting fee as a percent of the total principal amount issued. RatingDummies are dummy variables for each Moody rating level. SplitDummies are dummy variables indicating the bond was rated differently by each agency. Log(Maturity) is the natural log of time to maturity of the bond in years. Log(Size) is the natural log of the principal size of the issue, in millions of dollars. IPO_Flag is a dummy variable equal to one if the issue was the first debt issue by the firm since 1970 and equals zero otherwise. IndustryDummies are dummy variables (not reported) for each one-digit standard industrial classification code. YearDummies are dummy variables for each year from 1977 to 1989. The omitted dummies are SplitBBB_BB, SIC0, and Year1989. A dash (-) indicates that we have no bond in our sample with that lead underwriter for that year.

Underwriter	1987	1988	1989	1990	1991	1992	1993
A. Median underwriter fee							
Bear Stearns & Co. Inc.	3.4	3.0	3.0	–	–	2.5	3.0
Dillion, Reed & Co. Inc.	–	–	3.5	–	2.5	2.9	2.8
Donaldson Lufkin & Jenrette Inc.	3.1	3.4	3.5	–	2.2	2.8	2.8
Drexel Burnham Lambert	3.5	3.5	3.5	–	–	–	–
First Boston Corp.	3.5	3.5	3.5		2.4	2.0	2.6
Goldman Sachs & Co.	3.2	3.1	3.5	2.5	2.0	1.8	2.3
Kidder Peabody & Co. Inc.	3.5	3.5	–	–	–	2.6	2.9
Lehman Brothers	–	–	–	–	1.2	2.3	2.7
Merrill Lynch & Co. Inc.	3.5	3.0	3.5	1.1	2.0	2.5	2.3
Morgan Stanley & Co.	3.5	4.0	3.8	–	2.6	2.4	2.8
PaineWebber Inc.	3.5	3.5	3.0	–	–	2.8	2.8
Salomon Brothers Inc.	2.9	3.5	3.0	0.5	2.0	2.5	2.3
BT Securities Corp.	–	–	–	–	2.7	2.4	3.0
Chase Securities Inc.	–	–	–	–	–	–	2.6
Citicorp Securities Markets Inc.	–	–	–	–	3.0	2.9	2.2
JP Morgan Securities Inc.	–	–	–	–	0.9	2.3	1.1
B.Median fee–predicted median fee							
Bear Stearns & Co. Inc.	−0.4	−0.4	−0.4	–	–	−1.0	−0.5
Dillon, Read & Co. Inc.	0.0	–	0.0	–	−0.5	−0.2	−0.3
Donaldson Lufkin & Jenrette Inc.	−0.3	0.3	0.0	–	−0.9	−0.7	−0.7
Drexel Burnham Lambert	0.0	0.1	0.2	–	–	–	–
First Boston Corp.	0.1	0.1	0.1	–	−0.9	−0.6	−0.8
Goldman Sachs & Co.	−0.2	−0.4	0.0	−0.9	−0.7	−1.3	−1.2
Kidder Peabody & Co. Inc.	−0.1	0.0	–	–	–	−0.9	−0.6
Lehman Brothers	–	–	–	–	−1.3	−1.0	−0.7
Merrill Lynch & Co. Inc.	0.1	−0.3	−0.1	−0.7	−0.5	−0.8	−0.6
Morgan Stanley & Co.	0.2	0.7	0.4	–	−0.2	−0.9	−0.6
Paine Webber Inc.	0.0	−0.1	−0.5	–	–	−0.8	−0.4
Salomon Brothers Inc.	−0.4	0.2	−0.4	−1.0	−1.0	−0.7	−1.0
BT Securities Corp.	–	–	–	–	−0.4	−1.0	−0.5
Chase Securities Inc.	–	–	–	–	–	–	−0.8
Citicorp Securities Markets Inc.	–	–	–	–	0.3	−0.5	−1.2
JP Morgan Securities Inc.	–	–	–	–	−0.8	−0.7	−0.8

predicted fee for each bond issued after 1989 and report the difference between the actual median fee and the median predicted fee in the table. In 1991, all of the investment bank differences are negative, indicating that actual fees were lower than would be expected given the 1980s pricing benchmark. All but one of the banks (Morgan Stanley, with a difference of -0.2%) had a difference of at least -0.5%. This evidence suggests that underwriters lowered their percentage fees in 1991 to capture the market share left after from Drexel's exit and captured more total underwriting revenue.

To show this point more clearly, Table 6 presents the total fees earned by the leading investment banks in the time period when they were competing with Drexel, (1987–1989) compared with the total fees earned in the time period immediately following Drexel's exit (1991–1993). Of the ten investment banks competing with Drexel from 1987 to 1989 that also underwrote issues in between 1991 and 1993, only CS First Boston experienced a large reduction in total fees following Drexel's liquidation. Among the other underwriters, Paine Webber and Morgan Stanley each experienced a small drop in the post-Drexel period (10% and 8%, respectively), but the other seven underwriters achieved an average growth in total fees of 280% over the 1987–1989 period. These gains cannot be attributed to

Table 6

Junk bond underwriting fees 1987–1993 by lead underwriters

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1987 to 1993 with data available in the Securities Data Company database. Investment bank underwriters are in normal type; commercial bank underwriters are in boldface. Total fees (in millions) is the sum of the underwriting fee in percent of principal times the principal issued for each issue for each investment bank.

Underwriter	1987–1989	1991–1993	1987–1993	% change 1987–1989 to 1991–1993
Drexel Burnham Lambert Inc.	515.5	0.0	515.5	−100
Merrill Lynch & Co Inc.	110.5	279.7	390.1	153
Morgan Stanley & Co.	164.0	151.4	315.4	−8
CS First Boston Corp.	220.0	65.9	285.9	−70
Goldman Sachs & Co.	128.1	145.4	273.5	14
Donaldson Lufkin & Jenrette Inc.	28.0	189.8	217.8	578
Salomon Brothers Inc.	63.1	89.8	152.9	42
Bear Stearns & Co Inc.	16.3	63.8	80.1	291
Lehman Brothers	0.0	77.1	77.1	–
Kidder Peabody & Co Inc.	20.9	26.3	47.1	26
Dillon, Read & Co Inc.	3.5	33.6	37.1	859
Jefferies & Co Inc.	0.0	21.4	21.4	–
PaineWebber Inc.	10.3	9.2	19.5	−10
Alex Brown & Sons Inc.	0.0	5.0	5.0	–
Wertheim Schroder & Co. (UK)	0.0	3.8	3.8	–
Dean Witter Reynolds Inc.	2.5	0.0	2.5	−100
Smith Barney Shearson	0.0	2.4	2.4	–
JC Bradford & Co.	0.0	1.8	1.8	–
Dain Bosworth Inc.	0.0	1.6	1.6	–
Interstate/Johnson Lane Inc.	0.0	0.7	0.7	–
Citicorp Securities Markets Inc.	0.0	58.1	58.1	–
BT Securities Corp.	0.0	56.6	56.6	–
JP Morgan Securities Inc.	0.0	21.7	21.7	–
Chase Securities Inc.	0.0	13.0	13.0	–
Total	1,282.6	1,317.8	2,600.3	3

growth in the junk bond market. Junk bond principal issued in 1991–1993 increased by 58% over 1987–1989, but the dramatic drop in fees as a percent of principal at this same time would mean total revenues from fees would have increased only 3% if market share of these investment banks had remained the same. With Drexel's share of those fees now available, however, the major investment banks made extraordinary gains in total underwriting revenues from underwriting junk bonds, even though they charged lower percentage fees. The reduction in percentage underwriting fees in 1991 was not a defensive reaction to commercial bank entry, but an aggressive move that resulted in dramatic gains in revenue for most of the investment banks.

5.3. The 1986–1989 time period

Next, we consider the trend in fees between the Drexel issues and those issued by other investment bankers as the junk bond market matured in the 1980s. Table 1 shows that Drexel's median fee was 3.5% in four of the six years following 1983. The exceptions were close to 3.5% (3.3% in 1985 and 3.4% in 1986). The non-Drexel median underwriting fee started below this level, at 2.5% in 1983, but climbed to match Drexel's fee of 3.5% in 1987 and remained at that level in 1988 and 1989. In 1984, 24% of junk bonds in our sample paid an underwriter fee of exactly 3.50%. This rose to 36% in 1987, and by 1989, 49% of the junk bonds in our sample paid an underwriting fee of exactly 3.50%. This pronounced effect is visible in Fig. 2, which graphs the median fee of Drexel and non-Drexel bonds during our sample period and shows how the median non-Drexel fee increased after 1983 until it was equal to the median Drexel fee from 1987 to 1989. Table 1 shows a similar result. This trend suggests that other underwriters undercut Drexel's fees in the early 1980s but found this less necessary as Drexel's legal problems mounted. Apparently, as Drexel faced more legal difficulties, its ability to use non-price competition to attract business was weakened.

To see this difference in fees after controlling for other factors that could affect underwriting fees, we added two variables to Eq. (1).

NonDrex   Dummy variable equal to one if the issuer is not Drexel; equal to zero otherwise (that is, the issuer is Drexel)

NonDrexYear   The interaction between NonDrex and YearDummies

We ran the following regression

$$\text{UnderwriterSpread} = \alpha_0 + \beta_{cr}\text{RatingDummies}$$
$$+ \beta_{\text{split}}\text{SplitDummies} + \beta_1\text{Log(Maturity)} + \beta_2\text{Log(Size)}$$
$$+ \beta_3\text{IPO\_Flag} + \beta_{\text{ind}}\text{IndustryDummies} + \beta_{\text{year}}\text{YearDummies}$$
$$+ \beta_{\text{ND}}\text{NonDrex} + \beta_{\text{NDYear}}\text{NonDrexYear}. \qquad (2)$$

The regression is designed so that the difference between the level of fees of non-Drexel and Drexel underwriters for each year is the sum of the NonDrex and NonDrexYear coefficients. This sum is negative if Drexel's fees are higher. The sum is more negative as the difference in fees increases. The results for the sum are reported in Table 7. The raw results of the regression are shown in Appendix A. The findings in Table 7 confirm our assertion that fees charged by other investment bankers grew closer to Drexel's fees over

Table 7

Annual differences in junk bond underwriting fees; Drexel versus all other investment banks

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1977 to 1989 rated as junk by Moody's or Standard and Poor's with data available in Securities Data Company database. The regression takes the following form:

$$\text{UnderwriterSpread} = \alpha_0 + \beta_{cr}\text{RatingDummies} + \beta_{split}\text{SplitDummies} + \beta_1\text{Log(Maturity)} + \beta_2\text{Log(Size)}$$
$$+ \beta_3\text{IPO\_Flag} + \beta_{ind}\text{IndustryDummies} + \beta_{year}\text{YearDummies} + \beta_{ND}\text{NonDrex}$$
$$+ \beta_{NDYear}\text{NonDrexYear}.$$

All of the variables are identical to those defined in Table 3, with the addition of NonDrex and NonDrexYear. NonDrex is a dummy variable indicating that the lead underwriter of the issue is not Drexel Burnham Lambert. NonDrexYear is the product of the NonDrex dummy variable and the Year dummy. For simplicity, we report only the value of NonDrex + NonDrexYear, which equals the average difference between the underwriting fee of non-Drexel underwriters minus Drexel's underwriting fee for that year, after controlling for issue-specific factors. F-values test the significance of this average difference in fees, a test of NonDrex + NonDrexYear equals zero. [*], [**], [***] indicate significance at the 10%, 5%, and 1% level, respectively. The omitted dummies are SplitBBB_BB, SIC0, Year1989, and NonYear89.

Year	Non-Drexel fees minus Drexel fees	F-Value
1977	−0.27	0.93
1978	0.28	2.23
1979	−0.04	0.03
1980	−0.28	1.67
1981	0.18	0.42
1982	0.27	1.20
1983	−0.08	0.18
1984	−0.64	15.84[***]
1985	−0.49	17.60[***]
1986	−0.33	14.12[***]
1987	−0.26	6.08[**]
1988	−0.06	0.24

time. The differences between the non-Drexel and Drexel fees were negative and significant from 1984 to 1987, indicating that Drexel's fees were higher. In 1986, however, the difference narrowed to a little more than half of what it was in 1984. By 1988 the difference was not significantly different from zero. Because Drexel's fees were the same throughout the period, the fees of the other investment banking firms were approaching Drexel's fees. Other investment bankers initially competed on price (fees) with Drexel to capture a share in the fast-growing junk market after 1983. Beginning in 1986, however, as Drexel's legal problems grew, other investment bankers found it increasingly less necessary to compete on price. By 1988, no difference existed between Drexel's fees and those of other investment bankers.

6. Commercial bank entry

This section examines the claim that commercial bank entry into underwriting of corporate bonds resulted in lower underwriting fees in 1991. We show that the evidence for

commercial bank entry is not robust to the choice of sample period and is actually a proxy for Drexel's exit. We also point out that commercial bank share in the early 1990s was small and constrained by regulation, and it would seem to have posed little threat to established commercial banks.

6.1. Commercial bank fee regressions

Gande, Puri, and Saunders (1999) use a sample of junk bonds for the period from 1985 to 1996 to test for the impact of commercial bank entry upon underwriter fees. We repeat their methodology using our data. Gande, Puri, and Saunders (1999) ran the following regression in Eq. (3).

$$
\begin{aligned}
\text{UnderwriterSpread} = {}& \alpha_0 + \beta_{cr}\text{RatingDummies} \\
& + \beta_1\text{HiMat} + \beta_2\text{LoMat} + \beta_3\text{Log(Size)} + \beta_4\text{IPOFlag} \\
& + \beta_5\text{LN(BANKSHARE)} + \beta_{ind}\text{IndustryDummies} + \beta_6\text{Time}
\end{aligned}
\tag{3}
$$

where HiMat is a dummy variable indicating the bond has a maturity greater than 15 years; LoMat is a dummy variable indicating the bond has a maturity less than 5 years; LN(BANKSHARE) is the natural log of 1 + the percent market shares of commercial banks; and time is the two digit year of the bond issue (e.g., if the bond was issued in 1987, time equals 87). The other control variables are the same as defined as in Eq. (1).[14]

Because Gande, Puri, and Saunders's regression coefficient for commercial bank market share was negative and significant, they conclude that commercial bank entry lowered junk bond underwriter fees. We show that the GPS results are a statistical artifact caused by including the years 1985 to 1990 when there were no commercial bank issues of junk bonds. Because junk bond fees were higher from 1985 to 1989, including these years biases the regression results.

To make the problem with the Gande, Puri, and Saunders approach explicit, we ran regression Eq. (3) using different measures of market share and different time periods. In Table 8 we report two regressions for junk bonds for the period 1985–1996. The first regression contains a variable for commercial bank share, which has a negative and significant coefficient almost identical to that of GPS. This negative coefficient was interpreted by GPS to mean that greater commercial bank share results in lower underwriter fees.

The second regression contains a variable for the market share of Drexel Burnham Lambert. The coefficient for this variable is positive and highly significant. Using the same logic as Gande, Puri, Saunders, one would conclude that higher market share from Drexel Burnham Lambert resulted in higher underwriter fees.

We are left with a puzzle. Did commercial bank entry cause fees to drop or did the market dominance of Drexel cause higher fees in the 1980s? These regressions do not provide a convincing answer because Drexel Burnham Lambert did not exist in the 1990s and commercial bank underwriting of corporate bonds did not occur before 1991.

---

[14]To replicate the GPS method, our rating dummies are now based only on the Moody's rating, instead of the average of the Moody and S&P rating.

Table 8

Market shares regressions.

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1985 to 1996 rated by Moody's with data available in Securities Data Company database. The regression takes the following form:

$$\text{UnderwriterSpread} = \alpha_0 + \beta_{cr}\text{RatingDummies} + \beta_1\text{HiMat} + \beta_2\text{LoMat} + \beta_3\text{Log(Size)}\beta_4\text{IPO\_Flag}$$
$$+ \beta_5\text{LN(MKTSHARE)} + \beta_{ind}\text{IndustryDummies} + \beta_6\text{Time}.$$

UnderwriterSpread is the total underwriting fee as a percent of the total principal amount issued. Rating-Dummies are dummy variables for each Moody rating level. LoMat (HiMat) is a dummy variable equal to one if the time to maturity for the issue is <5 (>15) years. Log(Size) is the natural log of the principal size of the issue, in millions of dollars. IPO_Flag is a dummy variable equals one if the issue was the first debt issue by the company since 1970; equals zero otherwise. LN(MKTSHARE) is the natural log of (1+ market share (in percent)) of commercial banks or Drexel for that year. IndustryDummies (not reported) are dummy variables for each single digit standard industrial classification code. Time takes the value of the two-digit year the bond was issued. The omitted dummies are DummyBB, SIC0, and Year96.

1985–1996 sample

Parameter	Bank share		Drexel share	
	Estimate	*t*-Value	Estimate	*t*-Value
Intercept	−1.89	−1.34	1.58	1.13
DummyB	0.83	20.31[***]	0.87	20.89[***]
DummyC	1.04	6.55[***]	1.08	6.66[***]
HiMat	−0.30	−3.08[***]	−0.32	−3.24[***]
LoMat	−0.60	−3.18[***]	−0.66	−3.42[***]
Log_size	−0.09	−3.37[***]	−0.05	−2.04[**]
IPO-Flag	0.22	−5.82[***]	0.21	5.38[***]
ln(bankshare)	−0.40	−9.03[***]		
ln(drexshare)				
Time	0.06	3.51[***]	0.01	0.54
Number of observations	950		950	
R^2	0.58		0.57	

Table 9 provides an answer. This table has two regressions. These regressions contain the explanatory variable commercial bank market share for the time intervals 1991–1996 and 1991–1999. In both regressions, the market share coefficient is insignificant. These regressions indicate that underwriting fees for junk bonds are not correlated with the market share of commercial banks. Only when using a sample period that straddles the step change in fees and market share that occurred from 1989 to 1991 does it appear that fees are correlated with the market share of commercial banks.

6.2. Commercial bank market share

In Table 10, we present the market share of commercial bank underwriters for the entire decade (1991 to 1999). The largest share of the investment bond market belonged to JP Morgan, with 7%. Each of the other commercial banks captured less than 2%

Table 9

Market share regressions, split time period

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1991 to 1999 rated by Moody's with data available in Securities Data Company database. The regression takes the following form:

$$UnderwriterSpread = \alpha_0 + \beta_{cr}RatingDummies + \beta_1 HiMat + \beta_2 LoMat + \beta_3 Log(Size)\beta_4 IPO\_Flag$$
$$+ \beta_5 LN(MKTSHARE) + \beta_{ind}IndustryDummies + \beta_6 Time.$$

UnderwriterSpread is the total underwriting fee as a percent of the total principal amount issued. Rating-Dummies are dummy variables for each Moody rating level. LoMat (HiMat) is a dummy variable equal to one if the time to maturity for the issue is <5 (>15) years. Log(Size) is the natural log of the principal size of the issue, in millions of dollars. IPO_Flag is a dummy variable equals one if the issue was the first debt issue by the company since 1970; equals zero otherwise. LN(MKTSHARE) is the natural log of $(1+$ market share (in percent)) of commercial banks for that year. IndustryDummies (not reported) are dummy variables for each single digit standard industrial classification code. Time takes the value of the two-digit year the bond was issued. The omitted dummies are DummyBB, SIC0, and the final year of the sample.

Parameter	1991–1996 sample		1991–1999 sample	
	Estimate	*t*-Value	Estimate	*t*-Value
Intercept	0.35	0.15	3.37	3.59[***]
DummyB	0.86	17.05[***]	0.88	20.06[***]
DummyC	1.12	4.43[***]	1.13	6.31[***]
HiMat	−0.66	−4.35[***]	−0.57	−4.40[***]
LoMat	−0.44	−1.57	−0.47	−1.98[**]
Log_size	−0.13	−3.21[***]	−0.05	−1.45
IPO_Flag	0.26	5.33[***]	0.27	6.35[***]
ln(bankshare)	−0.14	−1.08	0.02	0.25
Time	0.03	0.98	−0.02	−1.73[*]
Number of observations	571		901	
R^2	0.49		0.45	

of the investment market during this time. For junk bonds, the highest market share for commercial banks belonged to Chase, with 5.3%, followed by Bankers Trust with 3.6% and JP Morgan with 2.5%. Each of the other commercial banks had individual market shares for the decade of less than 2%. The small market share of commercial banks strongly suggests that commercial banks did not have enough market share to significantly reduce underwriter fees.

Table 11 presents the market share of the top 20 underwriters in the junk bond market for each year from 1991 to 1999. Commercial bank market shares are shown toward the bottom of the table. The total market share for commercial banks is shown as the very last row of the table.

On average, commercial banks as a whole had a 15.6% market share of the junk bond market for the decade, but the largest average market share for an individual commercial bank was Chase with 4.8% for the decade. In 1991 and 1992, when underwriting fees for junk bonds suddenly and dramatically fell, the highest market share by an individual commercial bank was 3.9% by Banker's Trust in 1991. This ranked eighth in market share for the year, behind seven investment banks and was

Table 10

Commercial bank bond underwriters 1991–1999

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1991 to 1999 with data available in Securities Data Company database. Principal issued and median size are in millions of dollars. Rating is a numerical assignment to Moody's rating: Aaa equals 1 through Caa equals 7. Split-rated bonds are assigned the average value of the two ratings. Median underwriter (uw) fee is the total underwriting fee for the issue in percent of total principal issued. Market share (in percent) is the amount of principal issued by the underwriter divided by the total principal issued.

	Number of issues	Principal issued (millions of dollars)	Median size (millions of dollars)	Median rating	Median UW fee (percentage)	Market share (percentage)
Investment -grade bonds						
JP Morgan	211	32,706	125	3.0	0.7	7.0
Chase	77	7,820	50	3.0	0.6	1.8
Bank of America	22	2,467	38	4.0	0.5	0.6
Nations Bank	27	2,064	25	4.0	0.5	0.5
Deutsche	13	1,561	80	3.0	0.4	0.4
Citicorp	9	425	20	3.0	0.7	0.1
Bankers Trust	1	300	300	4.0	0.7	0.1
Chemical	2	155	78	2.8	0.5	0.0
First Chicago	1	100	100	4.0	0.9	0.0
GG Natwest	1	25	25	4.0	0.7	0.0
First Union	2	15	3	4.0	0.4	0.0
Total	366	47,638				10.5
Junk bonds						
Chase	52	9,475	150	6.0	3.0	5.3
Bankers Trust	37	6,499	150	6.0	3.0	3.6
JP Morgan	22	4,410	150	5.8	2.3	2.5
Citicorp	24	3,236	125	6.0	2.5	1.8
Nations Bank	18	2,497	125	6.0	2.8	1.4
Bank of America	5	1,150	175	6.0	0.3	0.6
Chemical	6	1,056	116	6.0	3.0	0.6
CIBC	5	793	200	6.0	3.0	0.4
First Union	3	515	115	6.0	2.8	0.3
GG Natwest	2	260	130	6.0	3.4	0.1
Deutsche	2	190	95	6.0	2.9	0.1
Bane Boston	1	105	105	6.0	3.0	0.1
First Chicago	1	100	100	6.0	2.8	0.1
Total	178	30,286				17.0

the only commercial bank in the top ten. In 1992, Banker's Trust again had the highest market share for a commercial bank, 4.2%, ranking eighth for the year, followed by Citicorp with 3.8%, ranking tenth. No commercial bank had a market share larger than 10% until 1997, possibly because of the Federal Reserve limitations on revenues from underwriting activities for commercial banks prior to 1997. These market share numbers once again suggest that commercial banks were not dominant market participants in the underwriting of junk bonds during the period 1991–1999.

Table 11

Junk bond underwriter market share 1991–1999

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1991 to 1999 rated as junk by Moody's or Standard and Poor's with data available in Securities Data Company database. Market share (in percent) is the amount of principal issued by the underwriter divided by the total principal issued. Commercial bank underwriters are in bold faced type.

Underwriter	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
Donaldson Lufkin Jenrette	5.2	10.0	14.9	20.2	25.6	18.3	22.6	20.2	33.0	18.9
Merrill Lynch	40.2	15.3	26.9	13.4	9.1	8.3	8.3	7.3	9.6	15.4
Goldman Sachs	18.2	18.7	6.1	8.0	16.6	9.5	2.4	5.1	4.6	9.9
Saloman Brothers	6.5	5.1	10.4	13.1	6.0	7.0	3.2	11.4	15.0	8.6
Morgan Stanley	6.3	9.9	10.3	10.6	7.0	6.5	4.5	6.2	5.5	7.4
Credit Suisse First Boston	7.0	9.8	2.1	6.8	6.0	4.5	4.6	10.0	0.0	5.6
Lehman Brothers	4.6	9.8	4.7	6.3	0.0	1.9	3.4	10.7	5.4	5.2
Bear Sterns	0.0	4.2	4.9	2.2	0.9	4.6	0.9	3.9	4.7	2.9
Jefferies	0.0	0.5	1.8	0.5	8.7	1.0	2.7	1.8	0.0	1.9
Billion Reed	2.0	2.1	2.1	1.4	1.1	2.3	2.0	0.0	0.0	1.4
SBI	0.0	0.0	0.0	2.6	0.9	5.2	1.7	0.0	0.0	1.2
WP	2.6	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.7
Kidder Peabody	0.0	1.7	1.9	2.0	0.0	0.0	0.0	0.0	0.0	0.6
Chase	0.0	0.0	0.4	0.6	2.0	8.6	20.4	10.0	1.2	4.8
Bankers Trust	3.9	4.2	2.9	5.0	8.3	5.4	4.4	0.8	3.1	4.2
JP Morgan	1.3	2.5	2.1	0.6	3.1	2.6	5.3	1.2	4.5	2.6
Citicorp	2.3	3.8	5.1	2.4	0.0	0.8	0.0	0.0	0.0	1.6
Nationsbank	0.0	0.0	0.0	0.0	0.0	2.4	3.8	3.7	0.4	1.1
Chemical Bank	0.0	0.0	0.0	0.5	2.8	4.0	0.0	0.0	0.0	0.8
CIBC	0.0	0.0	0.0	0.0	0.0	3.1	0.4	0.6	0.0	0.5
Total	100.0	97.5	96.7	96.3	98.0	96.0	94.8	92.8	86.9	95.5
Commercial bank total	7.5	10.5	10.5	9.1	16.2	26.9	34.3	16.3	9.2	15.6

7. Conclusion

In the 1980s, Drexel Burnham Lambert was the dominant underwriter for junk bonds. During this decade, fees for junk bonds averaged 3.5%. When Drexel exited the market in 1990, fees dropped to approximately 2.5% and remained at essentially that level during the rest of the 1990s. We find that junk bond underwriters capitalized on Drexel's departure by lowering fees to gain market share. Virtually all of Drexel's competitors experienced significantly large gains in total underwriting revenue in the early 1990s despite charging significantly lower percentage fees. Some authors attribute the drop in underwriter fees to the entry of commercial banks into underwriting of junk bonds. We show that the regression results of previous studies are misleading. Because commercial banks did not underwrite any junk bonds from 1985 through 1990, and only underwrote four issues in 1991, it seems implausible to attribute the decline in underwriting fees from 1989 to 1991 to the entry of commercial banks.

Appendix A

Regression to determine the annual differences in junk bond underwriting fees: Drexel versus all other investment banks.

The sample consists of all unregulated, non-financial, fixed-coupon bonds issued from 1977 to 1989 rated as junk by Moody's or Standard and Poor's with data available in Securities Data Company database. The regression takes the following form: Table 12

$$
\begin{aligned}
\text{UnderwriterSpread} = {} & \alpha_0 + \beta_{cr}\text{RatingDummies} \\
& + \beta_{split}\text{SplitDummiess} + \beta_1\text{Log(Maturity)} + \beta_2\text{Log(Size)} \\
& + \beta_3\text{IPO\_Flag} + \beta_{ind}\text{IndustryDummies} + \beta_{year}\text{YearDummies} \\
& + \beta_{ND}\text{NonDrex} + \beta_{NDYear}\text{NonDrexYear}.
\end{aligned}
$$

Table 12
Appendix table

Parameter	Estimate	*t*-value	F-value
Intercept	2.68	7.16[***]	
DummyB a	0.70	4.91[***]	
SplitBa_B	1.03	7.20[***]	
DummyB	1.45	11.20[***]	
SphtB_CCC	1.53	10.59[***]	
DummyC	1.81	9.22[***]	
Log_matunty	0.25	3.46[***]	
Log_size	−0.13	−4.64[***]	
IPO_Fhg	0.09	1.88[*]	
Non Drex	−0.26	−1.90[*]	
year77	−0.85	−3.44[***]	
year78	−0.85	−4.43[***]	
year79	−0.63	−2.56[***]	
year80	−0.71	−3.24[***]	
year8l	−1.16	−5.64[***]	
year82	−1.18	−5.61[***]	
year83	−0.77	−4.34[***]	
year84	−0.22	−1.41	
year85	−0.31	−2.24[**]	
year86	−0.14	−1.11	
year87	−0.05	−0.34	
year88	−0.19	−1.37	
Non Drex77	−0.01	−0.04	
Non Drex78	0.54	2.32[***]	
Non Drex79	0.22	0.77	
Non Drex80	−0.02	−0.09	
Non Drex81	0.44	1.40	
Non Drex82	0.53	1.87	
Non Drex83	0.18	0.74	
Non Drex84	−0.39	−1.84[*]	
Non Drex85	−0.23	−1.30	
Non Drex86	−0.08	−0.48	
Non Drex87	0.00	−0.01	
Non Drex88	0.20	1.12	
Nondrex77 + non Drex	−0.27		0.93
Nondrex78 + non Drex	0.28		2.23
Nondrex79 + non Drex	−0.04		0.03
Nondrex80 + non Drex	−0.28		1.67
Nondrex8l + non Drex	0.18		0.42

Table 12 (*continued*)

Parameter	Estimate	*t*-value	F-value
Nondrex82 + non Drex	0.27		1.20
Nondrex83 + non Drex	−0.08		0.18
Nondrex84 + non Drex	−0.64		15.84[***]
Nondrex85 + non Drex	−0.49		17.60[***]
Nondrex86 + non Drex	−0.33		14.12[***]
Nondrex87 + non Drex	−0.26		6.08[***]
Nondren88 + non Drex	−0.06		0.24
Number of observations			
R^2			

All of the variables are identical to those defined in Table 3, with the addition of Non_Drex and Non_DrexYear. Non_Drex is a dummy variable indicating that the lead underwriter of the issue is not Drexel Burnham Lambert. Non_DrexYear is the product of the Non_Drex dummy variable and the Year dummy. Non_Drex + Non_DrexYear equals the average difference between the underwriting fees of non-Drexel underwriters minus Drexel's underwriting fee for that year, after controlling for issue-specific factors. F-values test the significance of this average difference in fees and are from a test of Non_Drex + Non_DrexYear equals 0. [*], [**], [***] indicate significance at the 10%, 5%, and 1% level, respectively. The omitted dummies are SplitBBB_BB, SIC0, Year1989 and NonYear89.

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