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Discounting and underpricing in seasoned equity offers[☆]

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Abstract

Expected discounting in seasoned equity offers is a cost of uncertainty about firm value, marketing new shares, and acquiring information that raises the offer price. Stockholders incorporate predictable discounting in stock prices when equity offers are first announced. The surprise component of discounting, reflecting the lead bank's final adjustment to the offer price, releases information that often causes economically large price swings on the offer day. Disparities between the issuer's closing price and the price suggested in the lead bank's final order book are a primary source of information. The discount surprise appears to be used by lead banks to update capital suppliers with that eleventh-hour information before they commit their funds.

JEL classification: G24; G32

Keywords: Underwriters; Seasoned public offerings; Investment banking; Underpricing

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1. Introduction

The discounting of seasoned equity offers has become commonplace and is of a larger order of magnitude in the 1990s than in earlier periods. Discounting is the logarithm of the ratio of the closing market price the day before the offer to the offer price. In the 1990s it averaged 3.2%, which often exceeds half the underwriting syndicate's fee and aggregates to over $2.6 billion. Explanations for discounting of seasoned equity offers remain limited and untested.

Our investigation divides discounting into two parts. The first part is expected discounting, which is the predictable component at the close of trading the day before the offer begins. Because expected discounting and expected underpricing are similar (underpricing is the logarithm of the ratio of the offer-day close to the offer price), our model of expected discounting relies on the extensive research done on expected underpricing in unseasoned offers of common stock. The second part of discounting is the eleventh-hour surprise that is revealed when the offer price is made public. In seasoned offers, both the eleventh-hour discount surprise and the offer-day return are observable, whereas neither can be seen in unseasoned offers. While the discount surprise and the eleventh-hour unanticipated underpricing are zero on average, they are not equal when the discount surprise is informative and thus impacts the offer-day return. We investigate this impact and assess the lead bank's advantage in gathering private information just before the offer. We also examine the relation between the offer-day return and the unanticipated underpricing.

Because discounting and underpricing are analogous, we focus on the application of a number of stories for underpricing in unseasoned offers to explain discounting in seasoned offers. The stories we examine tend to differ in their assumptions about the source of the lead bank's information and about how the bank uses that information. Consequently, they predict different behavior in expected discounting. In the value uncertainty story, investors should receive more compensation in the form of underpricing as valuing the firm becomes more difficult (e.g., Rock, 1985). Similarly, we expect lead banks in seasoned offers to increase discounting as valuing the issuer becomes more difficult. In the placement cost story, as the offering becomes more difficult to place, higher discounting is needed to attract capital suppliers and compensate them for bearing the burden of more illiquidity of longer term investing. Regarding the information acquisition cost story, Benveniste and Spindt (1989) suggest that lead banks in unseasoned offers improve the offer price by using allocations of more deeply underpriced shares to pay for information provided by better-informed investors. Therefore, discounting in seasoned offers should be higher as more positive private news about share price is released. Regarding the rent expropriation story, Loughran and Ritter (2002) suggest that lead banks in unseasoned offerings exploit gains in issuer value by allocating more deeply underpriced shares to customers who are likely to repay the bank by way of future reciprocal deals. Applying this reasoning to seasoned offerings predicts that discounting is higher when more good news is released about the firm, regardless if the news is public or private.

The initial model for expected discounting contains six variables identified from previous empirical models of expected underpricing in unseasoned offers. Expected discounting in seasoned offers is larger for issuers with higher stock return volatility, and for those listed on Nasdaq. It is smaller for issuers with higher priced stock, and for issues having a more reputable bank leading the underwriting syndicate. The estimates imply that expected discounting is U-shaped, reflecting a tradeoff as issuers raise more capital; it falls as proceeds increase keeping the relative amount fixed, and rises for relatively larger offers, keeping the amount fixed. These findings are robust as each variable is highly statistically significant. They agree with empirical models of expected underpricing in unseasoned offers, in which the rationale for these same determinants is that they represent the uncertainty about firm value and marketing effort.[1]

To investigate the economic relevance of the pricing stories for seasoned offers, the empirical model is enlarged to test the response of expected discounting to the release of information during the registration period (from the filing day through the day before the offer). The findings show that expected discounting increases with the release of more positive private information during the registration period. This agrees with the information acquisition cost story. Lowry and Schwert (2003) show that underpricing in unseasoned offers rises with the amount of positive private information revealed and is asymmetrically zero for offers lacking a positive information release. We show that discounting rises with the release of more negative information, which is compatible with the finding that discounting increases as volatility rises and thus agrees with the value uncertainty and placement cost stories. We do not find a significant relation between expected discounting and public information released during the registration period for seasoned offers, whether the news is bad or good. This is contrary to the notion that banks use discounting to extract rents when the value of the issuer is appreciating. Thus, both seasoned and unseasoned offers have a number of common factual regularities in the predictable components of expected underpricing.

The expected discounting model throws light on a long-standing question about whether investors anticipate underpricing before equity offers. Rational investors should incorporate the expected dilution cost from discounting when they evaluate the announcement of the new financing. The price reaction to the financing announcement indicates that investors anticipate discounting costs, as it is more negative when predicted discounting is larger. The model also addresses the question we raise about why discounting has become more common in seasoned offerings. Comparisons of discounting in a sample of 1980s issues with their 1990s predicted discounting suggest that the average level of discounting has risen in later years primarily because of a greater propensity of use and increased uncertainty among issuing firms.

[1] Empirical models of expected underpricing in unseasoned offers are reported in Barry et al. (1990), Barry et al. (1991), Hanley (1993), Jegadeesh et al. (1993), Dunbar (1995), Beatty and Welch (1996), Booth and Chua (1996), Habib and Ljungqvist (2001), Hansen (2001), Lowry and Schwert (2003), Benveniste et al. (2002), and Busaba et al. (2001).

The offer pricing stories predict different behavior for discounting's eleventh-hour surprise. While the eleventh-hour discount surprise could simply be a random last-minute price adjustment, it also could release information held by the lead bank. If the surprise conveys new information, then the offer-day will be characterized by larger than normal stock returns, both good and bad. Consistent with this, the data indicate unusually large revaluations of issuing firms on the offer-day, but not on the surrounding days. For instance, issuers have a one-in-five chance of an abnormal 1.2% rise in their stock price and a similar chance of a 3.1% drop. These unusual and large swings in value often exceed the underwriter's compensation. Evidently, investors in seasoned offers face significant offer-day uncertainty about firm value and issuers face significant uncertainty about the amount of proceeds.

To further understand the behavior of eleventh-hour pricing, the response of the offer-day abnormal return to the discount surprise (hereafter sensitivity) is examined. The offer pricing stories predict different sensitivities. In the placement cost story, eleventh-hour discounting resolves the uncertainty about the gap between the prior day's closing price and the price implied in the final order book, and it reflects related changes in placement cost.[2] This predicts that discounting changes exceed return changes, hence a negative sensitivity above minus one. In the information acquisition story, last-minute discounts are used to buy better information. This predicts that return changes exceed discounting changes, so the sensitivity is below minus one, but only when the news is good. In both of these stories the bank makes no other use of the information. In the rent expropriation story, while the source of information is not material, the bank should use the eleventh-hour discount to exploit its information advantage to fine tune its rent extraction, raising the discount if the news is good and scaling back the discount if the news is bad. This predicts that return changes exceed discounting changes and sensitivity is below minus one, regardless of the news. Cross-section estimates reveal that an unanticipated 1.0% increase in the discount is associated with an abnormal 0.62% decline in the stock price. This is consistent with the placement cost story, and it rejects the prediction from the rent expropriation story. Although it contradicts the information acquisition story, we report further tests that reveal that the sensitivity is more negative, but still above minus one, when offer-day news is positive. These results concur with the conclusion that placement cost is the primary use of eleventh-hour discounting and that eleventh-hour information gathering may play a secondary role.

Our findings provide an indirect indication of how lead banks price offers. Theoretical and empirical papers have suggested that lead banks tend to behave

[2] Cornelli and Goldreich (2001) and Sherman and Titman (2002) discuss the order book, and investors' indications of interest and price and quantity bids contained therein, in the case of unseasoned offers. In addition to the order book and informed investors, the eleventh-hour information source could be firm managers. A number of underpricing stories in unseasoned offers assume managers use underpricing to signal their knowledge that the firm is undervalued, underpricing more as the undervaluation increases. We focus on the lead banks having the eleventh-hour information, based on later results that seem to rule out that managers use discounting to signal that their firm is undervalued or that the information is stored up from prior periods.

credibly and certify the fairness of offer prices to maintain their reputations with capital suppliers and thus their lead bank role in future offers (Booth and Smith, 1986; Smith, 1986). Our results appear to agree with the notion that lead banks possess economically significant information that investors do not have in the eleventh-hour—information that primarily reflects discrepancies between the market price and the price implied by their order book. The evidence also indicates that the banks convey this information in the final offer price adjustments. It thus looks as if alert capital suppliers in all likelihood require the banks to make fair pricing adjustments, and the banks respond by using discounting as an effective information updating mechanism, before those investors commit their funds. In agreement with this interpretation, no evidence in our study supports the application of the rent expropriation story to seasoned offers.

The remainder of the paper proceeds as follows. Section 2 discusses the sample and the identification of the offer-day. Section 3 discusses underpricing and discounting, investigates the expected discounting, and provides comparisons with discounting in the 1980s. Section 4 reports the offer-day information release, examines the return sensitivity to the unanticipated discounting, and assesses unanticipated underpricing. Section 5 concludes the paper.

2. The sample

The sample of seasoned offers is obtained from the population of seasoned offers reported on the April 1998 Securities Data Company Worldwide New Issues Data Bases. The Securities Data Company provides offer data (type; lead bank identity; underwriting contract form; offer date; gross proceeds, excluding funds from overallotment option exercise; the portions secondary; offer price; shares issued; lead bank identity; size of the global tranche). The issuer's exchange listing, standard industrial classification (SIC) code, stock market prices, shares outstanding, daily trading volume, and daily returns are obtained from the Center for Research in Security Prices (CRSP) files. Where data are available, closing ask and bid prices are obtained from the NYSE Trade and Quote Database (TAQ). Institutional ownership of common stock is taken from *Disclosure/Spectrum Institutional 13F Common Stock Holdings and Transactions*. Lead bank reputation (hereafter reputation) is measured using the Carter and Manaster (1990) ranking of banks that underwrite unseasoned equity offerings and as updated in Carter et al. (1998). Sample banks identified from the Securities Data Company as lacking a ranking, are assigned a reputation of zero. All monetary variables are expressed in January 1998 dollars using the consumer price index. The sample focuses on firm-underwritten, syndicated offers. Although some results are reported for offerings by utility firms, the primary focus is on offerings by industrial firms (SIC codes other than 400s, regulated firms; or 600s, financial firms). Also excluded are shelf offerings and offers that have warrants or are in a unit offer. Results are reported as data are available. Small offers are deleted from the sample (those under $10 million). This yields a final sample of 1,703 offerings.

Fewer (64) offers were made in 1990, when the U.S. economy was recovering from recession. Over the sample period the number of offers per year tends to be higher in later years. Almost two out of three (65%) offers are by Nasdaq-listed firms. The offers are fairly distributed over the calendar year, with fewest in the third quarter (21.1%) and most in the fourth quarter (28.4%). According to the two-digit SIC codes, 52 industries are represented, with 60% of the offers from firms in seven industries (Chemicals and Allied Products, 171; Industrial and Commercial Machinery, Computer Equipment, 94; Electronic, Other Electrical Equipment, Components, Except Computer Equipment, 89; Oil and Gas Extraction, 84; Business Services, 79; Health Services, 62; Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks, 57). The mean gross proceeds is $85.9 million (median of $57.12 million) or 21,7% of outstanding equity (median of 19.8%), with both measures excluding exercise of overallotment options.

The Securities Data Company offer date is not an accurate indicator of the actual offer-day, so the offer date is identified with a new procedure that relies primarily on the offer date reported in the business press. For each issuer we search the Dow Jones News Retrieval Publications Library (DJNR) for articles reporting the offer, commonly numbering one or two per issuer. The offer date is that article's date if its time stamp is before the close of trading. When the time stamp is after the close, the next day is designated as the offer date. When no article is found on the DJNR, the Securities Data Company offer date is used. A second identification procedure draws on the Safieddine and Wilhelm (1996) method that exploits the fact of an enormous trading volume surge on the offer-day. In the sample, for example, offerday relative volume (volume and shares outstanding are obtained from CRSP) is more than a dozen times larger than the average measured over the prior 250 trading days or the 250 trading days commencing one year later. Relative daily trading volume is examined on 11 trading days, centered on the Securities Data Company offer date. The offer-day is chosen as the day among the 11 days on which relative volume jumps five times over the prior day's relative volume, provided it is not more than twice its prior day's level.

The two procedures identify the same offer-day for 98% of the offers, disagreeing in 36 cases. These discrepancies are resolved by appealing first to articles from DJNR and second, where needed, to the relative volume criteria. Using this offer date as a benchmark, Securities Data Company classifies over 50% of the offer dates incorrectly, from the standpoint of the day the stock market is open when the offer begins. When the Securities and Exchange Commission (SEC) declares the offer effective after the close of trading, Securities Data Company most commonly reports that day as the offer date, while the offering actually takes place the next day. Because differences between the closing prices the day before and two days before the offer-day are not systematic, not correcting for the right offer-day does not appear to introduce a significant effect on our main findings about discounting. Further comparisons of the prospectus document dates reported by the Securities and Exchange Commission's EDGAR, for a sample of offers, with offer dates reported by the Securities Data Company gave inconsistent results.

3. An examination of discounting

This four-part section examines sample discounting. Part one reviews the definitions of underpricing, discounting, and the offer-day return, and it compares their sample behavior with findings reported in earlier studies. Part two reports the estimates of the empirical model of expected discounting. Part three uses the model with a sample of 1980s offers to examine the growth of discounting in the 1990s. Part four investigates whether price reactions to equity financing announcements reflect discounting costs predicted by the empirical model.

3.1. Underpricing, discounting, and the offer-day return

Underpricing, discounting, and the offer-day return, denoted respectively by U, D, and R, are measured as logarithms of the following respective ratios: the offer-day's closing price, p_1, to the offer price, p_0; the prior day's closing price, p_{-1}, to the offer price; and the offer-day close to the prior day's close. From the identity

$$\frac{p_1}{p_0} = \left[\frac{p_{-1}}{p_0}\right] \times \left[\frac{p_1}{p_{-1}}\right], \qquad (1)$$

taking logarithms shows that underpricing is the sum of discounting and the offer-day return,

$$U = D + R. \qquad (2)$$

Panel A of Table 1 reports mean underpricing, discounting, and offer-day returns for issuers listed on the NYSE or Amex and on the Nasdaq exchange. Underpricing and discounting are higher for Nasdaq issuers. Reflecting the identity between underpricing and the sum of discounting and the offer-day return, combined mean underpricing (2.58%) is comparable to the sum of the combined mean discounting (2.47%) and the mean offer-day rate of return (−0.03%).

The underpricing and discounting percentages in Panel A are economically significant. For the typical offer, the nominal value for discounting is $1.4 million. Moreover, over 75% of the offers experience some discounting, averaging 3.2%. The significantly large and widespread discounting rejects the hypothesis that seasoned offers are priced at the prior day's closing price. That being said, many offers are not discounted.

Although underpricing and discounting are larger and common, the mean offer-day return remains modest. Yet significant volatility is present in offer-day prices, as is evident in the return standard deviation of 4.7%, which is 50% above its mean of 3.2% over the prior five trading days and 100% above its mean of 2.3% over the subsequent five trading days (not reported). While at first it might seem unusual that the offer-day return is modest, particularly in light of the apparent increase in discounting, it is not surprising if investors rationally assess possible offer-day closing prices and thus value issuers fairly just before the offer-day.

To place 1990s seasoned offer pricing in perspective, Panel B has mean pricing measures from prior studies, sorted from lowest to highest and by exchange listing.

Table 1

Underpricing, discounting, and offer-day returns for sample firms by exchange listing and as reported in prior studies. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants and issues under $10 million. The rate of underpricing is the logarithm of the ratio of the offer-day closing price to the offer price. The rate of discounting is the logarithm of the ratio of the pre-offer-day closing price to the offer price. The offer-day rate of return is the logarithm of the ratio of the closing offer-day price to the prior close price. Panel A reports sample firm pricing characteristics. Closing prices are from the Center for Research in Security Prices and the offer price is from the Securities Data Company. Panel B reports comparable measures from noted studies. In parentheses are p-values, using the Student's *t*-test for the means and the Wilcoxon rank test for the medians.

	Underpricing		Discounting		Offer-day return	
	Mean	Median	Mean	Median	Mean	Median
Panel A. Sample						
NYSE/Amex offers ($N=590$)	1.78	0.8	1.47	0.53	0.23	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.11)	(0.12)
Nasdaq offers ($N=1{,}113$)	3.01	1.72	3.01	2.13	−0.17	−0.29
	(0.00)	(0.00)	(0.00)	(0.00)	(0.27)	(0.23)
Combined	2.58	1.28	2.47	1.52	−0.03	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.77)	(0.76)
Panel B. Prior studies						
NYSE/Amex offers	−0.11[a]		0.44[a]		0.00[b]	
	0.12[c]		0.28[c]		−0.15[d]	
	0.45[e]		0.54[f]		−0.69[g]	
	0.82[f]				−0.70[h]	
Nasdaq offers	1.94[c]		1.64[c]			
NYSE/Amex/Nasdaq offers	0.27[i]		0.45[e]		−0.29[j]	
	0.52[k]		0.55[k]			
Average	0.56		0.71		−0.33	

[a] Eckbo and Masulis (1991), 401 offers by industrial firms, 1963–1981.

[b] Barclay and Litzenberger (1988), 218 offers by industrial firms, 1981–1983. This is an average of the prior day's closing price to the offer-day open price and the open to the offer-day closing price. These are excess returns.

[c] Loderer et al. (1991), 680 Nasdaq and 926 NYSE/Amex offers by industrial and utility firms, 1980–1984.

[d] Lease et al. (1991), 210 offers by industrial and utility firms, 1981–1983. These are excess returns.

[e] Safieddine and Wilhelm (1996), 118 offers by industrial firms, 1988–1991.

[f] Smith (1977), 328 offers by industrial and utility firms, 1971–1975.

[g] Mikkelson and Partch (1985), 311 offers by industrial firms, 1974–1983.

[h] Mikkelson and Partch (1986), 56 offers by industrial firms, 1972–1982. These are excess returns.

[i] Yeoman (2001), 1,143 offers by industrial, financial, and utility firms, 1988–1993.

[j] Korajczyk et al (1991), 601 over-the-counter and 646 NYSE/Amex offers by industrial firms, 1978–1983.

[k] Safieddine and Wilhelm (1996), 356 offers by industrial firms, 1980–1987.

Most offers in these studies occur before 1985. Based on the Panel B means, underpricing and discounting in the 1990s are four to five times higher than in earlier years. Not reported in the table is a rising trend in 1990s discounting, based on its three-month moving average. However, this is due to a rise in the monthly moving average of the fraction of offers that are discounted (annual means increase steadily from 70% to 86%), while the trend in amount of discounting in the discounted offers has remained flat (annual means hover around 3.2%). Thus, while discounting became more frequent, users encountered similar discounting rates throughout the 1990s. In contrast, underpricing in unseasoned offers rises in the 1990s with a dramatic trebling in 1999 and 2000 (Loughran and Ritter, 2003; Ljungqvist and Wilhelm, 2002). For comparison purposes we are able to confirm the flat trend in seasoned offer discounting in these years, as the mean discounting for the 182 offers from the Securities Data Company that meet sample criteria in 1999 and 2000 is 2.93%.

Fig. 1 depicts underpricing, discounting, and offer-day return frequencies. Fractiles are formed by rounding to whole points. Thus, for example, the 1% discounting fractile contains all discounting above 0.5% to 1.5%. Underpricing in Panel A is a mixture of the discounting and return distributions, and it shows both light skewness and a large frequency at zero that are traceable to the discounting. The distinctive feature of discounting in Panel B is that it is essentially truncated at 0% and right-skewed (skewness is 2.14). Loderer et al. (1991) report similarly truncated discounting for offers during 1980–1984. A similar censoring arises in analyses of underpricing in unseasoned offers in which negative underpricing is typically set to zero and Tobit regressions are used (Hansen, 2001). Thus, discounting is modeled using the Tobit regression. The offer-day return in Panel C is roughly symmetrically distributed around its −0.03% mean (median, 0; skewness, −1.21).

3.2. An empirical model

The initial model of expected discounting is based on the rich research that models underpricing in unseasoned offers for determinants of discounting. The model is then extended to assess the extent to which discounting reflects information released during the registration period.

3.2.1. Discounting and offering characteristics

From Eq. (2), expected underpricing equals expected discounting:

$$\mathrm{E}[U] = \mathrm{E}[D], \tag{3}$$

where we assume for simplicity that the offer-day expected return is zero. The estimates obtained from the empirical model of expected discounting are thus also estimates of expected underpricing.

Studies of unseasoned offers report mixed results of the effect of the amount of the offering on underpricing (Barry et al., 1990; Dunbar, 1995; Hanley, 1993). The offer amount is measured by the natural logarithm of the gross proceeds. Hansen (2001) reports underpricing increases with the relative amount of the offer. Relative amount is the gross proceeds with regard to the market value of equity, measured one week before the offer-day. An increase in the relative amount, while keeping the offer

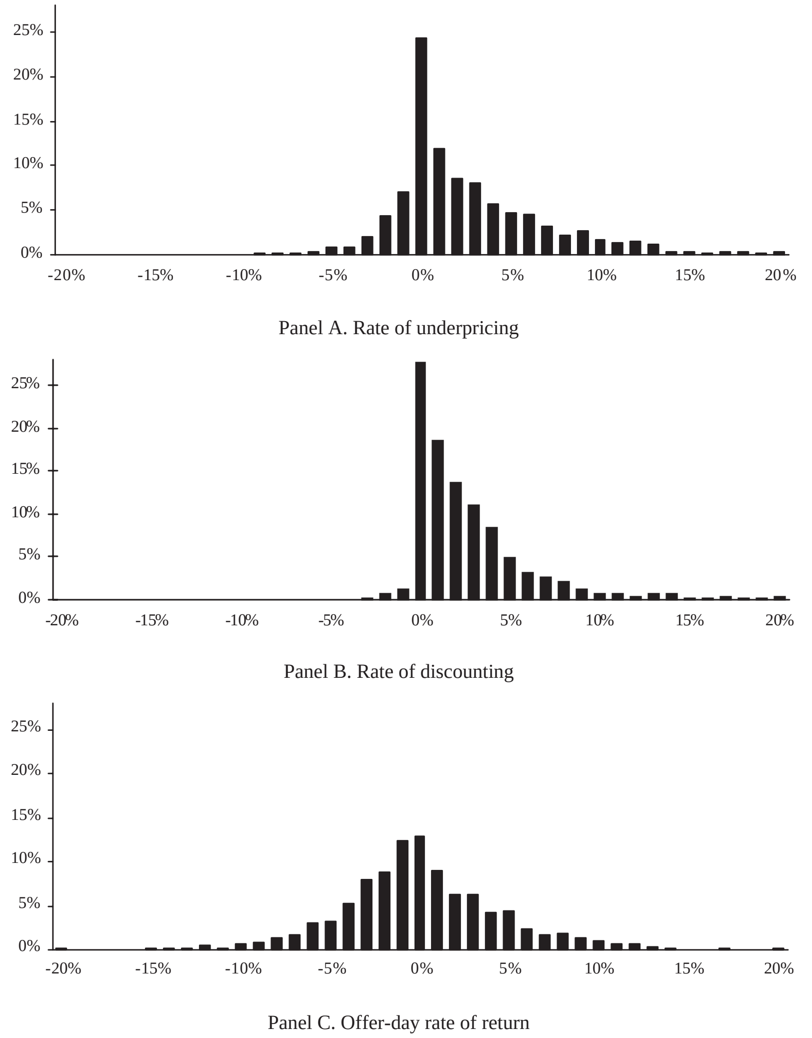

Fig. 1. Frequency distributions of discounting, underpricing, and offer-day returns. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants, and issues under $10 million. The rate of underpricing is the logarithm of the ratio of the offer-day closing price to the offer price. The rate of discounting is the logarithm of the ratio of the pre-offer-day closing price to the offer price. The offer-day rate of return is the logarithm of the ratio of the offer-day closing price to the pre-offerday closing price.

amount fixed, is likely to raise the uncertainty cost of adverse selection and placement pressure, given that more capital is being sought relative to issuer size. This would suggest greater reliance on discounting for relatively larger amounts. The offer price inverse, a proxy for uncertainty about value, has a significant effect on underpricing; that is, underpricing is higher for lower priced stock (Jegadeesh et al., 1993; Beatty and Welch, 1996). Because the offer price is endogenous, the inverse of the market price as of five days before the offer-day is used. Marketing of lower priced stock is expected to be more difficult, suggesting greater reliance on discounting. A number of studies report higher underpricing when stock return volatility is higher (Barry et al., 1990; Barry et al., 1991; Jegadeesh et al., 1993). Volatility is measured with the standard deviation of abnormal returns over the 200 days ending one month before the offer. The Table 1 results suggest that discounting is larger for Nasdaq offers. The model therefore includes an indicator variable equal to one for Nasdaq-listed firms. A number of studies suggest that issuers hire more reputable banks to certify the offer price (Smith, 1986; Booth and Smith, 1986; Carter and Manaster, 1990). Empirical studies of unseasoned offers that have variable underwriter spreads, as seasoned offers, report that more reputable banks are associated with lower underpricing (see, for example, Megginson and Weiss, 1991; Dunbar, 1995; Booth and Chua, 1996; Carter et al., 1998). In contrast, studies of "7% plus" contract users, which predominate in unseasoned offers, show that underpricing increases when more reputable lead banks are used (Beatty and Welch, 1996; Hansen, 2001).

Fig. 2 shows the bivariate relations between discounting and the selected variables, where the column heights report mean discounting by variable quintile in all cases except the Nasdaq listing indicator variable. Discounting is higher for smaller offerings and for relatively larger amounts. It is also higher for lower priced stocks, for more volatile stocks, and for offerings with the lowest reputation lead banks. Nevertheless, the largest amounts are associated with discounting above 1.25%, as are the proportionally smallest offers, the highest priced offers, the least volatile offers, the NYSE firms, and the offers with the highest reputation lead banks. The relations are not driven by extreme values.

The discounting model also includes the inverse Mills' ratio, in anticipation of estimation bias from censored pre-offer pricing and return measures caused by withdrawn offers (Edelen and Kadlec, 2002). The ratio is calculated using the probability of withdrawal estimated by a Probit model (Heckman, 1979; Maddala, 1983). Panel A of Table 2 shows that compared to completed offers, withdrawals that meet sample criteria file after lower abnormal returns and are withdrawn after significantly negative pre-offer abnormal returns (−17.64% with 83% negative, versus −0.34% with 54% negative). Mikkelson and Partch (1988) report similar return behavior for filings from 1973 through 1984. Panel B has four withdrawal probability models. Column 1 shows that withdrawal is likelier for smaller firms and smaller offers and is unaffected by lead bank reputation or exchange listing. Withdrawal is more likely when pre-file returns are worse (Column 2), and when either pre-offer abnormal returns or market returns are worse (Column 3) confirming Clarke et al. (2002). Column 4 includes the return measures when they are respectively positive, and zero otherwise, and shows that withdrawal is more likely when news is bad. These results show that pre-offer pricing and returns in completed offer samples are censored.

To address further concern about discounting model misspecification associated with omitted variables, we considered other possible variables, and each discounting

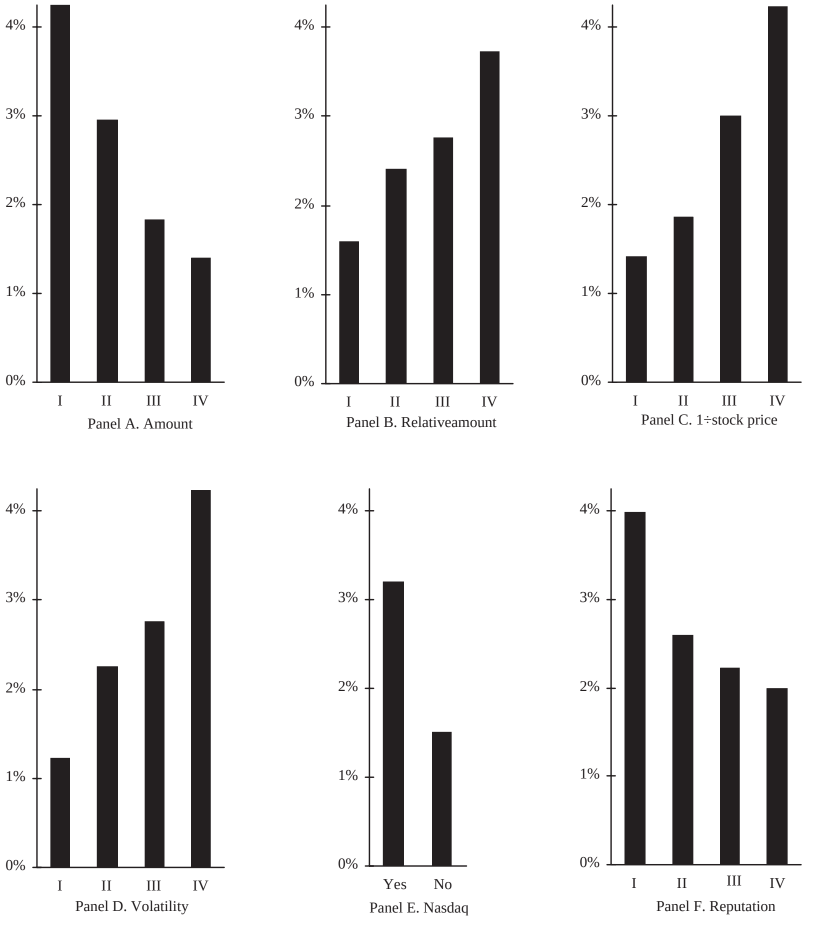

Fig. 2. The rate of discounting versus several issuer characteristics. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants, and issues under $10 million. The variables are defined in Table 3. The mean and median discounts are measured within the respective quartiles (lowest I to highest IV) or in the case of exchange listing, by exchange. Discounting is the logarithm of the ratio of the pre-offer-day closing price to the offer price.

model estimation includes industry-specific dummy variables, one for each two-digit SIC code, and dummy variables for each calendar year. These variables allow for a different intercept for each industry and year. Throughout, the coefficients of these variables are not reported.

We model discounting in a multivariate Tobit regression estimation. Column 1 of Table 3 lists the base case estimates. Larger offers have lower discounting, while relatively larger offers have greater discounting. Notice that this indicates a *U*-shape pattern in the discounting, as the amount of the offer increases, ceteris paribus. This may reflect scale economies at lower amounts that give way to rising discounting

Table 2

Completed and withdrawn offers and the likelihood of withdrawal. The sample is firm-underwritten completed and withdrawn, nonshelf offers by listed industrial firms from 1990 through 1997, excluding units, offers with warrants, and issues under \$10 million. AR(60 through 2 days before filing) is the issuer's cumulative abnormal return from 60 days through two days before the file date. R_M(file to decision day) and AR(file to decision day) are the market and issuer abnormal return during the registration period for completed offers and from the file date to the withdrawal date for withdrawn offers. Positive R_M(file to decision day) and positive AR(file to decision day) are the same two variables when they are respectively positive, and zero otherwise. Amount is the gross proceeds. Relative amount is the ratio of shares issued to shares outstanding before the offer-day. Reputation is the lead bank's average reputation based on tombstone advertisements. Nasdaq is an indicator variable equal to one for issuers listed on the Nasdaq Exchange. Returns are constructed using prices and indices from the Center for Research in Security Prices (CRSP). In parentheses are p-values, using chi-square statistics.

	Completed offers		Withdrawn offers	
	Mean	Median	Mean	Median
Panel A. Characteristics				
AR(60 through 2 days before filing)	24.89	21.75	11.28	9.82
AR(file to decision day)	−0.39	−0.92	−17.64	−16.93
R_M(file to decision day)	1.26	1.08	3.02	1.76
Amount (\$ millions)	85.85	51.89	62.60	44.11
Relative amount (%)	21.71	19.27	26.02	23.25
Reputation	7.82	8.75	7.42	8.75
Nasdaq (%)	65.32	1.00	70.20	1.00
N	1,707		198	
Independent variable	(1)	(2)	(3)	(4)
Panel B. Probit regressions				
Intercept[a]	−0.80	−0.81	−1.09	−1.25
	(0.00)	(0.00)	(0.00)	(0.00)
AR(60 through 2 days before filing)		−0.71	−0.87	−0.89
		(0.00)	(0.00)	(0.00)
AR(file to decision day)			−0.98	−1.18
			(0.00)	(0.00)
Positive AR(file to decision day)				1.04
				(0.00)
R_M(file to decision day)			−0.21	−1.66
			(0.58)	(0.02)
Positive R_M(file to decision day)				1.69
				(0.00)
Amount	−0.17	−0.16	−0.14	−0.16
	(0.00)	(0.01)	(0.02)	(0.01)
Relative amount	1.13	1.26	1.55	1.52
	(0.00)	(0.00)	(0.00)	(0.00)
Reputation	−0.01	−0.00	0.01	0.01
	(0.72)	(0.98)	(0.72)	(0.69)
Nasdaq	−0.02	0.05	−0.04	−0.08
	(0.82)	(0.62)	(0.72)	(0.44)
Log likelihood	620	597	530	522
N	1,905	1,905	1,905	1,905

Table 3

Regressions of discounting on selected factors. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants, and issues under $10 million. Tobit estimates are reported in all models except in Column 4, which has ordinary least squares (OLS) estimates, and in Column 8, which reports Fama–MacBeth means of year-by-year regression estimates of the model. The dependent variable is the natural logarithm of the ratio of the closing price the day before the offer to the offer price. In Column 3, the dependent variable is winsorized at the 5th and 95th percentiles. Amount is the gross proceeds. Relative amount is the ratio of shares issued to shares outstanding before the offer-day. 1 ÷ stock price is one over the closing stock price five days before the offer-day. Volatility is the issuer's abnormal return standard deviation for the 200 days ending one month before the offer. Nasdaq is a zero-one variable equal to one if the issuer is listed on Nasdaq. Reputation is the lead bank's average reputation based on tombstone advertisements. Price adaptation is the ratio of the offer price to the closing price the day after the filing date. Positive price adaptation is Price adaptation when it is positive and zero otherwise. R_M(registration) is the cumulative return on the Center for Research in Security Prices (CRSP) equally weighted market index during the registration period, which begins the day after the file date and ends the day before the offer date. Positive R_M(registration) is R_M(registration) when it is positive and zero otherwise. AR(registration) is the issuing firm's cumulative abnormal return during the registration period, it is the raw return less the CRSP equally weighted market index. Positive AR(registration) is AR(registration) when it is positive and zero otherwise. The inverse Mills' ratio is estimated from the Probit model of offer withdrawal in Column 3 of Panel B in Table 2. An offer is primary unless it is 10% or more secondary. In parentheses are p-values, using chi-square and Student's *t*-statistics.

Independent variable	1990s offers										1980s offers
								Fama–MacBeth	Primary offers	Secondary offers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Intercept	1.00	1.01	0.01	1.02	1.07	1.01	1.02	1.04	1.02	1.02	0.99
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Amount	−0.33	−0.38	−0.36	−0.58	−0.47	−0.39	−0.43	−0.47	−0.43	−0.49	−0.16
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Relative amount	1.94	2.13	2.04	2.87	3.41	2.08	2.20	2.37	2.59	1.80	1.41
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
1 ÷ stock price	17.10	17.28	16.79	17.15	13.18	16.80	15.89	15.65	10.61	17.28	5.50

	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Volatility	32.49	32.73	31.03	42.40	21.55	32.46	23.75	35.41	16.99	27.35	22.76
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.02)	(0.00)
Nasdaq	0.46	0.43	0.44	0.28	0.37	0.45	0.45	0.11	0.51	0.43	0.47
	(0.00)	(0.00)	(0.00)	(0.21)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.09)	(0.00)
Reputation	−0.07	−0.07	−0.06	−0.07	−0.07	−0.07	−0.06	0.06	−0.04	−0.10	−0.01
	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)	(0.02)	(0.55)	(0.30)	(0.02)	(0.49)
Inverse Mills' ratio		−0.02	−0.02	−0.03	−0.16	−0.03	−0.05	−0.10	−0.07	−0.03	
		(0.12)	(0.08)	(0.21)	(0.00)	(0.07)	(0.01)		(0.02)	(0.39)	(0.00)
Price adaptation					−9.15						
					(0.00)						
Positive price adaptation					10.42						
					(0.00)						
R_M(registration)						−5.30	−6.60	−1.01	−7.17	−5.40	
						(0.29)	(0.18)	(0.90)	(0.25)	(0.46)	
Positive R_M(registration)						12.27	11.93	3.90	13.12	12.55	
						(0.09)	(0.13)	(0.75)	(0.19)	(0.23)	
AR(registration)							−3.31	−4.76	−2.95	−2.84	
							(0.00)	(0.04)	(0.03)	(4.07)	
Positive AR(registration)							6.66	6.89	6.94	5.18	
							(0.00)	(0.01)	(0.00)	(0.01)	
Log likelihood	3860	3803	4147		3850	3800	3875		1772	2016	2221
Adjusted R^2				0.17							
N	1,703	1,703	1,703	1,703	1,703	1,703	1,703	8	818	885	764

costs for larger offers. The estimates suggest that the *U*-shape reaches a minimum at a relative amount near 17% (0.33/1.94). Discounting increases as issuers' stock prices decline and as their stocks become more volatile. Capital suppliers also appear to require less discounting in offers led by more reputable banks. However, they require almost 0.5% more discounting for offers by Nasdaq firms, even after controlling other issuer and offering characteristics.

The base model is expanded in Column 2 to include the inverse Mills' ratio, estimated from the Column 4 model in Table 2. For unseasoned offers, Benveniste et al. (2002) report a positive effect of withdrawal probability on underpricing. Busaba et al. (2001) report a negative effect and suggest that issuers who are more likely to withdraw their offers have more power negotiating with the lead bank. In our setting, in which poor pre-offer returns are a key withdrawal predictor, the negative effect may reflect reduced placement effort and below normal purchase of good information when market conditions predict that withdrawal is more likely. The stability of the other coefficient estimates in the discounting model indicates that the estimation bias caused by withdrawals is negligible.

To address the concern that extreme discounting values are driving the results, the model is reestimated after winsorizing the discounting; that is, for offers in the lower 5% tail the discounting rate is set equal to the 5th percentile value of 0%. Discounting rates in the upper 5% tail of the distribution are set equal to the sample's 95th percentile value of 8.9%. The winsorized Tobit results, in Column 3 of Table 3, are essentially the same as those results in Column 1. Column 4 reports qualitatively similar results that use ordinary least squares, except for the Nasdaq indicator, which is insignificant.

Overall, none of the industry and offer-year dummy variable effects are statistically significant.Evidently, no particular industry or calendar-year effects are associated with discounting in the 1990s.

Hanley (1993) reports that end-of-quarter institutional holdings of an unseasoned issuer's common stock has a positive effect on underpricing, and Hanley and Wilhelm (1995) find that institutional holdings do not have a significant effect on underpricing. We examine the effect of changes in institutional ownership from before to after the offer-day as well as the post-offer level of institutional ownership, constructed from Spectrum's files that draw from 13F filings with the Securities and Exchange Commission. Studies show that underpricing is larger in unseasoned offers by firms in high-technology industries (see, for example, Mola and Loughran, 2001; Lowry and Schwert, 2003; Bradley and Jordan, 2002) and when underpricing of other recent unseasoned offers is higher (Bradley and Jordan, 2002; Benveniste et al. 2002; Loughran and Ritter, 2002). We look for a high-technology industry effect using hi-tech industry definitions from these studies (two-digit SICs of 36, 38, 48, or 73) as well as the definition given on the SDC file. We examine the effect of discounting of other recent seasoned issues. We also investigate the effect of selling a part of the offer in a foreign market and the length of time between the filing date and the offer date. None of these variables is statistically significant, so these findings are not reported.

We test the prediction of the Gerard and Nanda (1993) model, which assumes that discounting increases as the informativeness of the stock price declines as measured by offer size relative to trading volume. No significant relation is found between expected discounting and the ratio of new shares to the average trading volume over the month before the offer-day.

These results show that part of discounting cost is predictable and that important discounting determinants are the same as those in empirical models of expected underpricing in unseasoned offers. The results are robust to the inclusion of the full range of independent variables and to reasonable methods of estimation. They are consistent with the use of discounting to address concerns about greater placement costs.

3.2.2. Discounting and registration period information

During the registration period the lead bank markets the offer to expand demand and gather information about share value. Theories of unseasoned offer underpricing provide some predictions about the response of expected discounting to this information. The information acquisition story predicts that expected underpricing is positively correlated with positive private information revealed during the registration period. The rent expropriation story predicts that expected underpricing is positively correlated with both private and public information revealed during the registration period.

To assess whether the registration period information is incorporated in the discounting, three pricing measures are used. The first pricing measure, called the offer price adaptation, is the ratio of the offer price to the closing stock price the day after the filing. The price adaptation is similar, but not identical, to the price revision studied in unseasoned offers, which is the offer price relative to the midpoint of the high and low price estimates reported in the filing prospectus. Information conveyed by the price revision can differ from information in the price adaptation to the extent unseasoned offer prospectus prices misestimate market value. The sample mean price adaptation is -1.36% (t-statistic $= -3.69$); the negativity partly reflects discounting as the mean raw return is 1.60% (t-statistic $= 12.48$). The second pricing measure is the return on the market. The return on the CRSP equally weighted index is 1.26% (t-statistic $= 16.25$) on average and positive for over 65% of the offers. The third pricing measure is the issuer's abnormal return, equal to the difference between raw return and the CRSP equally weighted return index. The sample mean abnormal return is a statistically significant -0.34%.

Fig. 3 charts discounting versus the respective pricing measures which are sorted in deciles from low to high. The column heights are within decile mean discounting. Variable means within decile are reported numerically on the abscissas.

The discounting-price adaptation relation is a measure of how much bank information is incorporated in the offer price. A rising discount as the price adaptation increases suggests the bank is not incorporating all its information in the offer price. Such evidence would be similar to the partial adjustment phenomenon documented by Hanley (1993), in which underpricing is significantly positively related to the price revision and thus the bank's information improves. The

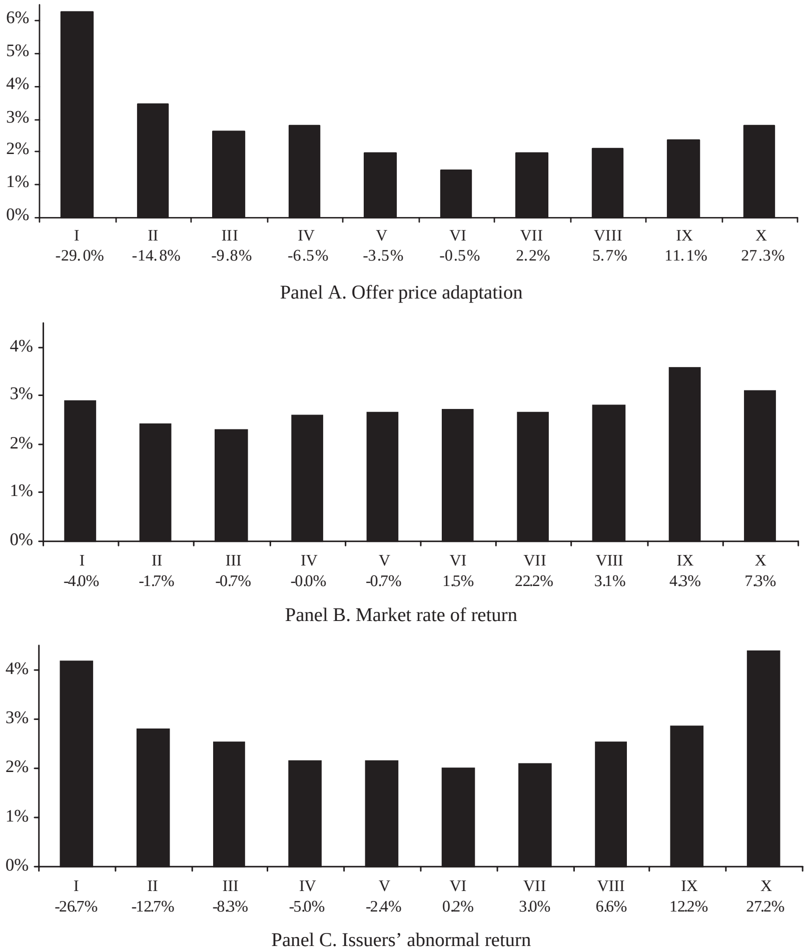

Fig. 3. Discounting versus the offer price adaptation, market returns, and abnormal returns. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants, and issues under $10 million. The registration period starts the day after the Securities and Exchange Commission file date and ends the day before the offer. The offer price adaptation is the logarithm of the ratio of the offer price to the closing price on the day after the file date. The market return is the registration period rate of return on the Center for Research in Security Prices (CRSP) equally weighted index. The registration period abnormal return is the issuer's raw return less the return on the CRSP equally weighted index over the registration period. Discounting is the logarithm of the ratio of the closing price the day before the offer to the offer price. The three variables are separately sorted from low to high into deciles I-X, which are reported along with their within decile means.

discounting-price adaptation Pearson correlation is a statistically significant -0.17. However, Panel A of Fig. 3 shows a shallow *V*shape pattern underlying this negative trend. The *V*-shape pattern agrees with the view that deeper discounting is exchanged for information when there is more positive information about share price. It also shows that discounting increases as negative information about share price worsens, perhaps reflecting more uncertainty and marketing cost for firms that perform more poorly as the offer-day approaches. The relation between discounting and the market return shows how much public information the lead banks incorporate in the offer price. Panel B shows discounting is not materially affected by market returns (Pearson correlation coefficient = 0.05), suggesting the offer price reflects all public information. The discounting-abnormal return relation is a measure of the amount of private information included in the offer price. Panel C reveals a low *V*-shape pattern between discounting and the abnormal returns. This is consistent with deeper discounting when there is more positive private information and when there is more negative private information.

To further investigate inclusion of registration period information in the offer price, the price adaptation is added to the Tobit specification for discounting. Panel A of Fig. 3 suggests the relation is likely to be asymmetric, so the Column 5 estimates include the price adaptation when it is positive. A statistically significant asymmetric relation is evident between discounting and the price adaptation in Column 7. Evidently, discounting is raised further when the price adaptation is more extreme, either down or up (found by adding the two coefficients).

The discounting-price adaptation relation does not reveal which class of information—public, private, or both—is being included in the offer price. To allow for asymmetric responses to market information, the market return and the market return when it is positive are included. The Column 6 estimates show discounting is unrelated to the public information, whether on the upside or the downside. To allow for asymmetric response to private information, the abnormal return and the abnormal return when it is positive are included in the model. The Column 7 estimates show that discounting increases with the flow of private information, both negative and positive (found by adding the two coefficients). The positive reaction of expected discounting to positive private information and its insignificant response to public information agrees with an information acquisition role but contradicts a wealth expropriation role. Its response to negative private information agrees with the uncertainty and marketing roles for discounting, as these offers are likely to be more volatile and thus experience greater placement difficulty, all else the same.

One concern with the evidence is that there might be cycles in the seasoned offer primary market, like cycles in the unseasoned offer market (Lowry and Schwert, 2002), that may induce correlation among regression errors of offers close in time. To address this concern estimates such as those of Fama and MacBeth (1973) are examined, by first estimating the Column 7 model in each year of the sample period. Column 8 of Table 3 reports the average of the year-by-year estimates with *p*-values based on the standard deviations of the estimates. The signs of the estimates are consistent with those in Column 7, and all are statistically significant, except for reputation and the registration period abnormal return.

Another concern is that the results are driven by the effect of the fraction of the offer that represents current stockholders' sales on underpricing. Studies report mixed evidence of the effect of secondary offers on unseasoned offer underpricing (see, for example, Jegadeesh et al., 1993; Ljungqvist and Wilhelm, 2003). To address this concern, separate estimates for the primary and secondary offers are reported; an offer is primary unless it is 10% or more secondary. The signs of the estimates, reported respectively in Columns 9 and 10, agree with the Column 7 estimates, and all are statistically significant except for lead bank reputation and the registration period abnormal return in the case of the secondary offers.

These additional results therefore indicate that public information is largely incorporated in the discounting while private information is partially incorporated. They also reveal an asymmetry between discounting and the release of private information that is consistent with the use of discounting to compensate investors for new information and for bearing uncertainty and liquidity costs. Comparable findings are reported for unseasoned offers by Lowry and Schwert (2003). The results do not appear to be sensitive to censored returns caused by withdrawn offers. Similar results are obtained using other specifications of the withdrawal choice model and when the inverse Mills' ratio is excluded altogether.

3.3. Comparison with discounting in the 1980s

With the above empirical model we are in a position to examine why discounting in the 1990s is higher. Using the 1990s sample selection criteria, seasoned offers are obtained from the Securities Data Company for the five-year period from 1980 through 1984, which is the period of focus of many of the studies noted in Panel B of Table 1.

Panel A of Table 4 reports means and their differences for selected variables for the 1980s and 1990s samples. Not reported in the table are sample differences in industry representation. However, industry is not a significant factor in determining discounting in the 1990s. The mean differences alone do not provide a particularly obvious explanation for the higher 1990s discounting. The 1990s offers are much larger and have higher prices (measured in January 1998 dollars), and their banks have higher reputations. Tobit estimates show that the determinants have disparate impacts. To further assess why discounting is higher in the 1990s, we examine the predicted discounting for the 1980s offers based on the 1990s discounting model estimates reported in Column 1 of Table 3.

Panel B of Table 4 reports that for all 1980s issuers, their 1990s predicted discounting is almost twice their actual level, rising from 1.01% to 1.94%, on average, with large increases regardless of exchange. Table 4 also reports the mean predicted discounting within four levels of actual discounting, ranging from those that are not discounting types in the 1980s (discounting is under 1%) to the heavy discounters in the 1980s (discounting is over 3%). Most 1980s offers are not discounting types, yet independent of exchange listing, their mean predicted 1990s discounting is statistically significantly higher (1.56%) on average. Furthermore, the offers with higher discounting in the 1980s have 1990s predicted discounting that is similar or lower, on average. This suggests that discounting is commonplace among most issuers in the 1990s. It is consistent with a general broadening of capital supplier demand for higher discounting. The higher 1990s discounting is not due to offer-day misalignment, as this is corrected, or to the increased proportion of issuers from Nasdaq.

Table 4
Discounting of early 1980s seasoned offers compared with their predicted 1990s discounting. The samples are firm-underwritten, nonshelf offers by listed industrial firms from 1980 to 1984, and from 1990 through 1997, excluding units, offers with warrants, and issues under $10 million. Amount is the gross proceeds in millions. Relative amount is the ratio of shares issued to shares outstanding before the offer-day, in percent. 1 ÷ stock price is one over the closing stock price five days before the offer-day. Volatility is the issuer's abnormal return standard deviation for the 200 days ending one month before the offer, in percent. The percentage Nasdaq is the mean of a zero-one variable equal to one if the issuer is listed on Nasdaq. Reputation is the lead bank's average reputation based on tombstone advertisements. Panel A reports mean values for the two samples and compares their means. Panel B compares the 1980s offers' mean discounting with their predicted discounting for the 1990s using the Column 1 model from Table 3. Discounting is the logarithm of the ratio of the pre-offer-day closing price to the offer price. In parentheses are *p*-values using Student's *t*-statistics.

	Variable					
	Amount	Relative amount	1 ÷ stock price	Volatility	Nasdaq	Reputation
Panel A. Variable means						
1980s offers (n = 764)	48.72	19.62	5.19	2.79	51.96	6.93
1990s offers (n = 1,703)	85.85	21.71	4.83	3.28	65.47	7.82
Difference	37.13	2.09	−0.36	0.49	13.51	0.85
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

			By 1980s discounting group			
Exchange		All	Under 1%	1% to 2%	2% to 3%	From 3%
Panel B. Difference between 1980s issuers' mean discounting and their predicted 1990s discounting						
All offers						
	1980s mean	1.01	0.03	1.45	2.40	5.93
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1990s predicted	1.94	1.56	2.38	2.62	3.27
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Difference	0.95	1.55	0.94	0.22	−2.65
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	N	764	500	136	56	72
NYSE/Amex						
	1980s mean	0.58	−0.06	1.39	2.34	6.31
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1990s predicted	1.35	1.18	1.74	1.74	2.80
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Difference	0.78 (0.00)	1.25	0.36	−0.58	−3.51
		(0.00)	(0.00)	(0.00)	(0.00)	
	N	364	293	34	13	24
Nasdaq						
	1980s mean	1.40	0.15	1.47	2.42	5.74
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1990s predicted	2.49	2.12	2.60	2.87	3.51
	Difference	1.09	1.98	1.13	0.45	−2.23
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	N	400	207	102	43	48

In an attempt to pinpoint shifts in investor demand for discounting, the 1990s Tobit model estimates are compared with those obtained by fitting the same model to the 1980s sample. The 1980s estimates, reported in the last column of Table 3, are generally qualitatively similar to the 1990s estimates. However, some differences in the estimated coefficients suggest that higher discounting in the 1990s reflects increases in capital suppliers' need for compensation for uncertainty and illiquidity. In contrast to the 1990s model, which suggests *U*-shaped discounting reaches a minimum at a relative amount of 17%, the 1980s minimum is smaller at a relative amount near 11% (0.16/1.41). Because of the implied increase in scale economies in discounting in the 1990s, discounting is higher for smaller offers. It also suggests higher discounting for those smaller issuers who seek proportionally more funds in the 1990s, everything else being the same. While 1990s issuers tend to have higher stock price levels, there is also a tripling of the stock price inverse coefficient from 5.55 in the 1980s to over 16 in the 1990s. Evidently, capital suppliers demand larger discounting for issuers with lower priced stock, consistent with a higher premium for value uncertainty in the 1990s. Volatility is also contributing to higher discounting in the 1990s. This is partly due to an almost 50% increase in the uncertainty premium for volatility, as indicated by the higher volatility coefficient (32.49 versus 22.76), and partly due to the fact that issuer volatility is up by 50% in the 1990s, on average (see Table 4). Furthermore, greater weight is attached to lead bank reputation in the 1990s. While reputation does not appear to be important economically or statistically in the 1980s, suppliers of capital receive more discounting in offers led by less reputable banks in the 1990s. This result is also evident in Panel F of Fig. 2. We also examined underwriting spreads, fitting the ordinary least squares model of Altınkılıç and Hansen (2000) and Altınkılıç (2003), for both the 1980s and 1990s samples. Analysis of the predicted spreads from those models indicates that underwriter spreads are not significantly different across the two samples.

The evidence suggests that capital suppliers in the 1990s tend to require discounting more often and demand more discounting on riskier and more difficult to market offers. The results point to two other plausible contributing factors. Greater offer frequency and contracting competition in the 1990s (Gande et al., 1999) complement discounting as an economically desirable underwriting contract innovation. Consistent with this, underpricing plays a more important role in unseasoned offers in the 1990s (Beatty and Welch, 1996; Hansen, 2001). Gerard and Nanda (1993) suggest that another factor is the 1988 prohibition (SEC Rule 10b-21) against covering short sales made before the offer with shares bought at the offer price. To the extent that short sales are an economically efficient mechanism for lowering placement difficulty, their prohibition could have induced a substitution of discounting for short selling.

3.4. Predictable discounting and the offer announcement price reaction

The predictability of discounting suggests that rational investors will anticipate the associated expected dilution costs when they first learn of the offer. Offer announcements are identified by a search of the DJNR. Two hundred two offers have other news released on the announcement date (84 are quarterly earnings reports). Panel A of Table 5 reports, for all offers, that the announcement period abnormal return is −2.23%, with a median of −2.24%. Both are highly statistically significant. For the offerings with no other announcement-day news, the mean is a highly statistically significant −2.32% (t statistic = −16.83), with a median of −2.36%. These abnormal returns are comparable to estimates documented by others.[3]

Panel A of Table 5 reports mean and median announcement abnormal returns by increasing levels of expected discounting, which is estimated using the Column 1 model from Table 3 and the inverse of the stock price one week before the announcement. Issuers expecting the least discounting have the highest abnormal return of −1.11%. Issuers with expected discounting of 1% to 2% have economically and statistically significantly more negative mean abnormal returns of −2.19%. Mean abnormal returns fall significantly further to −2.49% for issuers with 2% to 3% expected discounting and statistically significantly further to −2.83% for issuers expecting the widest discounting. This evidence indicates a monotonically declining relation between falling abnormal returns and rising expected discounting. It is not consistent with expected discounting as a positive signal that the firm is undervalued. In signaling models of underpricing in unseasoned offers better-informed managers use underpricing to signal that their firm is undervalued (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989).

These results do not hold other factors constant. To address this concern, Panel B reports cross-section estimates of announcement period abnormal returns. The Column 1 model includes the return on the CRSP index and the relative amount, which is added to control for offer size effects in the announcement reaction. Expected discounting has a statistically significant negative impact on the announcement price reaction. When firm size is added to the model in Column 2, collinearity between firm size and expected discounting makes the expected discounting coefficient insignificant. In Column 3 a discrete variation of expected discounting is instead used (expected discounting is one when the predicted discounting is under 1%, two when from 1% to 2%, three when from 2% to 3%, and four for higher levels). This specification restores the expected discount's negative effect, while the firm size coefficient is less significant. Qualitatively similar results are obtained when expected discounting is measured with a set of dummy variables for the predicted discounting levels and when size is measured discretely (not reported). While it is unlikely that the multicollinearity problem can be completely satisfactorily disentangled, the evidence agrees with the conclusion that investors account for expected discounting costs when they learn of the seasoned offer.

[3] Evidence of significantly negative reaction to seasoned offerings is found in Asquith and Mullins (1986), Masulis and Korwar (1986), Mikkelson and Partch (1986), Bhagat and Frost (1986), Barclay and Litzenberger (1988), Hansen and Crutchley (1990), Korajczyk et al. (1991), Denis (1991), Choe et al. (1993), Bayless and Chaplinsky (1996), and Chaplinsky and Ramchand (2000).

Table 5

Abnormal announcement period returns and expected discounting. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 through 1997, excluding units, offers with warrants, and issues under $10 million. Panel A reports announcement period mean and median abnormal returns, the issuer's raw return less the Center for Research in Security Prices (CRSP) equally weighted market index. R_{M}(announcement) is the announcement period return on the CRSP index. Firm size is the natural logarithm of the market value of outstanding equity the day before the offer-day. Relative amount is the ratio of shares issued to shares outstanding before the offer-day. *E*[discounting] is predicted discounting by model (1) from Table 3, where the inverse of stock price five days before the announcement is used. Discrete *E*[discounting] is a discrete measure of discounting from 1 to 4, corresponding to the four Discrete *E*[discounting] groups in Panel A. An offer is primary unless it is 10% or more secondary. In parentheses are *p*-values, using Student's *t*-statistics and Wilcoxon rank statistics.

	All offers	Discrete *E* [discounting] group			
		Under 1%	1% to 2%	2% to 3%	From 3%
Panel A. Announcement period abnormal returns					
Mean	−2.23	−1.11	−2.19	−2.49	−2.83
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Median	−2.24	−1.45	−2.54	−2.60	−2.63
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
N	1703	321	481	518	383

	All offers			Primary offers	Secondary offers
Independent variable	(1)	(2)	(3)	(4)	(5)
Panel B. Regressions of the announcement period return					
Intercept	0.26	−0.24	−0.07	−0.05	−0.09
	(0.04)	(0.24)	(0.10)	(0.45)	(0.11)
R_{M}(announcement)	1.22	1.21	1.23	1.27	1.19
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Firm size	0.62	0.27	0.20	0.35	
	(0.00)	(0.15)	(0.47)	(0.18)	
Relative amount	−0.47	1.36	1.42	0.43	2.74
	(0.71)	(0.32)	(0.30)	(0.84)	(0.13)
E[discounting]	−0.27	0.09			
	(0.03)	(0.60)			
Discrete *E*[discounting]	−0.42	−0.57	−0.29		
	(0.02)	(0.02)	(0.09)		
Adjusted R^2	0.03	0.03	0.04	0.04	0.03
N	1,703	1,703	1,703	818	885

To identify possible differences between primary and secondary offers, Columns 4 and 5 of Table 5 report their respective estimates. The signs for these estimates are the same as in the Column 3 model and are generally statistically significant. Investors account for expected discounting costs when they learn of the seasoned offer, independent of the offer being primary or secondary.

4. Offer-day information release, the return sensitivity, and unanticipated underpricing

This three-part section focuses on the information release of the discount surprise and test predictions from the pricing stories for the return sensitivity. All variables are as of the offer-day, unless noted. Part one discusses the pricing story predictions. Part two reports tests for the effect of information release on the offer-day. Part three has cross-section estimates of the sensitivity to the discount surprise and the return-surprise correlations.

4.1. Predicted price effects of the offer-day information release

Deducting Eq. (2) from Eq. (3) yields unanticipated underpricing as the discount surprise plus the offer-day abnormal return (hereafter return), denoted respectively as μ, δ, ρ:

$$\mu = \delta + \rho(\delta). \tag{4}$$

When the surprise is informative, unanticipated underpricing behavior differs from the surprise, reflecting the behavior of the return sensitivity.[4]

While our primary focus is on estimating the return sensitivity, we report the correlation between the unanticipated underpricing and the return. The pricing stories predict different sensitivity behavior that, by Eq. (4), translates into predictions of different return correlation with unanticipated underpricing. In the placement cost story, if the final order book reveals the positive information that the offer-day market price will rise, then the offer price is raised by more to recover the related unanticipated placement cost reduction. Thus, the surprise discount cut is more than the price increase, which predicts negative sensitivity above minus one. Consequently, regressing the offer-day return on the discount should result in a negative coefficient estimate above minus one. Moreover, underpricing falls because investors require less inducement to buy in. Hence, from Eq. (4), unanticipated underpricing and the return are negatively correlated. Similar logic applies for the

[4] The surprise discount dilutes stock price. For example, if it is negative, then the offer price is above its expected level, reducing dilution below what is expected, pushing up the return. To isolate the information release, unanticipated dilution, denoted $\alpha\delta$, is removed from the observed return. The adjustment is most evident in discrete time, noting that the offer day close equals the prior day's close plus the value of information in the surprise, all on old plus new shares $(n+m)$, less the unanticipated dilution loss on new shares (m). Thus, if i is the information value per share, the end of offer day equity value is $p_1(n+m) = p_{-1}(n+m) + i(n+m) - (E[p_o] - p_o)m$. Dividing by $p_{-1}(n+m)$, the abnormal return is $AR = \rho - \alpha\delta$, and the dilution-free return is $\rho = AR + \alpha\delta$.

release of bad news. In the information acquisition story, if good information is purchased from better-informed investors, then they are compensated with increased underpricing. Therefore, the offer price is raised partially toward the higher offer-day close, so the return increase exceeds the discount cut, which predicts sensitivity below minus one. Consequently, regressing the offer-day return on the discount should result in a coefficient estimate that is less than minus one, only when the information is positive. Moreover, from Eq. (4), the unanticipated underpricing-return correlation is positive when the information is good. The asymmetries between the positive and negative information releases could thus result in different coefficient estimates, as explored in the paper. In the rent expropriation story, the bank uses its information advantage, raising the offer price partially toward the offer-day close if news is good and cutting the offer price less than the drop in the offer-day close if news is bad, to fine tune its rent expropriation. This predicts sensitivity below minus one and, by Eq. (4), a positive unanticipated underpricing-return correlation, whether the information is good or bad.

4.2. A test of offer-day information release

To test if an unusual amount of information is released on the offer-day, we examine the variance ratio. The variance ratio is an F-statistic that tests if the daily return variance expands significantly above normal. An issuer's daily variance ratio is the squared common stock daily abnormal rate of return relative to its normal benchmark daily abnormal return variance. We examine the mean variance ratio on each of the 11 days, centered on the offer-day. The benchmark variance is estimated with the available returns over the 200 days ending one month before the offer. Given the large sample size, in the absence of significant information release, the expected ratio approaches one. Under the information release story, the offer-day variance ratio should exceed one and the ratios on other nearby days.

Column 1 of Table 6 has the mean variance ratios. The pre-offer ratios hover near one until two days before the offer, then rise a statistically significant 15% two days before and 26% one day before the offer. This agrees with the arrival of an unusual increase in information on each day. On the offer-day the ratio rises sharply by 70%. This increase is significantly above both one (t-statistic = 10.64) and the unusually high ratios on the two prior days. The ratios in Columns 2 and 3 show that the information surge is independent of the issuer's exchange listing.

The variance ratio is significantly below one on each of the five days after the offer, regardless of exchange listing. This is consistent with a number of offers being stabilized during the syndicates' placement efforts, which will drive their abnormal returns toward zero, everything else being the same. Wilhelm (1999) and Aggarwal (2000) report that lead banks in unseasoned offers never use formal, or pure, stabilization. This casts doubt on the use of pure stabilization in seasoned offers. However, as they note, it does not rule out other stabilization-related activities that include short selling and the use of penalty bids. To investigate this stabilization hypothesis, the variance ratio is reestimated on each relative day only for those

Table 6

Daily stock abnormal return variance ratios for 11 days centered on the offer-day. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants, and issues under $10 million. The variance ratio is the squared difference of the daily common stock rate of return, except on the offer-day when the return is adjusted for the dilution from the discounting surprise, less the corresponding market return, to the issuer's benchmark daily abnormal return variance. For all issues, the benchmark is the variance of all returns for the 200 days ending one month before the offer. For issuers with positive returns on the relative day, the benchmark is the variance of all positive returns for the same period. In parentheses are p-values using Student's t-statistics, followed by number of observations.

Day relative to the offer-day	All issuers			Issuers having positive returns on the relative day		
	All	NYSE/Amex	Nasdaq	All	NYSE/Amex	Nasdaq
	(1)	(2)	(3)	(4)	(5)	(6)
−5	0.97	1.11	0.95	1.06	1.11	1.03
	(0.82)	(0.29)	(0.51)	(0.46)	(0.44)	(0.79)
	1703	590	1113	707	256	451
−4	0.99	0.98	0.99	1.14	1.14	1.13
	(0.95)	(0.82)	(0.92)	(0.14)	(0.43)	(0.42)
	1703	590	1113	656	208	448
−3	1.08	1.03	1.10	1.07	1.10	1.05
	(0.21)	(0.71)	(0.22)	(0.43)	(0.54)	(0.61)
	1703	590	1113	656	226	430
−2	1.15	0.98	1.23	1.02	0.87	1.09
	(0.01)	(0.80)	(0.00)	(0.84)	(0.16)	(0.20)
	1703	590	1113	599	204	395
−1	1.26	1.34	1.22	1.04	1.08	1.02
	(0.00)	(0.02)	(0.00)	(0.57)	(0.58)	(0.75)
	1703	590	1113	602	196	406
Offer	1.70	1.95	1.56	1.86	2.07	1.73
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1703	590	1113	740	271	469
1	0.84	0.92	0.80	1.02	1.19	1.01
	(0.00)	(0.39)	(0.00)	(0.99)	(0.21)	(0.92)
	1703	590	1113	803	284	519
2	0.85	1.02	0.76	0.96	1.05	0.97
	(0.00)	(0.84)	(0.00)	(0.55)	(0.66)	(0.75)
	1703	590	1113	777	260	517
3	0.85	1.12	0.71	0.92	1.15	0.85
	(0.01)	(0.36)	(0.00)	(0.52)	(0.34)	(0.06)
	1703	590	1113	778	278	500
4	0.88	0.95	0.84	1.01	0.97	1.10
	(0.01)	(0.63)	(0.01)	(0.38)	(0.84)	(0.36)
	1703	590	1113	761	260	501
5	0.85	0.95	0.80	0.92	0.97	0.92
	(0.00)	(0.51)	(0.00)	(0.98)	(0.82)	(0.35)
	1703	590	1113	743	266	477

issuers with positive returns that day and are thus not materially influenced by stabilization. To remove the bias from conditioning on a positive return, for each issuer the benchmark variance is remeasured using only its positive return from the 200 days ending one month before the offer.

Columns 4–6 report variance ratio performance for issuers with positive returns. The ratios hover near one every day around the offer and show a very large, statistically significant increase on the offerday, rising more than 70% on each exchange. They are consistent with unusually large information release on the offer-day. They do not show unusual decline after the offer, consistent with the stabilization hypothesis.

4.3. The return-discount surprise sensitivity

Although the evidence thus far indicates unusually high information flow on the offer-day, it does not reveal whether the offer price releases information or the nature of that information. High information flow could simply reflect the trading activity of informed investors.

We initially estimate the sensitivity using an ordinary least squares model in which the dependent variable is the return adjusted for the dilution from the discount surprise. The primary proxy for the surprise is the residual from the empirical discounting model in Column 7 in Table 3, which incorporates the latest stock price information. A positive residual is a measure of a deeper than expected discount (the offer price is below what was expected). A negative residual indicates smaller than expected discounting. Fig. 4 is a plot of the offer-day rate of return versus the surprise. The return and the surprise appear to have a strong inverse relation.

The regression model includes three controls that may affect the return. The first control is contemporaneous movements in the market, as measured by the return on the CRSP equally weighted daily index. The second control, the market value of common stock before the offer, registers cross-section differences between issuer returns that are the result of firm size. The third control is the ratio of offer-day trading volume relative to benchmark average daily trading volume, which is measured from the beginning of the 25th week after the offer through the 100th week after the offer. The variable attempts to control for selling pressures on offer-day stock price that arise from the equity sale that can reduce the return. Although firms can voluntary withdraw their offers infrequently at the eleventh-hour, we report results that include the inverse Mills' ratio to correct for possible bias caused by such withdrawals.

The significantly negative sensitivity estimate in Column 1 of Table 7 indicates that a 1% discount surprise reduces the return by −0.62%. This estimate shows that positive discounts are bad news, negative discounts are good news, and the discount surprise is larger than the return response (in absolute values). It confirms the previous evidence that offer pricing is highly informative and indicates that a major component of the information is the discount surprise. This finding also confirms a similar finding by Lease et al. (1991) for equity offers during 1981–1983.

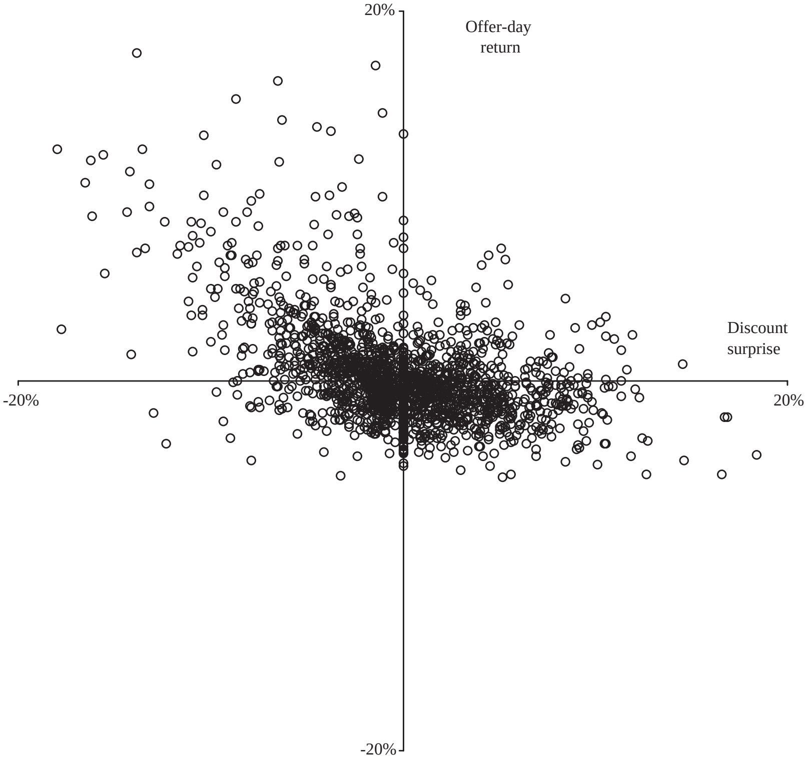

Fig. 4. Plot of the offer-day rates of return versus the surprise in the rate of discounting. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units and offers with warrants, and issues under $10 million. The surprise discounting is the residual from the Column 1 model for discounting reported in Table 3. The offer-day return is the logarithm of the ratio of the offer-day closing price to the closing price the day before.

The –0.62 sensitivity estimate in Column 1 of Table 7 is significantly above minus one (t-statistic $=-10.84$). This supports the conclusion that unanticipated underpricing is used primarily to pass through eleventh-hour price changes and meet unanticipated placement costs. Because the sensitivity estimate is not below minus one, it is inconsistent with both the information acquisition cost and the rent expropriation stories for offer pricing. The market return and offer size have positive effects on the return. While the selling pressure variable has the expected sign, it is not statistically significant using a two-tail test. We also examine other controls for possible selling pressures, including the relative amount and the number of new shares issued relative to the benchmark average daily trading volume. These variables were also statistically insignificant.

Because the estimated negative sensitivity estimate is above minus one, Eq. (3) suggests a negative relation should exist between unanticipated underpricing

Table 7
Regressions of daily stock returns on and around the offer-day on surprise discounting. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants, and issues under $10 million. Reported are ordinary least squares tests. The dependent variable is the logarithm of one plus the daily stock rate of return, adjusted for the dilution from the discounting surprise, using the Center for Research in Security Prices (CRSP) closing stock prices, except in Column 1 where it is the logarithm of one plus the daily stock rate of return. Columns 6–10 report results from regressions on each of five days centered on the offer-day. Surprise is the residual from the Column 7 model for discounting in Table 3. Fama–MacBeth surprise is the discounting less the discounting predicted using the Column 8 Fama-MacBeth coefficient estimates of Table 3. The symbol x indicates the product of the two associated variables to form a multiplicative interaction variable. AR(ann.) is the abnormal return on the issuer's common stock at the announcement of the offering. Surprise I, II, IV, and V are zero-one variables, respectively equal to one if the surprise is in the 1st, 2nd, 4th, and 5th quintile of the surprise frequency distribution. R_M is the equally weighted offer-day return on the CRSP index. Firm size is the natural logarithm of the market value of outstanding equity the day before the offer-day. Abnormal turnover is offer-day trading volume relative to the daily average trading volume over the year after 150 days after the offer. The inverse Mills' ratio is estimated from the Probit model of offer withdrawal in Column 3 of Panel B in Table 2. In parentheses are p-values using Student's t-statistics, followed by number of observations.

Independent variable						Five days centered on the offer-day				
	Offer-day					Day-2	Day-1	Offer-day	Day + 1	Day + 2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	−2.57	8.47	−3.61	−3.09	−2.57	−4.73	5.13	−3.47	−1.52	3.01
	(0.23)	(0.00)	(0.01)	(0.16)	(0.24)	(0.02)	(0.01)	(0.13)	(0.35)	(0.07)
Surprise	−0.62			−0.61	−0.62					
	(0.00)			(0.00)	(0.00)					
Discounting		−0.57								
		(0.00)								
Fama-MacBeth surprise			−0.59							
			(0.00)							

Surprise × firm size				−0.00						
				(0.29)						
Surprise × AR(ann.)					0.06					
					(0.91)					
Surprise I						−0.10	−1.09	1.21	0.05	−0.08
						(0.72)	(0.00)	(0.00)	(0.81)	(0.71)
Surprise II						0.11	−0.29	0.55	0.20	0.09
						(0.70)	(0.29)	(0.06)	(0.34)	(0.65)
Surprise IV						−0.11	0.33	−1.21	0.12	0.40
						(0.70)	(0.22)	(0.00)	(0.56)	(0.07)
Surprise V						−0.03	0.03	−3.13	0.12	0.37
						(0.92)	(0.92)	(0.00)	(0.58)	(0.10)
R_M	1.52	1.55	1.51	1.51	1.52	1.17	1.57	1.56	−0.12	−0.24
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.37)	(0.07)
Firm size	0.19	−0.28	0.23	0.22	−0.19	0.29	−0.04	0.26	0.06	−0.14
	(0.03)	(0.00)	(0.01)	(0.02)	(0.03)	(0.00)	(0.64)	(0.01)	(0.39)	(0.04)
Abnormal turnover	−1.80	−2.34	−1.65	−1.77	−1.80	−0.08	−0.27	−1.39	0.02	−0.01
	(0.21)	(0.10)	(0.25)	(0.22)	(0.21)	(0.51)	(0.00)	(0.34)	(0.82)	(0.21)
Inverse Mills' ratio	−0.03	−0.05	−0.08	−0.03	−0.03	−0.03	−0.15	−0.03	0.02	−0.00
	(0.22)	(0.06)	(0.00)	(0.23)	(0.22)	(0.22)	(0.00)	(0.20)	(0.21)	(0.79)
Adjusted R^2	0.18	0.18	0.18	0.18	0.18	0.04	0.08	0.16	−0.00	0.01
N	1,702	1,702	1,702	1,702	1,702	1,702	1,702	1,702	1,702	1,702

and the return, ceteris paribus. This is confirmed by their Pearson correlation coefficient of −0.37 (p-value = 0.0001). These results agree with the notion that the offer price is overadjusted in the eleventh-hour to the change in the offer-day price in seasoned equity offers. Furthermore, they are not consistent with unanticipated underpricing providing a positive signal that the firm is undervalued.

One important concern with the sensitivity estimate is estimation error. Perhaps the first-stage discounting model estimation generates the negative sensitivity in the second stage. To address this concern, we investigate whether discounting is a proxy for the surprise. The estimated sensitivity reported in Column 2 of Table 7, −0.57, is highly statistically significant (t-statistic = −17.02) and shows that the sensitivity is not generated by econometric forecast errors. The robustness of the estimate is also evident in the Column 3 sensitivity estimate that is obtained using the discounting surprise drawn from the Fama and MacBeth averages reported in Column 8 of Table 3. That estimate, −0.59 (t-statistic = −15.16), is virtually identical to those reported in Columns 1 and 2.

A second concern is with the nature of the information release. Is the information from another time, before the eleventh-hour? Is it driven by a small subset of the issuers? Is it confined to the offer-day? While the findings suggest that the information is not likely to come from the registration period, perhaps the lead bank has retained private information about the firm that it learned during the investigation of the issuing firm before the registration period. The drop in stock price when firms announce equity offers reflects concern that managers possess hidden information that the firm is overvalued (Myers and Majluf, 1984). That information disparity may not be fully resolved by the offer announcement, and the lead bank's investigation may yield more residual information. Arguably, the bank may wait to release that information in the offer price.[5] To test if the information is from the announcement period we assume that a given discount surprise evokes a greater return reaction, as investors perceive lower adverse selection at the announcement. Thus, as investors are more confident at the announcement of low adverse selection costs, the return is more sensitive to a given discount surprise. This suggests that lower adverse selection likelihood at the announcement is associated with higher offer-day sensitivity.

We employ two proxy variables for adverse selection perceived at the announcement. The first is firm size. Larger firms are monitored more effectively

[5] Although underwriters may release information when it is found, investors and regulators may view such releases, particularly of speculative or evolving information, with skepticism and perhaps as price manipulation. Issuers might also prefer that details of information remain private, knowing that the lead bank must price the issue appropriately with regard to that information. Release via the offer price is free of these concerns and is credible as banks stake their reputations on the offer price, accepting legal liability for its fairness. Underwriter trading in the issuer's shares may release the information, but this is prohibited just before the offer by law (Regulation M after April 1, 1997, and Regulation 10(b)-6, before). Analyses of underwriter risk bearing and selling effort when the issuer delegates the offer pricing decision to the underwriter are examined by Mandelker and Raviv (1977), Baron and Holmström (1980), and Baron (1982).

by capital market participants and are perceived to have lower potential adverse selection. The second proxy variable is the announcement-day abnormal return. Studies suggest that a lower abnormal return indicates anticipation of lower adverse selection costs (Asquith and Mullins, 1986; Masulis and Korwar, 1986; Denis, 1991; Bayless and Chaplinsky, 1996). Column 4 of Table 7 has the sensitivity estimate when the equation is augmented with the product of the discounting surprise and firm size. The hypothesis that larger firms have greater sensitivity to the surprise is rejected. When the logarithm of firm size is instead used, which weights smaller firms differently relative to larger firms, similarly insignificant results are obtained (not reported). Estimates when the return equation is augmented with a multiplicative term between the discounting surprise and the announcement-day abnormal return are in Column 5 of Table 7. The results using the multiplicative term of discounting times the abnormal return are also insignificant. To further test if the information source is tied to announcement date information, we conduct sensitivity tests for regulated utility firms. A number of studies show that utility offer announcements have inconsequential stock price reactions (Smith, 1986). This is because utility firms are not likely to be associated with much information asymmetry (Smith, 1986). The estimates show that the return-discount surprise sensitivity is fully present for offers by utility firms (not reported).

To address the concern that extreme values drive the sensitivity, the sensitivity is stratified using a dummy variable specification of the surprise. The offers are sorted from lowest to highest surprise into quintiles, then they are assigned to four surprise dummy variables, each equaling one only for offers falling in quintiles I, II, IV, and V. The mean returns in the respective surprise quintiles span a full 5%, decrease monotonically (2.04%, 1.29%, 0.76%, −0.79, and −3.36%), and are statistically significantly different from zero and from each other.

To address the concern that sensitivity is not confined to the offer-day, we estimate the surprise dummy variable specification separately for the offer-day and for the two days just before and after. Columns 6 through 10 in Table 7 contain the estimates. On the offer-day, Surprise I issuers have the lowest discounts relative to what was expected. Hence, their surprise should be good news. Consistent with this, the estimates show that they experience an economically large 1.21% (t-statistic = 3.81) increase in stock price on the offer-day. At the other extreme, Surprise V issuers have an economically significant drop of 3.13% (t-statistic = −10.19) in offer-day stock price. More generally, the dummy variable estimates show the daily return is monotonically related to the surprise, but only on the offer-day. A reasonable estimate suggests issuers face offer-day dilution adjusted value changes that range in excess of 4.34% of firm value, 40% of the time. On other days around the offer-day, the daily return is unresponsive to the surprise (similarly insignificant unreported results are found on earlier and later days). This suggests the surprise is reliable news only on the offer-day and complements the variance ratio evidence of a large information release on the offer-day. This evidence also shows that the sensitivity estimate is not biased downward because the surprise is anticipated, or leaks out as the offer-day nears. There is also a significant weakening of the size and market return coefficient estimates after the offer. We suggest these results may be the product of stabilization activity.[6]

Although the sensitivity estimates are contrary to both the information acquisition cost and rent expropriation stories, the placement cost and information acquisition stories need not be mutually exclusive across the entire sample. Because the information acquisition story predicts asymmetric sensitivity behavior, we can test if it has some influence on eleventh-hour pricing. To test for asymmetric sensitivity the regression is augmented to include two independent surprise variables, the surprise and the surprise when it is good.

The sensitivity estimates in Column 1 of Table 8 indicate that a 1% discounting surprise when bad news is revealed reduces the return by 0.55% (t-statistic = −11.18), and when good news is revealed the sensitivity expands to −0.84 (−0.55 −0.29, t-statistic = −7.59), which is significantly above minus one (t-statistic = 1.82). These negative sensitivities above minus one suggest that unanticipated underpricing and the return are negatively correlated whether the news is good or bad, ceteris paribus. This is confirmed by their Pearson correlation coefficients of −0.09 (p-value = 0.01) when good news is revealed and −0.49 (p-value = 0.0001) when bad news is revealed. This evidence is consistent with the placement cost story. However, the significantly larger correlation (in absolute value) when good news is revealed agrees with a secondary role for unanticipated underpricing to acquire information. It does not support the view that the unanticipated underpricing is a signal of firm value.

In Columns 2 and 3 of Table 8 the asymmetry tests are reported for the primary and secondary offers, using their respective surprise estimates from Columns 9 and 10 in Table 3. The sensitivities estimated within the primary and secondary offer samples are also qualitatively similar to those in Column 1.

For some offers, the lead bank might engage in stabilization activities that prevent worse offer-day returns. This would suggest the sensitivity estimate is biased upward. To control for this possible effect, we reestimated the sensitivity for samples that are successively less likely to have stabilization. That is, as the gap between the market price and the offer price widens. Columns 4 through 6 of Table 8 report sensitivity estimates as increasingly less underpriced offers are excluded from the sample. Specifically, offers are first excluded if their unanticipated underpricing is at or below −2.0%, then at or below 0.0%, and then at or below 2.0%. The sensitivity estimate is not materially affected by the removal of these offers.[7]

[6] We investigated several specification issues that could potentially cause the sensitivity. We find all such issues to be unimportant. Using a Tobit procedure to estimate the regression yields a sensitivity of −0.65. Separately estimated sensitivities for NYSE/Amex and for Nasdaq issuers are −0.66 and −0.61, respectively (t-statistics = −7.72 and −10.28, respectively). A similar sensitivity estimate is obtained if we instead use the residuals from the ordinary least squares model in Table 2 or when we use the residual from the Yeoman (2001) formulation for discounting. After controlling for the order flow imbalance using the method of Lease et al. (1991) for all issuers for which data are available from TAQ, the sensitivity estimate is −0.61, which is similar to the sensitivity using CRSP closing prices.

[7] We investigate and reject several alternative explanations for the sensitivity findings. It is not driven by new firm-specific information that is released to the public between the close the day before and the offer-

Table 8

Regressions of daily stock returns on surprise discounting. The sample is firm-underwritten, nonshelf offers by listed industrial firms from 1990 to 1997, excluding units, offers with warrants, and issues under \$10 million. In columns 4-6, offers are included only if their underpricing is above -2%, 0%, and 2%, respectively. Underpricing is the logarithm of the ratio of the offer-day closing price to the offer price. Reported are ordinary least squares regression coefficients. The dependent variable is the logarithm of one plus the offer-day stock rate of return, adjusted for the dilution from the discounting surprise, using the Center for Research in Security Prices (CRSP) closing stock prices. Surprise is the residual from the Column 7 model for discounting in Table 3. Good surprise equals surprise if Surprise is negative (i.e., good news) and zero otherwise. R_M is the equally weighted offer-day return on the CRSP index. Firm size is the natural logarithm of the market value of outstanding equity the day before the offer-day. Abnormal turnover is offer-day trading volume relative to the daily average trading volume over the year after 150 days after the offer. The inverse Mills' ratio is estimated from the Probit model of offer withdrawal in Column 3 of Panel B in Table 2. An offer is primary unless it is 10% or more secondary. In parentheses are p-values using Student's t-statistics, followed by number of observations.

Independent variable	All offers	Primary offers	Secondary offers	All offers with underpricing above		
				−2%	0%	2%
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	−4.03	−2.20	−6.29	−1.62	2.04	2.21
	(0.07)	(0.49)	(0.06)	(0.45)	(0.42)	(0.94)
Surprise	−0.55	−0.68	−0.42	−0.53	−0.58	−0.57
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Good surprise	−0.29	−0.32	−0.34	−0.36	−0.25	−0.23
	(0.04)	(0.13)	(0.06)	(0.01)	(0.09)	(0.16)
R_M	1.54	1.70	1.35	1.22	0.88	0.60
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)
Firm size	0.26	0.12	0.42	0.14	−0.00	0.17
	(0.01)	(0.37)	(0.00)	(0.10)	(0.93)	(0.19)
Abnormal turnover	−1.68	−2.93	−1.25	−1.53	−0.78	0.03
	(0.24)	(0.13)	(0.56)	(0.27)	(0.63)	(0.89)
Inverse Mills' ratio	−0.03	0.01	−0.07	−0.02	0.00	−0.01
	(0.20)	(0.82)	(0.03)	(0.32)	(0.99)	(0.76)
Adjusted R^2	0.18	0.20	0.17	0.20	0.23	0.27
N	1,702	885	818	1,592	1,067	721

Possible censoring of pre-offer returns caused by withdrawn offers appears to have an inconsequential impact on the estimates in Tables 7 and 8. Those estimates remain virtually unchanged when using other withdrawal choice models, as well as when no correction for estimation bias is performed altogether.

(*footnote continued*)
day close. A number of tests rule out a widespread tendency for some lead banks to hesitate setting the offer price until after offer-day stock prices have moved closer to the close. For example, discounting does not mirror the return. Also, after dividing the sample of issuers for which opening and closing prices are available from TAQ, into the night group (i.e., those having their offer price reported after the close the night before the offer day) and the remaining day group, both groups have highly significant sensitivity and more so for the night group. Further, there is large and significantly negative return-surprise sensitivity in the overnight return.

5. Conclusion

Discounting of the offer price in firm-underwritten seasoned equity offers is economically large and common, remaining stable around 3.0% throughout the 1990s. The increased use relative to earlier periods appears to reflect both greater demand by capital suppliers and higher risk profile of issuing firms.

Our investigation partitions discounting into its expected and surprise components. Estimates from a model of expected discounting agree that placement costs per dollar raised decline for larger firms given the amount raised and increase with the amount raised keeping firm size the same. Discounting is higher for issuers with lower stock prices and for those with greater stock return volatility. Offers by Nasdaq firms have larger discounting than NYSE/Amex firms. Discounting is less for banks with better reputation. These findings are qualitatively comparable to evidence reported in earlier studies of underpricing in unseasoned offers. Collectively, the results agree with the notion that two important purposes of expected discounting in seasoned offerings are to compensate investors for uncertainty about firm value and cover placement costs. Further evidence backs the view that expected discounting is also a method of payment for positive information about issuers. The findings do not support the application of the rent expropriation story to explain discounting of seasoned offers or the idea that discounting represents a signal by firm managers that their firm is undervalued.

On the offer-day, returns are unusually volatile and significantly negatively related to the discount surprise. This shows that lead underwriters release economically significant misvaluation information with the offer price, before capital suppliers buy new shares. The return-surprise sensitivity estimates support the idea that the discount closes the gap between the issuer's prior closing price and the price for new shares implied by the final order book and adjusts for related changes in placement difficulty. The findings suggest that information acquisition plays a secondary role in the eleventh-hour pricing. That the banks price the offers fairly and do not show a tendency to use discounting to extract rents from issuing firms is supported by the evidence.

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