Financial Management

Are Initial Returns and Underwriting Spreads in Equity Issues Complements or Substitutes?

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The objective of this paper is to analyze the joint behavior of underwriting spreads and initial returns on equity issues for a large sample of issues over a 21-year period. Traditional empirical approaches to the determination of these direct and indirect issuing costs view them as independent. Using a three-stage least squares approach, we find these costs to be positively and significantly related. In the case of seasoned equity offerings, our results are robust to replacing initial returns with the offer price discount. We also find that low quality issuers are charged higher underwriting spreads and initial returns when compared to high quality issuers.

The underpricing of an issue of new initial publics offerings (IPOs) and seasoned equity offering (SEOs) has been well documented in the literature.[1,2] Yet, a major source of underwriter revenue lies in the underwriting spread, which in a firm commitment offering is the difference between the price paid for the issue by investors and the price paid to the issuer divided by the issue proceeds. There is increasing interest in the literature to analyze the size of these spreads (Hansen, 1986, 2001; Smith, 1986; Hansen, Fuller, and Janjigian, 1987; Denis, 1991; Eckbo and Masulis, 1991; Lee et al., 1996; Chen and Ritter, 2000; Loughran and Ritter, 2004; a recent survey by Eckbo, Masulis, and Norli, 2008).

While it is recognized that underpricing and spreads reflect the indirect and direct costs of issuance, respectively, the empirical relationship or correlation between these two "costs" has not been fully analyzed. In fact, Smith (1986) argues that the issuer seeks to maximize the issue proceeds when it sells securities in an underwritten issue, and is not separately concerned about the underwriting spread or the offer price (which determines the degree of underpricing). Hansen (1986) also suggests that there might be a correlation between underpricing and flotation costs. While not explicitly examining the joint correlation, Chen and Ritter (2000) discuss this

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[1] In this paper, we use underpricing and initial returns (or the one-day returns on the day of the issue) interchangeably.

[2] This study does not examine rights offerings (Hansen and Pinkerton, 1982; Hansen, 1988; Eckbo and Masulis, 1991; Slovin, Shushka, and Lai, 2000; Heron and Lie, 2003) or competitive bid offerings (Logue and Jarrow, 1978; Hansen and Khanna, 1994).

possibility when they state "Further, although spreads are the primary compensation of underwriters, the money 'left on the table' via the short-run underpricing of IPOs is an important indirect compensation. . . ."

This paper uses a simultaneous equations model in which underwriting spreads (direct costs) and underpricing (indirect costs) are allowed to be jointly determined for both IPOs and SEOs. Strictly speaking, underwriting spreads and underpricing cannot be simultaneously negotiated on the day before the offer date as underwriting spreads are determined on that day, whereas underpricing is determined by the stock price only at the close of the offer day.[3] In the case of IPOs, we must restrict our analysis to underpricing given that there are no traded prices prior to the offer date. However, in a rational expectations framework, it is reasonable to assume that the expected degree of underpricing at the time the spread is negotiated is equal to the actual degree of underpricing observed at the close of the offer day. In the case of SEOs, we examine both underpricing and an alternative, and more simultaneous measure of indirect costs, the SEO discount. The SEO discount is based on the observed closing price of the SEO issuer at the time the spread is negotiated. This measure of indirect costs was first used by Altinkilic and Hansen (2003) and is defined as the percentage price change between the prior closing price and the offer price relative to the offer price.

There are three possible relationships between underwriting spreads and underpricing. The first possibility is that there is an insignificant relationship between the two variables. The second possibility is that they are related in a negative fashion or they are substitutes. The third possibility is that there is a significant positive relationship between the two variables; that is, underwriting spreads and underpricing are complements.

Under the complementarity hypothesis, low-quality issuers would be charged an even higher underwriting spread than what they were actually charged if the underwriter had not received indirect compensation from underpricing. Underwriters and issuers may prefer this two-dimensional pricing system in order to reduce transparency rather than to directly charge low-quality issuers an obviously higher underwriting spread that may have negative informational consequences for the firm.

The following example may assist in illustrating this two-dimensional pricing scheme. Suppose an underwriter would like to charge 18% to 20% (12% to 14%) in total compensation to a low-quality (high-quality) issuer but instead charges the low-quality (high-quality) issuer 8% (6%) in direct underwriting spreads. The underwriter knows that it can underprice more (less) for a low-quality (high-quality) issuer given investors' lower (higher) demand for the issue. Assume that the low-quality (high-quality) issue subsequently gets 10% (6%) in underpricing. In this two-part pricing scheme, the issuer pays a lower spread than it normally would if all costs of underwriting had to be reflected in the spread. What we would also observe in the actual data is a positive correlation between initial returns and spreads, with low-quality issuers charged both a higher underwriting spread and greater underpricing than high-quality issuers.[4] Interestingly, Mola and Loughran (2004) find a significantly positive association between initial underpricing of SEOs and underwriting spreads from 1986 to 1999, but underwriting spreads are used as a control variable in the underpricing regressions and their joint determination is not fully explored.

Under the substitution hypothesis, there is a significant negative relationship between underwriting spreads and underpricing. In an early paper, Logue and Lindvall (1974) examine 100

[3] We thank the referee for this insight.

[4] With respect to bank lines of credit, a similar argument for finding a positive correlation between loan interest rates and posting collateral for low-quality borrowers is made by Berger and Udell (1990), John, Lynch, and Puri (2003), and Brick and Palia (2007).

IPOs from 1965 to 1968 using a two-stage least squares (2SLS) approach. However, they focus on the relationship between the offer price and the all-in cash spread without explicitly examining the degree of underpricing. If it is assumed that a higher offer price is equivalent to lower underpricing, then the authors' results are consistent with a negative correlation between underwriting spreads and underpricing.[5] More formally, Yeoman (2001) provides a "net proceeds maximization theory," whereby the issuer maximizes the net proceeds received for securities sold in an underwritten offering, subject to an underwriter competitive equilibrium constraint that the revenue from the issue is equal to the offering's expected costs. Yeoman's (2001) theory also suggests that initial returns and underwriting spreads are substitutes. Indeed, in subsequent ordinary least squares (OLS) regression tests for IPOs and SEOs over the six-year period (1988 to 1993), he finds that initial returns are negatively related to spreads for IPOs but insignificantly (positively) related for SEOs. However, these regressions do not control for the joint endogeneity of the two costs and exclude many of the variables that have been shown in the prior literature to affect initial returns. Ljungqvist (2003) examines IPOs in the United Kingdom where he finds substantially more variability in the direct costs than in the United States and documents a negative association between returns and spreads, while controlling for their joint determination. He concludes by stating "whether US issuers would be worse off if they reduced underwriting compensation remains an open question."

In this paper, we examine the complements versus substitutes hypothesis using a three-stage least squares (3SLS) simultaneous equations model in which underwriting spreads and underpricing are allowed to be jointly determined. We identify valid instrumental variables while including control variables that have been proven in the previous literature to impact underpricing and spreads. Moreover, we seek to analyze the factors that determined the spreads and initial (one-day) returns for both IPOs and SEOs over a 20-year period from 1980 to 2000. We try to avoid the short periods analyzed by earlier studies. In particular, a short period may only capture an upward or downward trend in issuance cost.

We find the following major result. There is strong evidence that over the long term, underpricing and underwriting spreads are positively related (i.e., the direct and indirect underwriting costs are complements for both IPOs and SEOs). In particular, low-quality issuers are charged both higher underwriting spreads and initial returns as compared to high-quality issuers. These positive relationships confirm Mola and Loughran's (2004) results for SEOs but are opposite of those of Yeoman (2001) for IPOs. Notably, this positive correlation is robust to using the offer price discount as our measure of indirect costs for SEOs. As discussed earlier, the offer price discount is simultaneously determined at the time the spread is negotiated, whereas the expected degree of underpricing can only be determined at that time. However, in a rational expectations framework, the expected degree of underpricing can be reasonably assumed to equal the actual degree of underpricing.

We note other important findings. First, many of the variables that affect underpricing also affect spreads. In order to control for this phenomenon, we use a 3SLS methodology to produce consistent estimators that account for the joint endogeneity among spreads and initial returns (Kmenta, 1986; Greene, 2003). In order to identify instruments, we examine the OLS results to locate variables that affect underpricing but not spreads, and vice versa. We observe that these instruments are valid and empirically strong in our system of equations. When comparing the results on the control variables for both the OLS (which assumes exogeneity) and the 3SLS regressions (which allows joint endogeneity), we find some controls to have different signs and

[5]We differ from this paper by examining a more recent, larger, and longer time series, while explicitly analyzing underpricing and including a larger set of regressors.

statistical significance.[6] In addition, we note that some of the control variables affect underpricing returns and spreads differently, and furthermore differently for IPOs and SEOs. Finally, we find that support for the complementary hypothesis is robust to splitting our sample period into two approximately equal periods, 1980 to 1990 and 1991 to 2000.

The paper is organized as follows. Section I discusses the variables that have been suggested in the previous literature as determinants for initial returns and/or underwriting spreads. Section II describes the univariate behavior of spreads and initial returns. Section III presents the empirical results with particular attention paid to the joint determination of spreads and initial returns using a 3SLS methodology. In addition, we examine the joint determination of spreads and the offer price discount for SEOs using a 3SLS methodology. Section IV explores our conclusions.

I. Sample Creation and Variable Description

The core database for our study is the US public new issue database of the Securities Data Corporation (SDC). The SDC database is compiled from regulatory filings, news sources, company press releases, and prospectuses. We examine 21 years of data from 1980 to 2000. We exclude all financial firms (one-digit Standard Industrial Classification [SIC] Code 6), all firms in regulated industries (one-digit SIC Code 4), and all firms whose gross spread data were missing from the SDC database. We obtained information on issue-specific characteristics (i.e., the date of issuance and the size of the issue [proceeds]), as well as information regarding the underwriting market (i.e., the names of the lead managers for each issue and their individual annual shares of underwriting in the market under consideration). We supplemented the SDC database with financial variables for issuing firms drawn from Compustat. All stock return data were obtained from Center For Research in Security Prices (CRSP). The requirement that all observations have stock return data (from CRSP) and gross spread data (from SDC) resulted in a final sample of 4,875 equity IPOs and 4,348 equity SEOs over the 1980-2000 period.

The existing literature has proposed a number of variables that affect initial returns and/or underwriting spreads. Given that we are interested in the joint determination of initial returns and spreads, we employ a set of control variables that have previously shown to affect initial returns and/or spreads. A summary of these control variables can be found in the Appendix. We describe these control variables and our reasons for including them in our tests below.

A. Reputation

The existing literature finds that issues underwritten by more reputable underwriters tend to have different initial (first-day) returns than those issues underwritten by less reputable underwriters (Carter and Manaster, 1990; Megginson and Weiss, 1991; Hanley, 1993; Aggarwal, Prabhala, and Puri, 2002). To create a reputation variable, we first list the market share of the top 25 underwriters in the issue year for IPOs and SEOs, respectively. We then include a variable, *Mshare*, defined as the total share of the underwriting market of the lead managers of the issue in the issue year. If the lead manager is not listed in the top 25 underwriters for that year, a separate dummy market share variable, *Dmshare*, is set to unity and zero otherwise.

[6]This occurs when the dependent variable is IPO spreads and the control variable is volatility, when the dependent variable is IPO spreads and the control variables are the market share of the underwriter or whether the underwriter is a subsidiary of a commercial bank or not, and when the dependent variable is SEO spreads and the control variable is whether the underwriter has an All Star analyst or not.

B. Competition: Commercial Banks versus Investment Banks and Market Power

Gande, Puri, and Saunders (1999) find that the entry of commercial banks into equity and debt underwriting through Section 20 subsidiaries had no significant effect on equity spreads but a significantly negative effect on debt underwriting spreads from 1990 to 1994. There were two significant events that allowed banks to enter the underwriting market: 1) in 1990, when bank holding companies' Section 20 subsidiaries were first given equity underwriting powers, and 2) in 1999, when all bank holding companies were given similar powers under the Financial Services Modernization Act.[7] Accordingly, we create a dummy variable, *Bank*, which is set to unity if the issuer's underwriter was a Section 20 subsidiary of a commercial bank holding company from 1990 to 2000 and a subsidiary of a bank holding company after 2000, and zero otherwise.

To examine whether spreads/initial returns are higher or lower due to increasing competition among investment bank underwriters from 1980 to 2000, we follow Hansen (2001) and include a Herfindahl-Hirschman index (*Herfindahl*) variable. For each year, we calculate the sum of the squared underwriters' market shares for IPOs and SEOs, respectively. In some specifications, we include year dummies to determine whether the equity underwriting market was becoming more concentrated. These year dummies also capture any systematic effects on spreads or initial returns over that year.

C. Investment Bank Analysts

Mola and Loughran (2004) find that underpricing of SEOs is more significant when underwriting firms employ a star analyst named on Institutional Investor's All America Research Team. Cliff and Denis (2004) find that underpricing of IPOs is greater when the lead underwriter has analyst coverage and when their analyst is a star analyst. Accordingly, these authors argue that issuer firms are "buying" analyst coverage along with pricing and distribution services. As in Mola and Loughran (2004), we classify star analysts as investment banking firms with the highest overall analyst ratings by major money management firms from past issues of *Institutional Investor*. We then create a dummy variable that reflects whether or not the underwriter of an issue employed is a star analyst in the year of issue (*Danalyst*), which is set equal to unity if yes and zero otherwise.

D. Momentum

Loughran and Ritter (2002) provide a prospect theory explanation for market timing of new issues and their cost. They argue that issuers bargain hard over the offer price in bad states of the world, while they do not negotiate as hard in good states of the world. Therefore, issuance costs may be higher in good states of the world than in bad, resulting in more money left on the table by issuers in rising markets. As in their paper, we define a variable, *15 Day*, which is the CRSP value-weighted market index in the 15 days prior to the offer date (where days are measured by trading days).

E. Volume

Lowry and Schwert (2001) and Lowry (2003) find that IPO volume and initial returns are significantly correlated. Following Lowry (2003), we calculate a variable, *Volume*, defined as the number of IPO (or SEO) issues divided by the number of CRSP-listed stocks. Lowry (2003) finds a positive relationship between volume and IPO returns.

[7]Essentially a bank holding company had to convert to a financial services company to underwrite securities.

F. Issuer-Specific Variables or Characteristics

We examine a number of variables that capture issuing firm profitability, leverage, and size (Altinkilic and Hansen, 2000; Hansen, 2001; Zheng and Stangeland, 2007; Aggarwal, Bhagat, and Rangan, 2009). We include a variable, *Profit*, defined as the ratio of operating profit before depreciation to total assets and a *Leverage* variable defined as the ratio of total debt to assets. We found that neither SDC nor Compustat provided financial statement data for a number of issuing firms. Rather than discarding these firms, we included a dummy variable, *Dumfin*, which is set equal to unity when these issuer-specific variables are unavailable and zero otherwise.

Consistent with the prior literature, we include a variable, *Size*. Following Altinkilic and Hansen (2000), we allow for this relationship to be nonlinear and U-shaped. We measure *Size* by the inverse of the inflation adjusted issue size (in 2000 dollars). Thus, the larger the *Size* variable, the smaller the issue. For SEOs, we also include $ME * Size$, which is the interaction of the market value of equity (inflation adjusted in 2000 dollars) multiplied by the inverse of the dollar value of the issue size (which is also inflation adjusted in 2000 dollars). Consistent with a nonlinear relationship between size and spreads, Altinkilic and Hansen (2000), Hansen (2001), and Drucker and Puri (2005) find a positive sign for *Size* and $ME * Size$. That is, smaller issues (a greater value of the size variable) have larger spreads. However, this relationship is nonlinear. Since there is no market value for IPOs, we are unable to create a similar variable for these issues.

G. Volatility

A number of papers (Bhagat and Frost, 1986; Denis, 1991; Hansen and Torregrosa, 1992; Altinkilic and Hansen, 2000) find a positive correlation between stock return volatility and SEO spreads. Accordingly, in the SEO tests, we create a variable, *Volatility*, which is the standard deviation of daily stock returns in the year prior to issue. Beatty and Ritter (1986) suggest that the greater the ex ante uncertainty regarding an IPO, the greater the underpricing. In our IPO tests, we use the IPO's standard deviation of daily stock returns in the year after issue as our proxy for ex ante uncertainty. Assuming rational expectations for our sample of IPOs, such a proxy should not be biased either positively or negatively.

H. Overallotment Options

Hansen, Fuller, and Janjigian (1987) and Lee et al. (1996) argue that many issues include an over-allotment option that may add to the flotation cost of an issue via the underwriting spread. To control for this, we create a dummy variable, *Over*, which is set equal to unity when the issue has an overallotment option and zero otherwise.

A summary of these control variables are provided in Panel A of the Appendix. Panel B of the Appendix details their means, medians, and standard deviations.

II. Univariate Behavior of Spreads and Initial Returns

In this section, we describe the univariate behavior of IPO initial returns (one-day returns) and SEO initial returns as well as the underwriting spreads for both IPOs and SEOs. Table I, Panel A provides data for the whole 1980 to 2000 sample period in terms of the number of issues (4,875 IPOs and 4,348 SEOs) as well as the mean, median, 5th percentile, and 95th percentile initial returns and spreads. We determine that the mean (median) initial returns on IPOs are substantially higher for IPOs relative to SEOs. For example, median underpricing of the IPOs was 7.14% versus

Table I. Underpricing Returns and Spreads

Underpricing returns are defined as the difference between the closing price on the day after the issue and the offering price expressed as the percentage of the offering price (Lee et al., 1996). Underwriting spreads are gross spreads defined as the difference between the offered amount and the proceeds to the issuer, expressed as the percentage of the offered amount (or issue size; Gande, Puri, and Saunders, 1999). Data are for the 21-year period from 1980 to 2000. Spreads are obtained from the US Public New Issues Database from Securities and Data Corporation (SDC). Equity returns are obtained from CRSP. We exclude all financial firms (one-digit SIC Code 6), all firms in regulated industries (one-digit SIC Code 4), all firms whose return data were missing from CRSP, and all firms whose gross spread data were missing from the SDC database. The final sample consists of 4,875 IPOs and 4,348 SEOs.

Panel A. Full Sample

	No.	Mean	Median	5th Percentile	95th Percentile
Underpricing returns					
IPOs	4,875	21.236	7.143	−7.500	93.333
SEOs	4,348	2.994	1.250	−5.000	14.667
Underwriting spreads					
IPOs	4,875	7.429	7.000	5.909	10.000
SEOs	4,348	5.455	5.262	3.119	8.000

Panel B. By Year

Year	IPOs					SEOs				
	No.	Returns		Spreads		No.	Returns		Spreads	
		Mean	Median	Mean	Median		Mean	Median	Mean	Median
1980	44	29.437	17.500	8.166	7.467	130	4.812	0.877	6.234	6.128
1981	126	8.764	4.375	8.292	7.778	115	4.417	0.667	6.352	6.000
1982	48	15.043	5.882	8.136	7.895	80	3.407	1.087	6.482	5.581
1983	254	11.561	3.750	7.834	7.300	289	1.512	0.694	5.821	5.522
1984	112	4.296	1.250	8.162	7.652	58	1.569	0.833	6.556	6.061
1985	115	7.979	3.750	7.871	7.429	107	1.689	0.312	6.304	6.041
1986	276	10.455	3.226	7.868	7.429	188	1.460	0.455	5.275	5.246
1987	239	9.215	2.083	7.908	7.273	143	0.851	0.000	5.296	5.008
1988	81	8.518	3.125	7.621	7.000	58	2.942	0.481	5.558	5.500
1989	96	10.683	5.769	7.516	7.000	105	1.623	0.683	5.913	5.770
1990	71	13.617	8.333	7.608	7.000	81	2.058	0.855	5.579	5.307
1991	223	12.123	7.500	7.409	7.000	248	3.658	1.724	5.517	5.465
1992	293	11.014	3.571	7.295	7.000	240	3.113	1.786	5.612	5.489
1993	404	13.291	6.250	7.364	7.000	338	3.027	1.845	5.499	5.357
1994	331	9.718	5.000	7.441	7.000	241	3.184	1.229	5.310	5.014
1995	335	21.161	12.500	7.249	7.000	352	2.832	1.370	5.237	5.247
1996	556	17.286	9.375	7.207	7.000	422	3.827	2.083	5.344	5.256
1997	391	13.701	6.716	7.252	7.000	363	3.237	1.590	5.193	5.220
1998	215	24.305	10.000	7.102	7.000	238	2.706	1.190	5.043	5.029
1999	360	78.273	38.839	6.984	7.000	274	3.530	1.250	4.988	5.002
2000	305	60.063	30.556	6.983	7.000	278	4.161	1.786	4.941	5.000

1.25% for SEOs with mean underpricing appearing substantially higher (21.24% vs. 2.99%). With respect to spreads, the median spread for IPOs was exactly 7% versus 5.26% for SEOS, while the means were 7.43% versus 5.46%. Thus, on average, IPOs have exhibited both higher initial returns and spreads than SEOs over the entire 1980 to 2000 period.

Recent papers identify increased clustering of spreads in the IPO market around 7% (Chen and Ritter, 2000; Hansen, 2001) and in the SEO market around 5% (Mola and Loughran, 2004). To control for rounding errors, as in Chen and Ritter (2000), we create a dummy, *D7%*, equal to one for IPOs, if spreads lie between 6.95% and 7.05%, and zero otherwise. A similar dummy, *D5%*, is equal to one for SEOs if the spreads lie between 4.95% and 5.05%, and zero otherwise. We find 53% of our IPO sample to have *D7%* spreads and 10.7% of our SEO sample to have *D5%* spreads. When we include these dummies as additional independent variables in our 3SLS regressions, none of our results change significantly.[8] We also find that initial returns have a correlation with spreads of −0.13 (0.16) for IPOs (for SEOs). These correlations are statistically significant at the 1% level. Whether those correlations remain unchanged when both initial returns and spreads are jointly determined is tested in Section III.

Table I, Panel B presents the annual mean (and medians) of initial returns and spreads for IPOs and SEOs. We begin by examining IPOs. The median initial returns appear to have increased in the 1990s when compared to the 1980s, largely reflecting the boom in the IPO market from 1998 to 2000. While initial returns may have increased over time, underwriting spreads generally appear to have decreased from a median of 7.42% in the 1980s to 7.0% in the 1990s. Also apparent is the increased clustering of spreads around 7% in the 1990s. Median SEO initial returns were higher in the 1990s when compared to the 1980s, while median spreads were lower. Also apparent is a move toward median spread clustering for SEOs around 5% toward the late 1990s and the year 2000.

While these univariate statistics regarding the behavior of IPO and SEO initial returns and spreads from 1980 to 2000 are of interest, the major focus of this paper is the determination of these spreads and returns. This is discussed in the next section regarding multivariate tests.

III. Multivariate Tests of Underwriting Returns and Spreads

We start by estimating the determination of spreads and initial returns in an OLS framework. The results are presented in Table II, where all standard errors are corrected for heteroskedasticity using the White (1980) correction. We provide two sets of results, one set for IPOs and one set for SEOs. Column 1 examines the relationship between initial returns and each control variable with a dummy for the year of issue (the results for year dummies are not reported in the table). Since many of the year dummies are statistically significant, we include the Herfindahl-Hirschman index (*Herfindahl*) each year in Column 2 to control for the degree of concentration in the underwriting market in that year. Columns 3 and 4 repeat similar specifications using the dependent variable underwriting spreads. We find that many of the control variables that are related to initial returns are also related to spreads. In some cases, a control variable is related to both initial returns and spreads with the same sign (i.e., *Size*), while in other cases it is associated with opposite signs (i.e., *Mshare*).

We next allow for initial returns and spreads to be (jointly) endogenously determined. We use a 3SLS methodology known to produce consistent estimators when two endogenous variables are jointly determined (Kmenta, 1986; Greene, 2003). In order to identify valid instruments for

[8]These results are available from the authors.

Table II. OLS Regression of Underwriting Returns and Spreads for IPOs and SEOs

Underpricing returns are defined as the difference between the closing price on the day after the issue and the offering price expressed as the percentage of the offering price (Lee et al., 1996). Underwriting spreads are gross spreads defined as the difference between the offered amount and the proceeds to the issuer expressed as the percentage of the offered amount (or issue size) (Gande, Puri, and Saunders, 1999). All other variables are defined in Panel A of the Appendix. Data are for the 21-year period from 1980 to 2000. Spreads are obtained from the US Public New Issues Database from Securities and Data Corporation (SDC). Equity returns are obtained from CRSP. We exclude all financial firms (one-digit SIC Code 6), all firms in regulated industries (one-digit SIC Code 4), all firms whose return data were missing from CRSP, and all firms whose gross spread data were missing from the SDC database. The final sample consists of 4,875 IPOs and 4,348 SEOs. Year dummies are not reported. All results are corrected for heteroskedasticity.

	IPOs				SEOs			
	Returns		Spreads		Returns		Spreads	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	22.95	−3.11	6.93***	6.46***	5.74***	2.24**	3.76***	3.83***
	(1.07)	(−0.37)	(31.40)	(44.18)	(3.14)	(2.39)	(15.00)	(23.26)
Mshare	1.67***	1.94***	−0.02***	−0.02***	−0.13***	−0.12***	−0.04***	−0.04***
	(5.55)	(6.17)	(−6.66)	(−6.53)	(−4.78)	(−4.52)	(−11.57)	(−11.57)
Dmshare	4.83*	4.49	0.05	0.05	−1.00***	−1.03***	0.12**	0.13***
	(1.68)	(1.53)	(1.49)	(1.41)	(−2.60)	(−2.63)	(2.51)	(2.60)
Bank	23.13	2.25*	−0.42**	0.03	−0.77	1.41***	−0.60***	−0.33***
	(1.20)	(1.78)	(−2.26)	(1.08)	(−0.49)	(3.78)	(−2.81)	(−5.02)
Danalyst	−2.96	−2.04	−0.09***	−0.09***	−0.39	−0.42	−0.11***	−0.12***
	(−1.58)	(−1.17)	(−4.06)	(−3.99)	(−1.50)	(−1.63)	(−3.24)	(−3.69)
Herfindahl	–	3.04***	–	0.001	–	−0.01	–	−0.01
		(9.09)		(0.15)		(−0.09)		(−0.66)
15 Day	21.40***	19.94***	−0.03	−0.02	1.84**	1.67**	−0.01	−0.01
	(5.81)	(5.42)	(−0.57)	(−0.41)	(2.27)	(2.08)	(−0.09)	(−0.13)
Volume	−5.53	−0.14	−0.06	−0.04	−0.48	−0.43	−0.03	−0.01
	(−1.28)	(−0.05)	(−0.94)	(−0.74)	(−0.70)	(−0.86)	(−0.38)	(−0.14)
Profit	−4.33***	−7.02***	−0.02	−0.03	−0.82	−0.62	−0.69***	−0.64***
	(−3.38)	(−4.91)	(−1.10)	(−1.36)	(−1.04)	(−0.78)	(−7.73)	(−7.38)
Leverage	−7.07***	−10.48***	−0.01	−0.01	−0.74	−0.70	0.27***	0.30***
	(−3.87)	(−5.04)	(−0.32)	(−0.58)	(−1.34)	(−1.24)	(2.90)	(3.17)
Dfin	−2.34	−2.62	0.09***	0.09***	−0.43	−0.42	0.15***	0.14***
	(−1.53)	(−1.60)	(3.78)	(3.78)	(−1.24)	(−1.20)	(3.57)	(3.28)
Size	37.60**	22.28	13.08***	13.02***	10.64***	10.78***	13.30***	13.71***
	(2.09)	(1.25)	(33.24)	(33.83)	(2.89)	(2.91)	(9.41)	(9.51)
ME ∗ Size	–	–	–	–	−3.98***	−3.84***	−2.03***	−2.13***
					(−6.91)	(−6.61)	(−4.88)	(−4.81)
Volatility	7.31	6.20	1.90***	2.00***	9.66	20.58	13.46***	12.25***
	(1.52)	(1.15)	(6.45)	(7.79)	(0.75)	(1.57)	(10.56)	(10.67)
Over	−13.83*	−17.33**	0.10	0.08	0.77	0.34	1.20***	1.11***
	(−1.64)	(−1.99)	(0.84)	(0.66)	(0.94)	(0.44)	(12.96)	(11.89)
Herfindahl	No	Yes	No	Yes	No	Yes	No	Yes
Year dummy	Yes	No	Yes	No	Yes	No	Yes	No
Adj. R^2	0.205	0.138	0.619	0.619	0.026	0.021	0.547	0.533

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

our system of equations, we need to determine variables that are related to initial returns but not to spreads, and vice versa. In the only previous study where spreads and returns are modeled as jointly determined, Ljungqvist (2003) examines UK IPOs and uses the size of an issue as an instrumental variable for spreads. He finds this variable to be related to spreads, but not to initial returns. In this study on US issues, we find *Size* to be statistically related to both initial returns and spreads, thereby making it an invalid instrumental variable in our system of equations. However, we note that the momentum variable *15 Days* is positively related to initial returns and not statistically related to spreads. This allows us to include it as a valid instrumental variable for initial returns. Similarly, we observe that *Danalyst, Dfin*, and *Volatility* are not significantly related to initial returns but are associated with spreads. This allows us to use these three variables as instrumental variables for underwriting spreads. Given that econometrically, we can use any linear combination of these instrumental variables in the first stage estimation of 3SLS, we use *15 Day* and $(15\ Day)^2$ as our instrumental variables for initial returns and *Danalyst, Dfin, Volatility*, and $(Volatility)^2$ as our instrumental variables for spreads. We include the squared terms on the continuous variables as they add to the goodness of fit of initial returns and spreads in the first stage. The results of our 3SLS estimation of the determinants initial returns and spreads is reported in Table III.

A. 3SLS and IPOs

We begin by examining the initial returns on IPOs. In Column 1, we control for year dummies, while in Column 2, we include the Herfindahl-Hirschman index (*Herfindahl*) in that year to control for the degree of competition in the underwriting industry. We find that by using both specifications, underwriting spreads had a positive and statistically significant effect on initial returns. This initial result suggests that underwriting spreads and initial returns are complements in IPO underwriting. We also find that the year dummies are statistically significant (results not reported) and that the *Herfindahl* variable is positively related to underwriting returns. However, the year dummies do not indicate any large-scale trend or one that it is correlated with the industry becoming more concentrated. With respect to other control variables, we find that the top 25 underwriters' total market share (*Mshare*) is positively related to initial returns. Further, initial returns are lower for more profitable firms (*Profit*), more leveraged firms (*Leverage*), when market momentum is greater (*15 Day*) and for issues without any overallotment options (*Over*). The coefficient on the inverse of the issue size variable (*Size*) suggests that smaller issues earn higher returns.

Next, we analyze the 3SLS results for the determination of IPO spreads. As for the initial return equation, the relationship between initial IPO returns and IPO spreads is positive and statistically significant at the 1% level. We also find that the top 25 underwriters' market share (*Mshare*) is negatively related to spreads, whereas the dummy for the underwriter not being among the top 25 (*Dmshare*) is insignificantly related to spreads. We also find that having a star analyst (*Danalyst*) and higher volatility (*Volatility*) reduces spreads, while the missing financial statement variable (*Dfin*) and smaller issues size variable (*Size*) increases underwriting spreads.

B. 3SLS and SEOs

We subsequently examine 3SLS regressions of initial returns on underwriting spreads for SEOs. Once again, the relationship between initial returns and underwriting spreads is positive and highly statistically significant, suggesting complementarity. Although strongly statistically significant at the 1% level, we note that the economic significance of the relationship is much lower for SEOs than for IPOs. We find that the top 25 underwriters' total market share variable

Table III. 3SLS Regression of Underwriting Returns and Spreads for IPOs and SEOs

Underpricing returns are defined as the difference between the closing price on the day after the issue and the offering price expressed as the percentage of the offering price (Lee et al., 1996). Underwriting spreads are gross spreads defined as the difference between the offered amount and the proceeds to the issuer expressed as the percentage of the offered amount (or issue size; Gande, Puri, and Saunders, 1999). All other variables are defined in Panel A of the Appendix. Data are for the 21-year period from 1980 to 2000. Spreads are obtained from the US Public New Issues Database from Securities and Data Corporation (SDC). Equity returns are obtained from CRSP. We exclude all financial firms (one-digit SIC Code 6), all firms in regulated industries (one-digit SIC Code 4), all firms whose return data were missing from CRSP, and all firms whose gross spread data were missing from the SDC database. The final sample consists of 4,875 IPOs and 4,348 SEOs. Year dummies are not reported. All results are corrected for heteroskedasticity.

	IPOs				SEOs			
	Returns		*Spreads*		*Returns*		*Spreads*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	−35.39*	−101.67***	6.96***	6.49***	2.46	−2.18	3.60***	3.69***
	(−1.76)	(−6.77)	25.75	(59.16)	(0.76)	(−1.32)	(9.78)	(28.47)
Spreads	9.03***	12.83***	–	–	0.56**	0.86***	–	–
	(5.05)	(6.90)			(1.96)	(3.05)		
Returns	–	–	0.01***	0.01***	–	–	0.06**	0.06**
			(9.6)	(9.34)			(2.06)	(1.98)
Mshare	1.68***	2.05***	−0.02***	−0.02***	−0.13***	−0.12***	−0.04***	−0.04***
	(10.07)	(11.81)	(−7.09)	(−7.14)	(−4.67)	(−4.17)	(−11.27)	(−11.63)
Dmshare	4.53**	2.98	0.03	0.03	−0.99***	−1.02***	0.12***	0.13***
	(2.31)	(1.45)	(0.96)	(0.81)	(−2.70)	(−2.80)	(2.61)	(2.75)
Bank	29.85**	2.75	−0.47*	0.01	−0.64	1.37***	−0.59*	−0.32***
	(2.09)	(1.55)	(−1.88)	(0.21)	(−0.24)	(3.95)	(−1.73)	(−7.09)
Danalyst	–	–	−0.18***	−0.18***	–	–	−0.05	−0.07
			(−6.60)	(−6.51)			(−1.12)	(−1.64)
Herfindahl	–	4.24***	–	−0.01	–	0.004	–	−0.01
		(11.02)		(−0.76)		(0.07)		(−0.70)
15 Day	22.72***	19.34***	–	–	1.94***	1.74***	–	–
	(7.16)	(5.95)			(3.06)	(2.80)		
Volume	−4.23	1.48	−0.09	−0.05	−0.47	−0.42	−0.03	−0.01
	(−1.10)	(0.49)	(−1.27)	(−0.92)	(−0.68)	(−0.77)	(−0.32)	(0.14)

(*Continued*)

Table III. 3SLS Regression of Underwriting Returns and Spreads for IPOs and SEOs (*Continued*)

	IPOs				SEOs			
	Returns		*Spreads*		*Returns*		*Spreads*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Profit	−3.16***	−6.32***	−0.01	−0.01	−0.69	−0.61	−0.69***	−0.64***
	(−3.10)	(−5.97)	(−0.54)	(−0.68)	(−1.17)	(−1.03)	(−8.83)	(−8.04)
Leverage	−5.02***	−8.81***	0.01	0.003	−0.28	−0.21	0.29***	0.31***
	(−3.61)	(−6.10)	(0.24)	(0.11)	(−0.53)	(−0.41)	(3.69)	(3.95)
Dfin	–	–	0.10***	0.10***	–	–	0.15***	0.14***
			(4.02)	(4.08)			(3.56)	(3.26)
Size	34.86***	16.55	12.87***	12.86***	10.50***	10.68***	13.32***	13.73***
	(3.37)	(1.54)	(71.43)	(72.37)	(4.77)	(4.91)	(46.79)	(48.18)
ME ∗ *Size*	–	–	–	–	−3.95**	−3.79**	−2.03***	−2.13***
					(−2.56)	(−2.45)	(−10.19)	(−10.56)
Volatility	–	–	−0.89**	−0.61*	–	–	11.43***	10.19***
			(−2.22)	(−1.71)			(8.03)	(7.33)
Over	−13.80***	−17.07***	0.09	0.07	0.76	0.34	1.20***	1.11***
	(−2.73)	(−3.25)	(1.02)	(0.76)	(1.42)	(0.65)	(17.29)	(16.04)
Herfindahl	No	Yes	No	Yes	No	Yes	No	Yes
Year dummy	Yes	No	Yes	No	Yes	No	Yes	No
Adj. R^2	0.232	0.156	0.232	0.156	0.082	0.076	0.082	0.076

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

(*Mshare*) is negatively related to initial returns for SEOs, as is the dummy for the underwriter bank not being one of the top 25 (*Dmshare*). We find that the momentum variable (*15 Day*) for an issuer earns higher initial returns. We also determine that the inverse of issue size (*Size*) is positively related to initial returns implying that smaller issues earn higher returns, while the nonlinear size term (*ME* ∗ *Size*) earns lower returns.

When we examine SEO spreads, we again find a positive correlation between spreads and initial returns that is statistically significant at the 5% level. We find that the top 25 underwriters' total market share (*Mshare*) is negatively related to spreads, whereas the dummy variable for the underwriter not being one of the top 25 (*Dmshare*) is positively related to spreads. The entry of banks into the SEO underwriting business (*Bank*) lowers underwriting spreads, as does issuer profitability (*Profit*). Firms with higher leverage (*Leverage*), firms with missing financial statement data (*Dfin*), firms with overallotment options (*Over*), and firms with higher volatility (*Volatility*) have higher underwriting spreads. We also determine that smaller issues (*Size*) earn higher spreads and that the sign on *ME* ∗ *Size* is negative, consistent with the results in Altinkilic and Hansen (2000), Hansen (2001), and Drucker and Puri (2005).

In Table IV, we redefine the indirect costs of SEOs issuers as the offer price discount, defined in Altinkilic and Hansen (2003) as the percentage price change between the prior closing price and the offer price relative to the offer price. The new issue discount is only available for SEOs, and potentially simultaneously determined with the spread. Whereas for initial returns, only the expected value of that initial return can be determined at the exact time of spread determination. In all four specifications, we find a positive relationship consistent with the complementary hypothesis and the results in Mola and Loughran (2004).

C. Summary of 3SLS Results

Overall, the results in Table III suggest that the long-term relationship between underwriting spreads and initial returns is strongly positive whether we regress underwriting returns on underwriting spreads or vice versa. This result is robust to the inclusion of a large set of control variables that have been posited in the existing literature. Our evidence that underwriting returns and spreads are complements (rather than substitutes) is consistent with that of Mola and Loughran (2004). They find a significantly positive association when examining SEOs, although they do not control for their potential joint determination nor do they examine IPOs. Our results contrast with those of Yeoman (2001) who finds that for the 1988 to 1993 period, initial returns were negatively related to spreads for IPOs but insignificantly (positively) related for SEOs. In summary, our study of the direct and indirect costs of underwriting differs in three significant ways from prior studies. First, we exploit the joint endogeneity of the two issuing costs. In addition, we demonstrate that our primary result of cost complementarity is robust to the inclusion of a larger set of control variables. Finally, we examine a 21-year period, allowing us to gain greater insight into the long-term relationship between the initial returns and underwriting spreads of US equity issues over both hot and cold periods and different stages of the economic cycle.

With respect to the control variables in the regressions, we find that smaller firms are consistently charged higher spreads and generate higher initial returns, whether the issue is an IPO or an SEO. We also find a U-shaped pattern between underwriting spreads and issuer size in SEOs, consistent with the results in Altinkilic and Hansen (2000), Hansen (2001), and Drucker and Puri (2005). The evidence regarding underwriter market share is mixed. The top 25 underwriters' market share variable, *Mshare*, is positively (negatively) related to IPO (SEO) initial returns, while it is negatively related to spreads for both IPOs and SEOs. The dummy variable, *Dmshare*, which is equal to one if the lead underwriter is not in the top 25, has the opposite effect on spreads and

Table IV. 3SLS Regression of Discount and Spreads for SEOs

SEO discounts are defined as the percent price change between the prior closing price and the offer price relative to the offer price (Altinkilic and Hansen, 2003). Underwriting spreads are gross spreads defined as the difference between the offered amount and the proceeds to the issuer expressed as the percentage of the offered amount (or issue size; Gande, Puri, and Saunders, 1999). All other variables are defined in Panel A of the Appendix. Data are for the 21-year period from 1980 to 2000. Spreads are obtained from the US Public New Issues Database from Securities and Data Corporation (SDC). Equity returns are obtained from CRSP. We exclude all financial firms (one-digit SIC Code 6), all firms in regulated industries (one-digit SIC Code 4), all firms whose return data were missing from CRSP, and all firms whose gross spread data were missing from the SDC database. The final sample consists of 4,348 SEOs. Year dummies are not reported. All results are corrected for heteroskedasticity.

	Discounts				***Spreads***			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Intercept	−0.15	−2.43*	5.70*	−0.44	3.17***	4.95***	3.57***	3.68***
	(−0.10)	(−1.80)	(1.84)	(−0.27)	(24.66)	(46.15)	(9.75)	(29.32)
Spreads	0.64***	0.84***	0.28	0.50*				
	(2.58)	(3.47)	(1.01)	(1.85)				
Discounts					0.56***	0.50***	0.08***	0.08***
					(19.09)	(16.81)	(2.59)	(2.58)
Mshare	–	–	−0.10***	−0.09***	–	–	−0.04***	−0.04***
			(−3.61)	(−3.27)			(−11.20)	(−11.57)
Dmshare	–	–	−0.60*	−0.64*	–	–	0.12***	0.13***
			(−1.72)	(−1.82)			(2.60)	(2.75)
Bank	–	–	−2.86	1.30***	–	–	−0.59*	−0.32***
			(−1.12)	(3.92)			(−1.71)	(−7.14)
Danalyst	–	–	–	–	–	–	−0.06	−0.08**
							(−1.60)	(−2.09)
Herfindahl	–	0.06	–	0.00	–	−0.10***	–	−0.01
		(1.14)		(−0.03)		(−10.39)		(−0.69)
15 Day	–	–	1.05*	0.90	–	–	–	–
			(1.74)	(1.52)				
Volume	–	–	−0.33	−0.26	–	–	−0.03	−0.01
			(−0.49)	(−0.49)			(−0.30)	(−0.13)
Profit	–	–	−0.86	−0.78	–	–	−0.69***	−0.64***
			(−1.52)	(−1.38)			(−8.85)	(−8.06)
Leverage	–	–	−0.39	−0.35	–	–	0.29***	0.31***
			(−0.76)	(−0.69)			(3.73)	(3.99)
Dfin	–	–	–	–	–	–	0.15***	0.14***
							(3.55)	(3.24)
Size	–	–	10.38***	10.42***	–	–	13.32***	13.74***
			(4.92)	(5.00)			(46.83)	(48.22)
ME ∗ Size	–	–	−2.72*	−2.59*	–	–	−2.03***	−2.14***
			(−1.84)	(−1.75)			(−10.21)	(−10.58)
Volatility	–	–	–	–	–	–	11.70***	10.40***
							(9.50)	(8.67)
Over	–	–	0.21	−0.05	–	–	1.20***	1.11***
			(0.41)	(−0.10)			(17.23)	(15.99)
Herfindahl	No	Yes	No	Yes	No	Yes	No	Yes
Year dummy	Yes	No	Yes	No	Yes	No	Yes	No
Adj. R^2	0.068	0.063	0.091	0.088	0.068	0.063	0.091	0.088

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

initial returns for SEOs and is generally not related to IPOs. Moreover, the Herfindahl-Hirschman index (*Herfindahl*) is not correlated to either initial returns or spreads except for IPOs where the initial returns are positively correlated. Issues with an overallotment option are negatively and significantly correlated with initial returns for IPOs, but no relationship is found for SEO returns. However, in the case of spreads, issues with overallotment options have higher spreads for SEOs, but not for IPOs.

The results for the control variables suggest that, in many cases, they affect initial returns and spreads differently. Thus, relating the significance and sign of these variables to the total cost for the issuer is far more complex than can be inferred by single equation studies that examine either underpricing returns or underwriting spreads.

D. Issuer Quality, Initial Returns, and Spreads

Given that we find a positive correlation between initial returns and underwriting spreads consistent with cost complementarity, we next examine whether low-quality issuers are charged higher underwriting spreads and are more underpriced than high-quality issuers. In order to do so, we define low-quality issuers as those in the lowest quartile of operating profits before depreciation to assets (*Profit*) or, alternatively, those in the highest quartile of stock return volatility (*Volatility*). Similarly, high-quality issuers are defined as those in the highest quartile of operating profits to assets or those in the lowest quartile of stock return volatility. The results are presented in Table V. For IPOs, based on *Profit* (*Volatility*), we find that low-quality issuers typically generate 45.21% (47.3%) in initial returns, which is significantly greater than the average initial returns of 18.92% (8.83%) earned by high-quality issuers. We also find that low-quality issuers are charged an average underwriting spread of 7.53% (7.63%). This is statistically significantly greater than the average underwriting spread of 7.39% (6.89%) charged to high-quality issuers. These results strongly support the complementarity argument whereby low-quality IPOs are charged both higher underwriting spreads and are more underpriced than high-quality IPOs.

Next, we examine the differential impact by issuer-quality for SEOs. Similar to IPOs, we define low-quality SEO issuers as those in the lowest quartile of operating profits before depreciation (*Profit*) or, alternatively, those in the highest quartile of stock return volatility (*Volatility*) and high-quality SEO issuers as those in the highest quartile of operating profits to assets or those in the lowest quartile of stock return volatility. We find that low-quality issuers typically generate 6.5% (6.75%) in initial returns, which is statistically significantly higher than the average initial returns of 4.12% (3.17%) earned by high-quality issuers when issuer-quality is defined by *Profit* (*Volatility*). We also find that low-quality SEO issuers are charged an average underwriting spread of 5.4% (5.9%), significantly higher than the average underwriting spread of 5.29% (4.10%) charged to high-quality issuers. Consistent with our results on IPOs, we find support for complementarity whereby low-quality SEO issuers are charged higher underwriting spreads and are more underpriced than high-quality SEO issuers.

E. Subperiods

In addition, we determine whether complementarity is driven by the period examined. In Table VI, we split our sample into two approximately equal subperiods, 1980 to 1990 and 1991 to 2000, and run the same four specifications (year dummies or *Herfindahl* with/without control variables) for both IPOs and SEOs, respectively. For brevity, we do not discuss in detail the results for the control variables, but note that we find support for initial return-underwriting spread complementarity over both subperiods.

Table V. Differences in Underwriting Returns and Spreads for IPOs and SEOs by Issuer Quality

Underpricing returns are defined as the difference between the closing price on the day after the issue and the offering price expressed as the percentage of the offering price (Lee et al., 1996). Underwriting spreads are gross spreads defined as the difference between the offered amount and the proceeds to the issuer expressed as the percentage of the offered amount (or issue size) (Gande, Puri, and Saunders, 1999). All other variables are defined in Panel A of the Appendix. Data are for the 21-year period from 1980 to 2000. Spreads are obtained from the US Public New Issues Database from Securities and Data Corporation (SDC). Equity returns are obtained from CRSP. We exclude all financial firms (one-digit SIC Code 6), all firms in regulated industries (one-digit SIC Code 4), all firms whose return data were missing from CRSP, and all firms whose gross spread data were missing from the SDC database. The final sample consists of 4,875 IPOs and 4,348 SEOs. Low-quality issues are those in the lowest (highest) quartile of operating profits before depreciation to assets (of stock return volatility). High-quality issues are those in the highest (lowest) quartile of operating profits before depreciation to assets (of stock return volatility).

	Low-Quality Issuer		High-Quality Issuer		*t*-statistics for Differences between High-Quality and Low-Quality Issuers	
	Returns	***Spreads***	***Returns***	***Spreads***	***Returns***	***Spreads***
IPOs						
Profit	45.21	7.53	18.92	7.39	(10.64)***	(2.85)***
Volatility	47.30	7.63	8.83	6.89	(16.79)***	(14.85)***
SEOs						
Profit	6.50	5.40	4.12	5.24	(4.20)***	(2.40)**
Volatility	6.75	5.90	3.17	4.10	(8.23)***	(27.56)***

***Significant at the 0.01 level.
**Significant at the 0.05 level.

IV. Conclusion

The main objective of this paper has been to close an important gap in the existing literature by analyzing the joint behavior of underwriting spreads and initial returns for US equity issues over a 21-year period. Traditional empirical approaches to the determination of these direct and indirect issuing costs have been to view them as independent. In this paper, we recognize the potential joint determination of underwriting spreads and initial returns. Using a 3SLS approach, we demonstrate that far from being independent, underwriting spreads and initial returns appear to be positively and significantly related (or are complements) for both types of equity issues. We find this result to be robust to using the offer price discount as an alternative proxy for the indirect costs of issuing SEOs. We also determine that low-quality issuers are charged both higher spreads and initial returns when compared to high-quality issuers. These results are consistent with investment bankers and issuers determining the direct and indirect costs of new issues jointly (Logue and Lindvahl, 1974; Hansen, 1986, 2001; Smith, 1986; Hansen, Fuller, and Janjigian, 1987; Eckbo and Masulis, 1991; Lee et al., 1996; Chen and Ritter, 2000; Yeoman, 2001; Ljungqvist, 2003; Eckbo, Masulis, and Norli, 2008). Also, we find that some of the control variables in the exisiting literature impact underpricing returns and spreads (as well as IPOs and SEOs) differently and that our results are robust over two decade-long subperiods. ■

Table VI. Subperiods

Underpricing returns are defined as the difference between the closing price on the day after the issue and the offering price expressed as the percentage of the offering price (Lee et al., 1996). Underwriting spreads are gross spreads defined as the difference between the offered amount and the proceeds to the issuer expressed as the percentage of the offered amount (or issue size) see (Gande, Puri, and Saunders, 1999). All other variables are defined in Panel A of the Appendix. Data are for the 21-year period from 1980 to 2000. Spreads are obtained from the US Public New Issues Database from Securities and Data Corporation (SDC). Equity returns are obtained from CRSP. We exclude all financial firms (one-digit SIC Code 6), all firms in regulated industries (one-digit SIC Code 4), all firms whose return data were missing from CRSP, and all firms whose gross spread data were missing from the SDC database. The final sample consists of 4,875 IPOs and 4,348 SEOs. Year dummies are not reported. All results are corrected for heteroskedasticity.

	IPOs								SEOs							
	Returns				*Spreads*				*Returns*				*Spreads*			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
1980 to 1990																
Spreads	2.36**	2.46**	2.56**	2.50**					0.52*	0.63**	0.54*	0.86**				
	(2.02)	(2.12)	(1.99)	(1.98)					(1.68)	(2.04)	(1.70)	(1.99)				
Returns					0.11***	0.11***	0.01	0.01					0.44***	0.43***	0.02*	0.04*
					(10.18)	(9.70)	(1.11)	(0.73)					(10.68)	(10.58)	(1.69)	(1.78)
1991 to 2000																
Spreads	13.79***	19.45***	18.62***	25.42***					1.10***	1.19***	0.61*	0.84***				
	(5.53)	(7.50)	(6.88)	(9.08)					(3.68)	(4.03)	(1.82)	(1.82)				
Returns					0.02***	0.01***	0.01***	0.01***					0.40***	0.37***	0.05**	0.18
					(13.83)	(10.92)	(5.67)	(3.78)					(16.69)	(15.59)	(2.04)	(1.12)
Herfindahl	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year dummy	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Control variables (not reported)	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Appendix

Panel A: Summary of Variable Definitions

Variables	Definitions
Returns	Difference between the closing price on the day after the issue and the offering price expressed as the percentage of the offering price (Lee et al., 1996).
Discounts	For SEOs only: percentage price change between the prior closing price and the offer price relative to the offer price (Altinkilic and Hansen, 2003).
Spreads	Difference between the offered amount and the proceeds to the issuer expressed as the percentage of the offered amount (Gande, Puri, and Saunders, 1999).
Mshare	Total market share ownership of lead managers among the top 25 underwriters in the year of the issue (Carter and Manaster, 1990; Megginson and Weiss, 1991; Aggarwal, Prabhala, and Puri, 2002)
Dmshare	Set to unity if the lead managers are not among the top 25 underwriters in the year of the issue, and zero otherwise.
Bank	Set to unity if the issue date was on or after 1990 (as bank Section 20 subsidiaries were first given equity issuance powers then), and zero otherwise (Gande, Puri, and Saunders, 1999).
Danalyst	A dummy set to unity if the underwriting firm employed a star analyst listed by the Institutional Investor's All America Research Team, and zero otherwise (Mola and Loughran, 2004).
Herfindahl	The investment banking concentration index in the year of issue or the Herfindahl-Hirschman index, defined as the sum of the squared annual lead banks market share (Hansen, 2001).
15 Day	The value-weighted market index in the 15 days prior to the offer date (Loughran and Ritter, 2002).
Volume	One-month lagged values on the number of IPOs (or SEOs), divided by the number of CRSP-listed stocks (Lowry and Schwert, 2001; Lowry, 2003).
Profit	Issuer firm's ratio of operating income before depreciation to total assets (Hansen, 2001).
Leverage	Issuer firm's ratio of total leverage to total assets (Hansen, 2001).
Dfin	Set to unity if the above two financial statement variables are unavailable for issuer firms, and zero otherwise.
Size	Inverse of the natural logarithm of the 2000 inflation-adjusted dollar value of issue size (Altinkilic and Hansen, 2000).
ME ∗ Size	Interaction of the market value of equity of the firm times the inverse of the natural logarithm of the 2000 inflation-adjusted dollar value of the issue size for SEOs (Altinkilic and Hansen, 2000).
Volatility	One-month lagged standard deviation of annual stock returns for SEOs and standard deviation of stock returns for a year postissue date for IPOs (Altinkilic and Hansen, 2000; Hansen and Torregrosa, 1992; Denis, 1991; Bhagat and Frost, 1986; Beatty and Ritter, 1986).
Over	Set to unity if the syndicate has an overallotment or green-shoe option to purchase additional amounts of the issue, and zero otherwise (Lee et al., 1996; Hansen, Fuller, and Janjigian, 1987).

Panel B: Descriptive Statistics for Control Variables Used in Regressions

IPOs and SEOs are for the 21-year period from 1980-2000 and are obtained from the U.S. Public New Issues Database from Securities and Data Corporation (SDC). We exclude all financial firms (one-digit SIC Code 6), all firms in regulated industries (one-digit SIC Code 4), all firms whose return data were missing from CRSP, and all firms whose gross spread data were missing from the SDC database

Variables	No.	Mean	Median	Standard Deviation
IPOs				
Mshare	4,875	3.101	0.000	5.762
Dmshare	4,875	0.651	1.000	0.477
Bank	4,875	0.715	1.000	0.452
Danalyst	4,875	0.313	0.000	0.464
Herfindahl	4,875	7.834	7.952	2.222
15 Day	4,875	0.062	0.072	0.202
Volume	4,875	0.560	0.547	0.237
Profit	4,875	−0.037	0.000	1.191
Leverage	4,875	0.267	0.103	0.876
Dfin	4,875	0.370	0.000	0.483
Size	4,875	0.062	0.034	0.070
Volatility	4,875	0.052	0.041	0.049
Over	4,875	0.984	1.000	0.126
SEOs				
Mshare	4,348	4.250	0.000	6.639
Dmshare	4,348	0.553	1.000	0.497
Bank	4,348	0.707	1.000	0.455
Danalyst	4,348	0.437	0.000	0.496
Herfindahl	4,348	7.855	7.952	2.322
15 Day	4,348	0.067	0.074	0.203
Volume	4,348	0.480	0.440	0.243
Profit	4,348	0.066	0.096	0.224
Leverage	4,348	0.203	0.143	0.242
Dfin	4,348	0.253	0.000	0.435
Size	4,348	0.041	0.021	0.064
ME ∗ Size	4,348	0.009	0.005	0.083
Volatility	4,348	0.036	0.033	0.019
Over	4,348	0.933	1.000	0.250

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