

Sailing in rough water: Market volatility and corporate finance

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Abstract

This paper examines how market volatility affects corporate financing transactions. Firms face substantial uncertainty with respect to the price, demand, and after-market costs associated with raising public capital. The ability to effectively hedge this risk is critical to the efficient financing of firm capital needs. Using monthly U.S. equity-related financing transactions from 1970 to 1998, I find that market volatility dampens financing transactions, particularly among small or unseasoned firms. Periods of above normal market volatility are associated with a significant 13-percent decline in the frequency of IPO transactions and a 21-percent decline in the number of IPO dollars raised. Increased market volatility generates greater underwriting fees but does not affect IPO underpricing. The findings are most consistent with Mandelker and Raviv's (1977) model of costly distribution risk bearing.

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1. Introduction

In August 1998, Goldman Sachs announced its plans to proceed with an initial public offering of its own shares. Over the subsequent weeks, market equity prices dropped sharply and price volatility increased as markets incorporated bearish worries over a

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deepening and continuing economic crisis in Asia and other developing markets. In late September, co-chairmen and CEOs, Jon Corzine and Henry Paulson, announced the decision to withdraw Goldman's public offering, explaining that "our executive committee made this difficult decision after giving full consideration to the *volatile state* of global financial markets and the disproportionately negative impact on the financial services sector...When market conditions improve, the executive committee may propose a new plan of incorporation and public offering to the partnership for its approval" (CNNfn, September 29, 1998; italics added). In the case of Goldman Sachs it is understandable that concerns regarding ownership dilution have an adverse effect on IPO timing following a sudden decline in market prices. It is less obvious, however, why an increase in volatility would affect the IPO decision of a firm that certainly has the capability to hedge market risk. The statement that volatility was a factor in the decision to withdraw the IPO for a financially sophisticated firm, such as Goldman Sachs, raises the question of how influential is market volatility in financing decisions for the economy at large.

This paper examines how market volatility impacts corporate financing transactions. Using the standard net-present-value rule, managers fund new projects when the present value of future cash flows exceeds the value of claims sold to finance the project. In practice, however, managers face considerable uncertainty forecasting the value of claims sold to fund such projects. Corporate financing transactions are not single point in time events. The securities registration process often takes months to effect. Firms must begin a financing transaction not knowing the final price and demand for the securities offered, as well as the impact the financing will have on future financings. Since the value of claims sold to finance the project can change substantially over an extended contracting period, financing uncertainty can have an important effect on the financing decision.

Underwriting contracts for security offerings provide a partial solution to this uncertainty. A variety of underwriting contracts are designed to accommodate preferences for structuring financing risk exposure. In a firm-commitment contract, the underwriter fully assumes the risk of distributing the securities. Price increases allow the

underwriter to generate extra profits by exercising the overallotment option now common to underwriting contracts. Price declines require the underwriter to hold the unsold and stabilization shares in inventory (see Ellis, Michaely, and O'Hara, 2000). In contrast, best-efforts underwriting contracts or self-distribution contracts assign the distribution risk to the issuing firm. Other contract forms, such as stand-by contracts or Dutch-auction offerings provide hybrid forms of distribution risk exposure (see, Sherman, 1999). Uncertainty with respect to the after-market performance of the offering also maintains generates important implications for transaction parties. Strong price performance builds a favorable reputation among investors for both the underwriter and issuing firm for follow-on offerings (see Beatty and Ritter, 1986 and Booth and Smith, 1986 for underwriters and Welch, 1989 for issuing firms). Weak price performance not only jeopardizes the demand for follow-on offerings by the firm, but also increases the probability of legal liability for the underwriter (see Booth and Smith, 1986 and Tinic, 1988).

Since Mandelbrot's (1963) initial work on price variation, there has been considerable evidence that stock market volatility varies over time.¹ Although the implications of time-varying volatility have been extensively studied in the asset pricing literature, there is little understanding of the relationship between market volatility and issues of corporate finance. Choe, Masulis, and Nanda (1993) find that managers issue more debt relative to equity when market volatility is high. They argue that equity offering preference decreases with volatility due to the increased cost of offering distribution exposure during volatile periods. Their explanation, however, appears inconsistent with Bhagat, Marr, and Thompson (1985) and Booth and Smith (1986), who find little correlation between underwriter compensation and contemporaneous market volatility.

Using U.S. equity and convertible-debt offerings between 1970 and 1998, I find that periods of high price volatility are associated with a significant reduction in corporate

¹ Recent additions to this literature include Bekaert and Harvey (1997), Bollerslev and Mikkelsen (1996), Braun, Nelson, and Sunier (1995), and Hamilton and Gang (1996).

financing activity--particularly for unseasoned equity or small firms.² During periods of above normal price volatility, the number of initial public offerings (IPOs) falls by a statistically significant 13 percent and the amount of IPO dollars raised falls by 21 percent. Market volatility also contributes to the frequency of aborted transactions. Seasoned equity and equity-linked debt are not significantly affected. I also provide evidence on the effect of market volatility on financing transaction terms. The evidence is most consistent with theories of costly distribution risk hedging, such as Mandelker and Raviv (1977). The findings provide novel evidence with respect to the IPO underpricing puzzle. Implications of the legal liability insurance hypothesis and reputational hypothesis, first proposed by Ibbotson (1975), receive little empirical support.

This paper is organized as follows. Section 2 reviews the theory on the relationship between market volatility and corporate finance behavior. Section 3 presents the sample characteristics and test results of the impact of market volatility on corporate financing transactions. Section 4 details tests of the relationship between market volatility and financing transaction terms. Section 5 provides concluding remarks.

2. Market volatility and corporate finance

If equity price volatility is exogenously determined, the structure and frequency of corporate financings in a frictionless market should be unaffected by price volatility changes.³ In a frictionless market, price volatility has little effect on financing behavior, since managers costlessly hedge the transaction's market risk exposure explicitly or allow investors to provide their own costless hedging. Moreover, price volatility has no effect

² I avoid extending the sample beyond 1998 because of the unusual financing environment prevalent in the 1999-2000 period (Ljungqvist and Wilhelm, 2003; Loughran and Ritter, 2003).

³ This section does not consider the indirect effect of price volatility on real investment. Financing transactions may be affected indirectly if price volatility alters real investment. Pindyck (1986) and Ferderer (1993) provide some empirical evidence that equity price uncertainty affects real investment. This relationship is discussed in Section 3.

on the information flow between managers and investors. With the introduction of market frictions, price volatility becomes germane to the financing decision.

In this section, I begin with a simple model of firm financing. I use this model merely as a framework for thinking about the relationship between market volatility and raising capital. The model motivates three forms of risk exposure facing a firm raising capital, offer price risk, distribution risk, and after-market risk. I explore the three risk types in turn and use them to motivate various hypotheses about the volatility-finance relationship.

Suppose that a firm with no financial slack has an investment opportunity for which the present value of future expected cash flows has value V . Using the standard net present value rule, the firm should raise the capital required to invest in the opportunity if the present value of future cash flows (V) exceeds the value of the claims sold to finance the investment, denoted as K . If the value of K is highly uncertain, the economic profitability of the opportunity is less clear and the firm may reject investment opportunities that would have otherwise been realized. Suppose that the value of the claims sold depends on three components: the offer price, the security distribution, and the after-market impact, denoted as

$$K = Py(P) - C_F(P) \quad (1)$$

where P is the realized offer price, $y(P)$ is the number of securities sold at offer price P , and $C_F(P)$ is the cost incurred by after-market performance of the security priced at P . At the time the investment opportunity is identified and the financing contract is initiated, none of the components of K are known with certainty. Over the course of the financing transaction, the value of each of the components is revealed in turn. The offer price P is determined on the pricing date. The demand $y(P)$ is revealed during the first few days after the offering. The after-market cost $C_F(P)$ is generally not revealed for months or years after the security begins trading. I define *offer price risk* as the uncertainty

associated with the value of P , *distribution risk* as the uncertainty associated with the value of $y(P)$, and *after-market risk* as the uncertainty associated with the value of $C_F(P)$.

2.1. Offer price risk

The preparation for a public offering is a lengthy and arduous process. Lead times for initial public offerings, for example, are generally two to four months (Shin, 1995). Such lead times are required to accomplish the necessary due diligence, SEC and state legislation conformity, and investor marketing. Since market prices for claims can vary considerably over several months, the time required to price an offering exposes the firm to considerable offer price risk. As financing contracts generally specify that underwriter fees are proportional to the price of the offering, underwriters also face offer price exposure. Market-driven price increases allow the contract parties to raise contract price and increase both proceeds to the issuing firm as well as fees to the underwriter. Price decreases require the parties to drop the price (decreasing the contract proceeds and fees) or even withdraw the offering altogether. To better manage price risk, the standard U.S. firm-commitment contract provides insurance against adverse, pre-effective date price fluctuations only to the extent of the option to delay or withdraw an offering. Rule 477 under the Securities Act of 1933 provides for the cancellation privilege of equity offerings.⁴ The direct cost of executing the option to withdraw the offering is generally only compensation of direct expenses of the underwriter. Despite the substantial competitive impact such a delay in capital acquisition can generate, aborting a financing transaction can be preferable to the increased offer price risk exposure.

There is some existing evidence that pre-offer period market conditions matter to firms raising capital. Lucas and McDonald (1990) argue that firms issuing equity time price levels. Consistent with their model, Korajczyk, Lucas, and McDonald (1990) find that financings tend to be completed following equity prices rises. Mikkelson and Partch

⁴ This ruling states that any registration statement may be withdrawn as long as the SEC finds that the withdrawal is consistent with the public interest and the protection of investors. The firm forfeits all registration fees and is required to fully state the grounds for the withdrawal.

(1988) examine the impact of market conditions on the decision to withdraw transactions. Using a small sample of withdrawn equity offerings, they find that the majority of firms cite "unfavorable market conditions" or "low stock price" as the most important reason for withdrawing offerings.⁵ It is unclear from the Mikkelson and Partch evidence, however, whether firms withdraw offerings due to adverse price level movements or changes in market volatility.

2.2. Distribution risk

The distribution of an offering often requires from days to weeks to complete. The probability of not selling the offering at the stated price becomes larger during periods of greater price volatility. Yet, the probability of benefiting from such contract features as overallocation options also increases in volatile markets. A variety of underwriting contracts are designed to accommodate preferences for structuring offering distribution exposure. A firm-commitment contract fully insures the firm's distribution risk exposure. Alternatively, in a best-efforts contract, the issuer pays an external firm to distribute the offered shares, but acquires no distribution insurance in the contract.

Mandelker and Raviv (MR, 1977) consider the optimal offering distribution contract for risk-averse issuers. An important implication of the MR model is that because risk bearing is costly underwriters require greater compensation for offerings distributed during riskier periods. Using a sample of SEOs, Booth and Smith (1986) find no relationship between market volatility and underwriter compensation, providing little support for the MR model.

2.3. After-market risk

⁵Using a different sample period, I find that IPO data provider IPO Data Systems lists 37 firms that withdrew equity offerings during the increased market volatility between September and November 1998. Of the 20 firms which justified their decision in their registration withdrawal filing with the SEC, 18 firms cited "adverse market conditions" as the major reason.

A number of models suggest that after-market performance has important wealth implications for financing transaction parties. Ibbotson (1975) first proposed two reasons that post-offering price performance matters: by altering the probability of legal liability and by impacting the reputational capital used in follow-on offerings. I discuss each of these propositions in turn.

Under U.S. securities law, underwriters are held responsible for verifying the accuracy of all claims made by management. Given the large cost of a thorough verification of all firm information, underwriters effectively choose rather to buy quasi insurance against the probability of a negative liability judgement by underpricing the offering (pricing the offering below its expected value). Booth and Smith (1986) and Tinic (1988) model this relationship. In Tinic's model the probability of liability rulings against the underwriter is positively correlated with price volatility. Thus, during periods of greater market volatility, underwriters respond to the increased liability by forcing increases in underpricing. As a result, such increases in financing costs are expected to dampen corporate financing activity.

Ibbotson (1975) proposes that reputational capital considerations also affect financing behavior. He suggests that firms discount current financing prices in order to generate favorable repeat investment in the future. Issuing firms effectively seek to build financing reputation by leaving "a good taste in investors' mouths." Signaling models of financing pricing using reputational impact have been more formally modeled by Allen and Faulhaber (1989), Chemmanur (1993), Grinblatt and Hwang (1989), and Welch (1989). During periods of high price volatility, building financing reputation becomes more hazardous for issuing firms. The underpricing required to assure a "good taste" with investors becomes larger during periods of strong volatility as the uncertainty of aftermarket pricing becomes greater. The impact of price volatility changes is expected to affect the willingness of all firms concerned about subsequent financing capacity to risk their reputation. Reputational capital is also important to underwriters. Investment banks that gain a reputation for abnormally strong after-market performance have

difficulty finding corporate clients, those that gain a reputation for abnormally weak after-market performance have difficulty finding investment clients. As empirical support of this hypothesis, Wolfe, Cooperman, and Ferris (1994) find that prestigious underwriter participation is negatively correlated with market volatility.⁶

3. Market volatility and aggregate financing

The material in Section 2 suggests that the uncertainty surrounding P and $y(P)$ may be difficult to hedge, and that $C_F(P)$ may have important implications in volatile markets. I empirically examine the relationship between market volatility and financing behavior in sections 3 and 4.

3.1. Data

I examine market volatility movements over the sample period January 1970 to December 1998. The sample does not extend beyond 1998 to avoid bias in the results caused by the extraordinary financing environment of the 1999 to 2000 period. The 1999-2000 IPO market is commonly viewed as unusual due to the dominance of the technology sector, as well as structural changes in firm ownership and insider incentives (Ljungqvist and Wilhelm, 2003; Loughran and Ritter, 2003).

One common measure of market volatility is based on the monthly ex-post variability of daily stock portfolio returns (see French, Schwert, and Stambaugh, 1987). To obtain this measure, I calculate the sample standard deviation of the daily returns for the CRSP value-weighted market portfolio by calendar month. I denote this measure as s_M . Sample statistics for the price volatility series are reported in Table 1 and the series is plotted in

⁶ To illustrate the after-market exposure faced by firms I examine the after-market performance (including the first-day return) of all IPOs listed by Securities Data Company between 1990 and 1995. The mean three-month after-market return is 13.6 percent. Over 27 percent of the sample had negative total after-

Figure 1. The series demonstrates high serial correlation, yet a Dickey-Fuller unit-root test is rejected at the 1-percent confidence level.

To obtain a monthly series of aggregate financing transactions, I use the Global New Issues database of Securities Data Company (SDC) for completions of IPOs, seasoned equity offerings (SEOs), and convertible debt offerings (CDOs). Because of the unique nature of transactions among highly regulated industries, I exclude all utility offerings. I also exclude equity carve-outs and closed-end fund offerings. One limitation of the SDC sample is that it is composed almost exclusively of firm-commitment offerings, which generally eliminates the smaller, best-efforts offerings. In later tests, I use a limited sample that also includes best-efforts offerings. Using the SDC data, I construct a monthly completed transaction frequency series for both number and dollar totals running from January 1970 to December 1998 for the three financing types. Monthly dollar volume is defined as the total proceeds from all offerings multiplied by 1000 and divided by the contemporaneous total capitalization of the CRSP market portfolio.

Table 1 provides sample statistics and Figures 2 and 3 plot the respective number and dollar volume of financings. The monthly number of IPO transactions has a mean of just over 21.5 offerings with a peak offering month of 91 in October 1996. The monthly number of SEO transactions has a mean of 24 offerings with a peak offering month of 79 in June 1996. The monthly number of CDO transactions is lighter with a monthly average of 4.1. Mean relative dollar volume runs from 0.014 percent of the market for IPOs to 0.036 percent of the market for SEOs. Again, serial correlation is relatively strong for all three financing series; yet again the Dickey-Fuller F-statistics are rejected. IPO and SEO volume series are particularly highly correlated with contemporaneous correlation coefficient of 0.86 for the number series and 0.59 for the dollar series. All six transaction series are negatively correlated with the aggregate price volatility measure.

market returns. The potential effect of this group on legal liability and reputation capital motivates the need to manage offering after-market exposure.

3.2. Completed financings

As an initial examination of the financing-volatility relationship, I begin with a simple comparison of the number of equity-related transactions during periods of high and low expected market volatility. Within this comparison I also measure the impact of the direction of price level changes and economic growth on transaction activity. I define months for which the volatility measure is greater than the median value for the S_M sample as high volatility months ($D_{\text{Price Volatility}}=1$) and the other months as low volatility months ($D_{\text{Price Volatility}}=0$). I repeat a similar procedure to obtain monthly dummy variables for market price changes ($D_{\text{Price Level}}$) and expected economic growth ($D_{\text{Econ Growth}}$). The market price changes are computed as the cumulative excess return over months -5 to 0 for the return on the CRSP value-weighted portfolio. Korajczyk, Lucas, and McDonald (1990) find past returns to be positively correlated with equity offering activity. Expected economic growth is estimated as the logarithm of the growth in the Department of Commerce Composite Index of 11 Leading Indicators from Datastream over the previous rolling quarter. Hickman (1953), Moore (1980), and Choe, Masulis, and Nanda (1993) find economic growth to be important in explaining financing transactions. Loughran, Ritter, and Rydqvist (1994) also use economic growth and price level variables to explain IPO volume. I use the three dummy variables to run the following regression separately for each of the transaction types

$$V(i,t) = b_0 + b_1 D_{\text{Econ_growth}}(t) + b_2 D_{\text{Price_Level}}(t) + b_3 D_{\text{Price_Volatility}}(t) + e(i,t) \quad (2)$$

where $V_{i,t}$ is the frequency of transaction i in month t . To accommodate the serial correlation in the dependent variable, I estimate the regression using the general method of moments and robust standard errors (Newey and West, 1987; Andrews, 1991).

The results are provided in Table 2. Equity-related financing volume is generally positively correlated with economic growth and equity price levels, yet negatively correlated with price volatility. IPO volume is particularly sensitive to price volatility

conditions. For the IPO number series the coefficient on the market volatility dummy is -2.8 with a t-statistic of -2.34. The coefficient implies that monthly IPO volume drops by 13 percent during periods of above normal market volatility. In dollar terms, the more volatile months are associated with a 21 percent decline in IPO dollars raised (regression 2). The coefficient point estimates for the SEO and CDO transactions also suggest that financing volume is adversely affected by above normal price volatility, yet these coefficient estimates are not statistically significant at conventional levels.

Financing transaction can be affected indirectly through the impact of price volatility on real investment. Pindyck (1986) and Ferderer (1993) provide some empirical evidence that equity price uncertainty affects real investment. If real investment changes are responsible for the negative correlation of financing with volatility, such correlation is expected to be uniform across financing types. This is not so. Unseasoned equity is highly affected by volatility conditions whereas convertible debt is not. There is little evidence here to support the notion that conditions of equity price volatility uniformly affect all financing transaction types.

The specification of the tests in Table 2 may be problematic due to the censoring of the dependent variable at 0. Tobin (1958) shows that such censoring creates estimation bias. I re-estimate equation 2 using a maximum-likelihood Tobit regression with the standard assumption that the residuals are normally distributed. I also add the lagged transaction volume to the right-hand side to correct for serial correlation in the residuals. Although the Tobit results are not reported for the sake of brevity, the Tobit results provide some differences with the coefficients for economic growth and price levels, but the results for the volatility levels are economically and statistically similar. Months of abnormal market volatility are associated with a highly significant 16-percent drop in IPO completions and a 23-percent drop in IPO dollars raised.

To check for result robustness, I re-estimate equation 2 using two different measures of volatility--monthly range and GARCH estimates. To generate the monthly range estimate, I take the difference between the monthly maximum and minimum for the

log-transformed closing value of the daily value-weighted CRSP index. I recognize that the range is traditionally obtained using the maximum and minimum prices for the day (Alizadeh, Brandt, and Diebold, 2002). Since my required volatility series is on a monthly rather than daily basis, I assume that daily closing values are likely to closely approximate the monthly range based on intraday data. My GARCH estimate is the conditional standard deviation forecast with a GARCH (1,1) specification using the monthly value-weighted CRSP portfolio return over the sample period. So for month t , the standard deviation measure used in the paper and the range estimate are based on ex-post daily returns for month t , whereas the GARCH estimate is based only on the past monthly return data. The correlation coefficient with the standard deviation measure is 0.42 for the GARCH measure and 0.80 for the range measure. Although the results using the RANGE estimate are very similar to those using the standard deviation, the GARCH estimates are not. Across the different financing series the GARCH series appears to be uncorrelated with financing transactions. The lack of correlation is due to the fact that the GARCH estimate, as specified, does not capture the contemporaneous shocks in monthly volatility. As is documented later in Table 3, it is the contemporaneous change in volatility that is most correlated with financing transactions, not the lagged values. In addition, the GARCH estimate is handicapped simply by the fact that it ignores the information contained in the daily return data.

With an appreciation of the economic impact of market volatility conditions on the frequency of financing transactions, I now directly test the correlation between market volatility expectations and transaction activity. To account for the serial correlation in transaction volume and market volatility, I first difference both series, $\Delta V(i,t)$, and $\Delta s_M(t)$. In order to capture the lead time effects in the transaction decision, I allow the coefficient estimates to vary across months t to $t-3$ for both the market return and volatility measures. This specification gives the following regression equation,

$$\Delta V(i,t) = b_0 + b_1 LEAD(t) + \sum_{j=0}^3 b_{j+2} R_M(t-j) + \sum_{k=0}^3 b_{k+6} \Delta s_M(t-k) + e(i,t) \quad (3)$$

where $LEAD(t)$ is the logarithm of monthly growth in the Department of Commerce Composite Index of 11 Leading Indicators from Datastream over the previous rolling quarter (months t , $t-1$ and $t-2$) and $R_M(t)$ is the return on the value-weighted CRSP portfolio.

The regression results are reported in Table 3. With this specification, the coefficient on economic growth provides little explanatory power with none of the coefficients found to be significantly different from zero at the conventional levels. The coefficients on the market return are found to be significant for all six series at lag lengths of zero, one, or two months.

The coefficient estimates on the volatility measure are again most important for the IPO transactions. The coefficients on IPO number and dollar volume are large with respective t-statistics of -3.11 and -2.56 for the contemporaneous change in market volatility. None of the lagged volatility variables produce significant coefficients. Market volatility appears to be an important factor in the going public decision process, whereas the coefficient estimates for SEO and CDO volume suggest that market volatility plays less of a role for these series. As an alternative test of the importance of market volatility, I test the restriction that the coefficients on the set of four volatility variables are zero. The F-statistic is significant for only the IPOs.

There is some evidence that price levels and price volatility are negatively correlated (see French, Schwert, and Stambaugh, 1987; Haugen, Talmor, and Torous, 1991; Bekaert and Wu, 2000; and Daouk, 2001). Although the relationship between volatility and price levels is unclear, there is a possibility that the negative correlation between financing activity and market volatility is picking up the price level through its effect on volatility. To control for the asymmetry, I construct an interaction variable that equals the volatility measure Δ_{SM} when the gross return over months $t-3$ to $t-1$ is negative and equals zero otherwise. When I insert this variable into the right-hand side of Equation 3, the inferences are unchanged.

Lastly, in unreported tests, I verify whether the reported results are sensitive to the extreme price volatility observed in the last quarter of 1987. I find that the weight associated with the extreme months has little impact on the overall implications. Regressions which eliminate the last three months of 1987 produce coefficient estimates with identical implications.

3.3. Market volatility and firm size

The past section finds that the impact of market volatility on aggregate financing completions appears to be particularly acute for IPO transactions. However, since IPO firms tend to be smaller than SEO firms, the regressions may be picking up a small firm effect rather than a seasoning effect. It may be that small firm financings are more susceptible to the hypothesized volatility effects discussed in Section 2. To control for firm size, I divide the IPO and SEO sample into two groups: small firms and large firms. To divide the samples, I use the initial market capitalization reported by CRSP for the IPOs and the market capitalization listed at the beginning of the offering year for the SEOs. Small firms are defined as those with market capitalization less than the respective year median for the CRSP sample. Large firms are defined as those with market capitalization greater than the CRSP median. Roughly one half of the sample IPOs are in the small size groups, whereas only one quarter of the SEOs are in the small group. Using the divided sample I recalculate the monthly frequency totals for the IPO and SEO transaction completions.

Regression estimates using the same procedure as for Equation 3 are obtained using the size adjusted series. These estimates are reported in Table 4. The estimates suggest that the impact of market volatility is both a size and a seasoning effect. The number of both large and small IPOs are adversely affected by increases in contemporaneous market volatility with respective t-statistics of -2.61 and -1.66. In contrast, the response of seasoned offerings to market volatility changes differ by size, with the small firms experiencing adverse volatility effects while large firms actually

show positive correlation to contemporaneous and lagged volatility changes. To further test this result I create a separate series that measures the monthly proportion of small-firm financings by dividing the small firm series by the combined transaction series. Rerunning the regressions using this series, I find that the proportion of small firm SEO financings is strongly negative correlated with contemporaneous and 1-month lagged changes in volatility with t-stats of -2.65 and -2.21, respectively. I conclude that market volatility has a negative effect on financings for both unseasoned and small firms.

3.4. Withdrawn financings

Given the lead times associated with major financing transactions, managers may have a difficulty forecasting the market conditions present at the time the transaction is consummated. One contract feature which can be important to risk-exposed managers is the ability to withdraw the transaction in the event of unfavorable state conditions. Equity offering agreements often allow the issuing firm to withdraw the offering by paying a fee to the underwriter, generally only compensating the underwriter for direct expenses (see Dunbar, 1998; Busaba et al., 2001).

There is some evidence that withdrawn transaction rates increase with unfavorable market conditions. Mikkelson and Partch (1988) identify 68 withdrawn stock offers between 1974 and 1983. Of the 61 firms with reported explanations, 49 firms cite "unfavorable market conditions" or "low stock price" as the major reason for withdrawing the offering. Mikkelson and Partch conclude that the withdrawn offerings are due to adverse movements of both market-wide and firm-specific equity prices. From such anecdotal evidence, it is unclear whether firms withdraw offerings due to adverse price level movements or changes in market volatility.

To test the notion that the withdrawn transactions is correlated with market volatility, I obtain withdrawn transaction volume for IPO financings from 1985 to 1998 as available from SDC. I compute the fraction of transactions withdrawn by dividing the

monthly frequency of withdrawn transactions by the sum of the monthly withdrawn and effected transactions. I do not construct a similar series for the SEO and CDO transactions because the withdrawn SEO and CDO data is unavailable from SDC. Using the same GLS procedure from the earlier regressions, I regress the fraction withdrawn series on the independent variables used in Equation 3.

The results are provided in Table 5. The percentage of IPOs withdrawn and IPO dollars withdrawn are negatively but generally insignificantly correlated with economic growth and returns. As with the other variables, the coefficient on the volatility variable is expected to reverse signs from that of the earlier regressions. The coefficients on the contemporaneous volatility are both positive as expected. The t-statistics for the relative number and dollars withdrawn are 1.98 and 1.60, respectively. The finding that aborted offerings are most correlated with contemporaneous rather than lagged volatility is consistent with anecdotal evidence of Busaba et al. (2001) that provide examples of firms that withdraw offerings the day of the offering.

Management's decision to abort IPO appears most affected by price uncertainty rather than price levels. It is unclear, moreover, whether the decision to withdraw an offering is made to avoid reputational risk for future financings, or whether underwriters exert influence on managers to withdraw due to increases in underwriter costs.

4. Tests of financing terms

4.1. Contract choice

Price volatility can affect financing terms in a number of ways. Firstly, volatility may affect the structure of underwriting contract. A best-efforts contract provides no offering distribution insurance to the issuing firm. Adverse post-offering date price movements are likely to reduce the capital raised by the firm. A firm-commitment contract shifts the offering distribution exposure to the underwriter. During periods of

increased price volatility one might expect offering firms to prefer firm-commitment contracts and underwriters to prefer best-efforts contracts.

As a test of the relationship between contract selection and market volatility, I examine the monthly proportion of IPOs completed with best-efforts contracts. Since the SDC data does not include best-efforts offerings, I use a nearly comprehensive database of IPOs between 1975 and 1984 constructed by Jay Ritter. Details of this database are provided in Ritter (1991). I calculate the best-efforts ratio by dividing the monthly number of best-efforts offerings by the total number of best-efforts and firm-commitment offerings. However, since there are very few IPOs between 1975 and 1978, I only include data between January 1979 and December 1984. Using the best-efforts ratio (BE%), I estimate the following regression using the same approach as with Equation 2,

$$BE\%(t) = 0.1096 + 0.0347D_{Price_Volatility}(t) + e(t) \quad (4)$$

(3.79) (1.09)

where the figures in parentheses are the respective t-statistics. Over the relatively short sample period, the correlation between the preference for best-efforts contracts and volatility is positive, suggesting that underwriters maintain the stronger negotiation position in the contract choice. The coefficient, however, is not significant at the conventional levels with a t-statistic of 1.09.

4.2. Underwriter compensation

The costly distribution risk hedging hypothesis predicts that underwriters require greater compensation in volatile markets. In practice, underwriters are generally compensated with an agreed percentage share of the proceeds. If market volatility is costly to hedge, gross underwriting spreads are expected to be larger.

Chen and Ritter (2000) find that in the 1990s IPO spreads have converged to a "seven percent solution." They conclude that the seven percent spread pervasive to IPO underwriting contracts is non-competitive. To explore this observation in my sample, I examine the distribution of underwriter spread values over the three decades (1970s, 1980s, and 1990s). I obtain gross spread values from SDC for 7366 IPOs and 6350 SEOs. The SDC gross spread figure includes all management fees, underwriting fees, selling concessions, and reallowance fees to the underwriting syndicate. Within each decade each offering's spread value is classified within integer or range definitions for values from 4 percent to 11 percent. For example, spreads greater than six percent and less than seven percent are allocated to the (6%, 7%) category. Spreads of exactly seven percent are allocated to the 7% category. Table 6 provides the resulting distribution of gross spread values. For the 1970s very few offerings cluster on the integer spread values. Only the 10 percent spread value appears to garner a disproportionate number of offerings with 21 percent of IPOs. Integer clustering becomes somewhat more pronounced in the 1980s. Twelve percent of gross spreads for IPOs occur at seven percent and 35 percent occur at 10 percent. A 10 percent spread also emerges as popular among the SEO sample with 6 percent of the issues. Consistent with Chen and Ritter, the integer spread clustering becomes extreme in the 1990s with 53 percent of all IPOs at seven percent and 17 percent at 10 percent. SEO compensation appears to still only slightly favor the seven and 10 percent integer values with 4 percent and 5 percent respectively of the 1990s offerings.

To control for any possible non-competitive compensation structure in gross spreads, I divide the sample into a 1970 to 1989 period and a 1990 to 1998 period. To test whether gross spreads are positively correlated with market volatility conditions, I regress the gross spread values on the three market condition dummies associated with the month of offering: economic growth, price level, and price volatility. Since gross spreads have been shown to be decreasing in total proceeds (i.e., due to economies of scale), I include the natural logarithm of the total proceeds of the offering. To examine any size effects, I include a dummy variable equal to one if the firm is smaller than the median CRSP firm. To control for cross-sectional correlation among contemporaneous

offerings, I also include annual dummy variables in the regression. The GMM results using the Newey-West covariance matrix are reported in Table 7.

For all sample periods and offering types, the coefficient on offering proceeds and size variable is significantly correlated, suggesting strong economies of scale. The economic growth condition appears to have little impact on IPO spreads, but is negatively correlated with SEO spreads in the early part of the sample period. Past returns are generally positively correlated spreads. Although price volatility conditions do not appear to affect SEO spreads, the volatility coefficient is highly positive and significant for the IPO sample. The point estimate for the 1970 to 1989 sample suggests that spreads rise by a significant 0.12 percentage points during periods of above normal market volatility. Although at first pass the percentage difference appears economically small, a 0.12 percentage point difference in spread represents a \$24,000 increase in fees to the underwriter for a representative \$20 million deal. The difference is small but not trivial. Although possibly affected by integer clustering, even market volatility conditions in the 1990s provide significant explanatory power for IPO compensation.

This evidence is consistent with the costly hedging hypothesis. Underwriters of IPOs demand higher fees during periods of higher market volatility. Consistent with my results, Booth and Smith (1986) find that volatility conditions have little effect on underwriting compensation for seasoned equity. The findings of section 3 suggest that the market volatility impact is most pronounced among the arguably more risky small, unseasoned firms. By including these firms in this test, I am able to more fairly test the implications of the MR model.

4.3. After-market performance

Both the legal liability and reputational models suggest that firms and underwriters manage increased offering after-market risk by reducing the offer price. Such behavior implies that the firm's after-market performance is positively correlated

with volatility levels. Testing this implication not only provides insight into the financings-volatility relationship, but also provides a novel test of the well known IPO underpricing puzzle of Ibbotson (1975) and others. Tests of the legal liability hypothesis and reputation hypothesis have received limited previous empirical support. Drake and Vetsuypens (1993) find little difference in the underpricing of firms which are sued from those that are not. Garfinkel (1993), Jegadeesh, Weinstein, and Welch (1993), and Michaely and Shaw (1994) find little relation between IPO underpricing and the likelihood of follow-on offerings. Testing the correlation between underpricing and market volatility provides an alternative testing method for these explanations of IPO underpricing.

To test this relationship, I use the return between the offer price and the closing price on the first day of trading for all IPOs as reported by SDC. The mean discount is consistent with other studies at just over 14 percent (see Loughran, Ritter, and Rydqvist, 1994). I regress the discount on the market condition dummy variables as used for the compensation tests, including the total proceeds, size dummy, and annual dummy variables. The results presented in Regression 5 of Table 7 produce significant coefficients for the proceeds and size variables. Larger issues and smaller issuers tend to be less discounted. The coefficient on the volatility variable is near zero and insignificant. The finding that market volatility has little effect on IPO underpricing is inconsistent with the after-market performance risk management suggested by the legal liability and reputational hypotheses.

5. Conclusion

Market volatility has a significant impact on major corporate financing transactions. During periods of increased market volatility, firms tend to forego issuing new equity, particularly among small or unseasoned firms. Since equity offerings are much more sensitive to price volatility than debt offerings, the observations are likely to be due more to changes in financing behavior than real investing behavior. Consistent

with MR's theory of costly offering distribution risk hedging, underwriters demand greater compensation during volatile periods. The finding that market volatility dampens equity financing encourages inquiry into the reasons why such risk exposure is so costly. The evidence also provides novel evidence with respect to the IPO underpricing puzzle. Implications of the legal liability insurance hypothesis and reputational hypothesis, first proposed by Ibbotson (1975), receive little empirical support.

Understanding the linkage between market volatility and manager behavior deserves ongoing research attention. Contracts for other major corporate transactions, such as takeovers and divestitures, maintain similar risk-sharing features among participants. For example, the agreement on the form of compensation in the transaction, e.g., cash or stock, provides differing market risk exposure for both the buyer and seller. Lagerstram (1990) provides some discussion of price risk exposure for tender offer participants. Transaction derivatives, such as collars, caps, and contingent value rights, are often written into the contract to protect transaction parties from market risk. For these other corporate transactions the effect can be similar. As market risk increases the insurance requirement between parties becomes greater and firms become less likely to execute their transactions. Merger transactions expose one or both parties to market movements between the transaction agreement date and the closing date. For example, an acquisition agreement that stipulates an exchange of a fixed number of shares allows for large variation in closing transaction compensation, particularly during periods of high equity price volatility. If management is unable to hedge such exposure, the market for corporate control is expected to be adversely affected by market volatility. If such important functions of the capital market as capital allocation and asset control are adversely affected by market volatility, identifying market and management solutions to managing this exposure provides an important area for future research.

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Table 1

Time-series statistics

The sample is composed of monthly data from January 1970 to December 1998. s_M is the monthly sample standard deviation of daily returns of the CRSP value-weighted market portfolio. The monthly transaction frequencies are obtained from SDC in unit and dollar terms for IPOs, SEOs, and CDOs (convertible debt offerings). Dollar volume is defined as the total proceeds from all offerings multiplied by 1000 and divided by the total capitalization of the CRSP market portfolio. Serial and cross-sectional correlation coefficients are provided. The Dickey-Fuller F-statistics for the regression $y_t = \alpha + \rho y_{t-1} + u_t$ with the restriction $\alpha = 0$ and $\rho = 1$ is listed.

Series	s_M	IPO Number	IPO Dollar	SEO Number	SEO Dollar	CDO Number	CDO Dollar
Observations	348	348	348	348	348	348	348
Mean	0.76	21.5	0.14	24.1	0.36	4.07	0.13
Std Dev	0.38	18.8	0.14	18.5	0.28	4.31	0.14
ρ_1	0.47	0.83	0.71	0.83	0.69	0.68	0.48
ρ_2	0.36	0.75	0.62	0.71	0.58	0.54	0.32
ρ_3	0.29	0.70	0.58	0.64	0.52	0.47	0.28
ρ_4	0.14	0.68	0.51	0.60	0.43	0.39	0.21
D-F F-stat	62.00 ^a	16.57 ^a	29.33 ^a	16.32 ^a	32.07 ^a	31.95 ^a	60.81 ^a
Cross-sectional correlation coefficients							
s_M	1.000	-0.224	-0.218	-0.200	-0.140	-0.059	-0.015
IPO Number		1.000	0.863	0.733	0.510	0.308	0.120
IPO Dollar			1.000	0.715	0.587	0.398	0.206
SEO Number				1.000	0.838	0.376	0.279
SEO Dollar					1.000	0.416	0.381
CDO Number						1.000	0.756
CDO Dollar							1.000

a, b, c, denote significance at the 1-percent, 5-percent, and 10-percent confidence level, respectively.

Table 2

Aggregate financing transactions and market conditions

The sample is composed of monthly transaction frequencies reported by SDC in unit and dollar terms for IPOs, SEOs, and CDOs from January 1970 to December 1998. Dollar volume is defined as the total proceeds from all offerings multiplied by 1000 and divided by the total capitalization of the CRSP market portfolio. The high and low dummy variables for each independent variable are defined as 1 for the months for which the respective variable measure is greater than the sample median and 0 otherwise. Expected economic growth is defined as the natural logarithm of the average monthly growth in the Department of Commerce Composite Index of 11 Leading Indicators from Datastream for months t , $t-1$ and $t-2$. Equity price level change is the return of the CRSP value-weighted market portfolio over months $t-5$ to t . Price volatility is defined as the monthly sample standard deviation of daily returns of the CRSP value-weighted portfolio in month t . Reported coefficients are estimated using GMM and robust standard errors. T-statistics are in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
	<u>IPO</u>		<u>SEO</u>		<u>CDO</u>	
Series	Number	Dollar	Number	Dollar	Number	Dollar
Observations	348	348	348	348	348	348
Constant	22.77 (5.35)	0.146 (3.16)	23.64 (5.51)	0.355 (3.28)	4.274 (1.49)	0.172 (0.56)
D _{Econ Growth}	0.525 (0.35)	0.007 (0.60)	2.526 ^c (1.79)	0.004 (0.15)	0.297 (0.89)	0.001 (0.09)
D _{Price Level}	1.383 (0.80)	0.011 (0.72)	0.961 (0.60)	-0.022 (-0.83)	0.696 (1.60)	0.022 (0.97)
D _{Price Volatility}	-2.815 ^b (-2.34)	-0.030 ^b (-2.18)	-1.685 (-1.43)	-0.031 (-1.22)	-0.609 (-1.54)	-0.011 (-0.82)

a, b, c, denote significance at the 1-percent, 5-percent, and 10-percent confidence level, respectively.

Table 3

Tests of changes in aggregate financing transaction volume

Dollar volume is defined as the total proceeds from all offerings multiplied by 1000 and divided by the total capitalization of the CRSP market portfolio. Unit and dollar volume is first differenced. Lead(t) is the natural logarithm of the average monthly growth in the Department of Commerce Composite Index of 11 Leading Indicators from Datastream for months t , $t-1$ and $t-2$. $R_M(t)$ is the return of the CRSP value-weighted market portfolio for month t . $\Delta S_M(t)$ is defined as the first difference of the sample standard deviation of daily returns of the CRSP value-weighted portfolio for month t . Reported coefficients are estimated using the Yule-Walker method to model the autoregressive residuals. T-statistics are in parentheses. The F-statistic tests the restriction that the coefficients on the four ΔS_M terms are zero.

	(1)	(2)	(3)	(4)	(5)	(6)
Series	IPO Number	IPO Dollar	SEO Number	SEO Dollar	CDO Number	CDO Dollar
Observations	347	347	347	347	347	347
Constant	-0.104 (-0.08)	-0.009 (-0.74)	-1.907 (-1.25)	-0.045 (-1.70)	-0.054 (-0.12)	-0.011 (-0.63)
Lead	-10.17 (-0.18)	-0.195 (-0.38)	-55.18 (-0.86)	-0.540 (-0.48)	-19.69 (-1.07)	-1.156 (-1.56)
$R_M(t)$	15.86 (1.20)	0.134 (1.08)	33.40 ^b (2.42)	0.521 ^c (1.93)	9.827 ^b (2.30)	0.279 (1.56)
$R_M(t-1)$	41.89 ^a (3.04)	0.190 (1.45)	47.59 ^a (3.36)	0.711 ^b (2.49)	11.91 ^a (2.67)	0.584 ^a (3.10)
$R_M(t-2)$	-7.665 (-0.56)	0.220 ^c (1.68)	23.39 ^c (1.67)	0.594 ^b (2.09)	4.388 (0.99)	0.106 (0.57)
$R_M(t-3)$	18.07 (1.38)	0.036 (0.29)	11.800 (0.86)	0.026 (0.10)	-2.643 (-0.62)	-0.030 (-0.17)
$\Delta S_M(t)$	-5.645 ^a (-3.11)	-0.044 ^b (-2.56)	-1.104 (-0.58)	0.037 (1.00)	0.169 (0.29)	0.025 (0.99)
$\Delta S_M(t-1)$	-1.424 (-0.73)	0.017 (0.95)	1.691 (0.70)	0.052 (1.31)	0.662 (1.04)	0.034 (1.31)
$\Delta S_M(t-2)$	-1.832 (-0.88)	-0.029 (-1.45)	0.208 (0.10)	0.012 (0.28)	0.009 (0.01)	-0.0001 (-0.00)
$\Delta S_M(t-3)$	2.312 (1.28)	0.015 (0.90)	-1.011 (-0.54)	-0.030 (-0.81)	-0.922 (-1.58)	-0.032 (-1.29)
r^2	0.107	0.071	0.084	0.067	0.055	0.050
F-stat	2.78 ^b	2.74 ^b	0.57	0.81	0.86	0.79

a, b, c, denote significance at the 1-percent, 5-percent, and 10-percent confidence level, respectively.

Table 4

Tests of changes in aggregate financing transaction volume by firm size

The sample is composed of monthly number of IPOs and SEOs of small firms and large firms reported by SDC from January 1970 to December 1996. Small (Large) firms are defined as those with market capitalization less than (greater than) the respective year median for the CRSP sample. Small% is the ratio of small firm offerings in the respective month to total offerings. Lead(t) is the average monthly growth in the Department of Commerce Composite Index of 11 Leading Indicators from Datastream for months t , $t-1$ and $t-2$. $R_M(t)$ is the return of the CRSP value-weighted market portfolio over the 30-day Treasury Bill rate for month t . $\Delta S_M(t)$ is defined as the first difference of the sample standard deviation of daily returns of the CRSP value-weighted portfolio for month t . Reported coefficients are estimated using the Yule-Walker method to model the autoregressive residuals. T-statistics are in parentheses. The F-statistic tests the restriction that the coefficients on the four ΔS_M terms are zero.

Series	(1)	(2)	(3)	(4)	(5)	(6)
	IPO			SEO		
	Small	Large	Small %	Small	Large	Small %
Observations	321	321	322	321	321	322
Constant	0.024 (0.03)	-0.664 (-0.79)	0.562 (7.46)	-0.266 (-0.48)	-1.860 (-1.55)	0.322 (9.04)
Lead	11.32 (0.36)	-6.468 (-0.19)	1.090 (0.41)	-15.599 (-0.69)	-21.02 (-0.43)	0.217 (0.18)
$R_M(t)$	0.856 (0.11)	6.939 (0.86)	-0.407 (-1.13)	5.846 (1.03)	25.39 ^b (2.12)	-0.084 (-0.53)
$R_M(t-1)$	15.02 ^c (1.75)	10.725 (1.27)	-0.030 (-0.07)	10.910 ^c (1.83)	43.66 ^a (3.47)	-0.165 (-0.90)
$R_M(t-2)$	-10.96 (-1.28)	8.571 (1.03)	-0.346 (-0.87)	3.003 (0.50)	11.439 (0.92)	-0.346 ^b (-1.93)
$R_M(t-3)$	13.97 ^c (1.76)	4.417 (0.55)	-0.005 (-0.01)	7.220 (1.28)	1.644 (0.14)	-0.218 (-1.37)
$\Delta S_M(t)$	-2.889 ^a (-2.61)	-1.853 ^c (-1.66)	-0.067 (-1.34)	-1.270 (-1.62)	2.380 (1.44)	-0.059 ^a (-2.65)
$\Delta S_M(t-1)$	-1.584 (-1.35)	-0.791 (-0.64)	-0.097 (-1.29)	0.262 (0.31)	3.880 ^b (2.15)	-0.075 ^b (-2.21)
$\Delta S_M(t-2)$	-0.419 (-0.32)	0.483 (0.39)	-0.054 (-1.11)	0.107 (0.12)	-0.539 (-0.29)	-0.020 (-0.92)
$\Delta S_M(t-3)$	1.679 (1.55)	0.785 (0.72)	-0.002 (-0.05)	-0.344 (-0.45)	-1.939 (-1.20)	-0.004 (-0.18)
r^2	0.066	0.043	0.020	0.046	0.076	0.039
F-stat	2.09	0.97	0.99	1.06	1.48	2.38

a, b, c, denote significance at the 1-percent, 5-percent, and 10-percent confidence level, respectively.

Table 5

Aggregate withdrawn IPOs

The sample is composed of monthly withdrawn transaction frequency relative to the monthly combined frequency of IPOs completed and withdrawn in number and dollar terms from January 1985 to December 1998. $\text{Lead}(t)$ is the natural logarithm of the average monthly growth in the Department of Commerce Composite Index of 11 Leading Indicators from Datastream for months t , $t-1$ and $t-2$. $R_M(t)$ is the return of the CRSP value-weighted market portfolio for month t . $\Delta S_M(t)$ is defined as the first difference of the sample standard deviation of daily returns of the CRSP value-weighted portfolio for month t . Reported coefficients are estimated using the Yule-Walker method to model the autoregressive residuals. T-statistics are in parentheses.

Series	(1) Number Withdrawn	(2) Dollar Withdrawn
Observations	167	167
Constant	0.109 (1.84)	0.169 (2.39)
Lead	-3.174 (-0.98)	-5.947 (-1.44)
$R_M(t)$	0.136 (0.53)	-0.006 (-0.02)
$R_M(t-1)$	-0.232 (-0.78)	-0.339 (-0.89)
$R_M(t-2)$	-0.357 (-1.22)	-0.615 ^c (-1.65)
$R_M(t-3)$	-0.203 (-0.80)	-0.533 (-1.62)
$\Delta S_M(t)$	0.055 ^b (1.98)	0.057 (1.60)
$\Delta S_M(t-1)$	0.048 (1.02)	0.038 (0.65)
$\Delta S_M(t-2)$	0.003 (0.11)	-0.009 (-0.24)
$\Delta S_M(t-3)$	-0.001 (-0.02)	-0.016 (-0.44)
r^2	0.071	0.087

a, b, c, denote significance at the 1-percent, 5-percent, and 10-percent confidence level, respectively.

Table 6

Distribution of underwriter gross spread values

The table provides the sample frequency distribution of gross spread values for IPOs and SEOs followed by SDC between January 1970 and December 1998. The gross spread fees distributed to the underwriting syndicate include management fees, underwriting fees, selling concessions, and reallowance fees. The range (X%,Y%) is defined as those spreads which fall within but do not include X% and Y%. The range Z% is defined as those spread which are exactly equal to the integer Z%.

Panel A: IPOs

	1970s		1980s		1990s	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
<4%	0	0.0	3	0.1	22	0.6
4%	0	0.0	1	0.0	10	0.3
(4%,5%)	0	0.0	6	0.2	36	0.9
5%	1	0.5	7	0.2	12	0.3
(5%,6%)	2	0.9	44	1.4	97	2.4
6%	2	0.9	17	0.5	48	1.2
(6%,7%)	23	10.4	386	12.2	314	7.9
7%	6	2.7	365	11.5	2107	53.0
(7%,8%)	54	24.4	692	21.8	271	6.8
8%	34	15.4	229	7.2	139	3.5
(8%,9%)	24	10.9	142	4.5	71	1.8
9%	10	4.5	82	2.6	95	2.4
(9%,10%)	11	5.0	57	1.8	58	1.5
10%	46	20.8	1102	34.8	668	16.8
(10%,11%)	0	0.0	5	0.2	10	0.3
11%	0	0.0	2	0.1	0	0.0
>11%	8	3.6	31	1.0	16	0.4
Total sample	221		3171		3974	

Panel B: SEOs

	1970s		1980s		1990s	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
<4%	52	13.5	367	14.2	337	10.0
4%	3	0.8	29	1.1	79	2.3
(4%,5%)	54	14.1	391	15.1	584	17.3
5%	3	0.8	40	1.5	211	6.3
(5%,6%)	53	13.8	520	20.1	992	29.4
6%	8	2.1	79	3.1	270	8.0
(6%,7%)	82	21.4	436	16.8	342	10.1
7%	5	1.3	50	1.9	141	4.2
(7%,8%)	54	14.1	253	9.8	103	3.1
8%	26	6.8	108	4.2	66	2.0
(8%,9%)	13	3.4	79	3.1	22	0.7
9%	1	0.3	20	0.8	22	0.7
(9%,10%)	7	1.8	22	0.8	22	0.7
10%	14	3.6	154	5.9	170	5.0
(10%,11%)	1	0.3	6	0.2	4	0.1
11%	0	0.0	0	0.0	1	0.0
>11%	8	2.1	36	1.4	10	0.3
Total sample	384		2590		3376	

Table 7

Tests of financing contract terms - Underwriter compensation

The sample is composed of IPOs and SEOs followed by SDC from January 1970 to December 1998. Underwriter compensation is the total fixed gross spread fees distributed to the underwriting syndicate (including management fee, underwriting fee, selling concessions, and reallowance fees). Underpricing is the offer-price-to-first-trading-day-closing-price return reported by SDC. Proceeds is the natural logarithm of the total proceeds of the offering. The size dummy is equal to 1 if the market capitalization of the firm is less than the median for the CRSP dataset in the offering year. The high and low dummy variables for the other independent variable are defined as 1 for the months for which the respective variable measure is greater than the sample median and 0 otherwise. Economic growth is defined as the natural logarithm of the average monthly growth in the Department of Commerce Composite Index of 11 Leading Indicators from Datastream for months t , $t-1$ and $t-2$. Price level is the return of the CRSP value-weighted market portfolio over months $t-5$ to t . Price volatility is defined as the natural logarithm of the standard deviation of daily returns of the CRSP value-weighted portfolio in month t . Coefficients are estimated using GMM and robust standard errors. Annual dummy variable coefficients are not reported. T-statistics are in parentheses.

	(1)	(2)	(3)	(4)	(5)
	1970-1989		1990-1998		1970-1998
	IPO	SEO	IPO	SEO	IPO
Dependent variable	Underwriter compensation				Underpricing
Observations	2845	2912	3730	3473	4111
Intercept	9.400 (94.1)	9.552 (32.8)	11.063 (113.6)	9.014 (85.5)	19.195 (3.05)
Proceeds	-0.8320 ^a (-24.95)	-1.331 ^a (-16.43)	-1.123 ^a (-45.11)	-0.9900 ^a (-37.61)	-2.809 ^a (-2.59)
D _{Size}	1.0487 ^a (16.04)	1.4161 ^a (10.61)	0.1071 ^a (2.77)	1.1433 ^a (12.99)	-9.192 ^a (-5.52)
D _{Econ_Growth}	0.0190 (0.40)	-0.2720 ^b (-2.24)	-0.0001 (-0.03)	0.0203 (0.52)	2.2118 (1.46)
D _{Price Level}	0.2389 ^a (5.66)	0.3834 ^b (2.57)	0.0375 (0.98)	0.1279 ^a (3.16)	3.1020 (1.63)
D _{Price Volatility}	0.1247 ^a (3.12)	-0.1230 (-1.04)	0.0857 ^b (2.39)	-0.0200 (-0.45)	-0.2980 (-0.18)
r ²	0.588	0.336	0.550	0.566	0.041

a, b, c, denote significance at the 1-percent, 5-percent, and 10-percent confidence level, respectively.

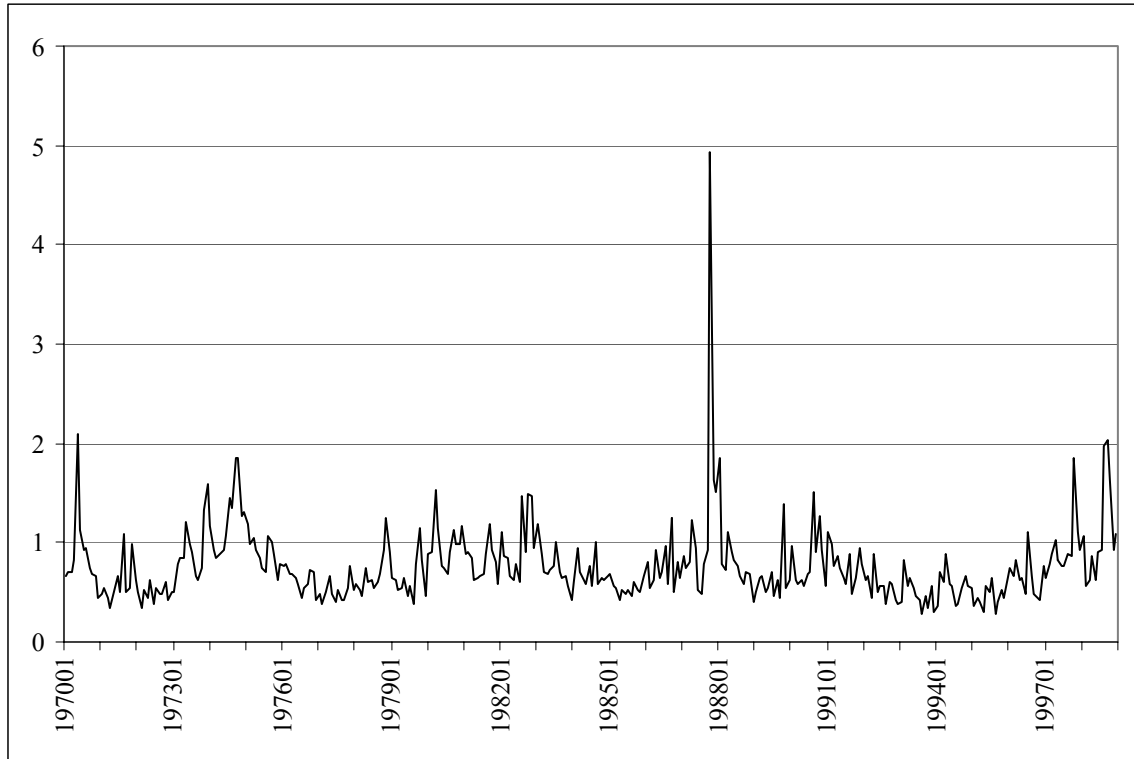


Fig. 1. Market volatility series. The series represents the monthly volatility defined as the standard deviation of daily returns of the CRSP value-weighted portfolio.

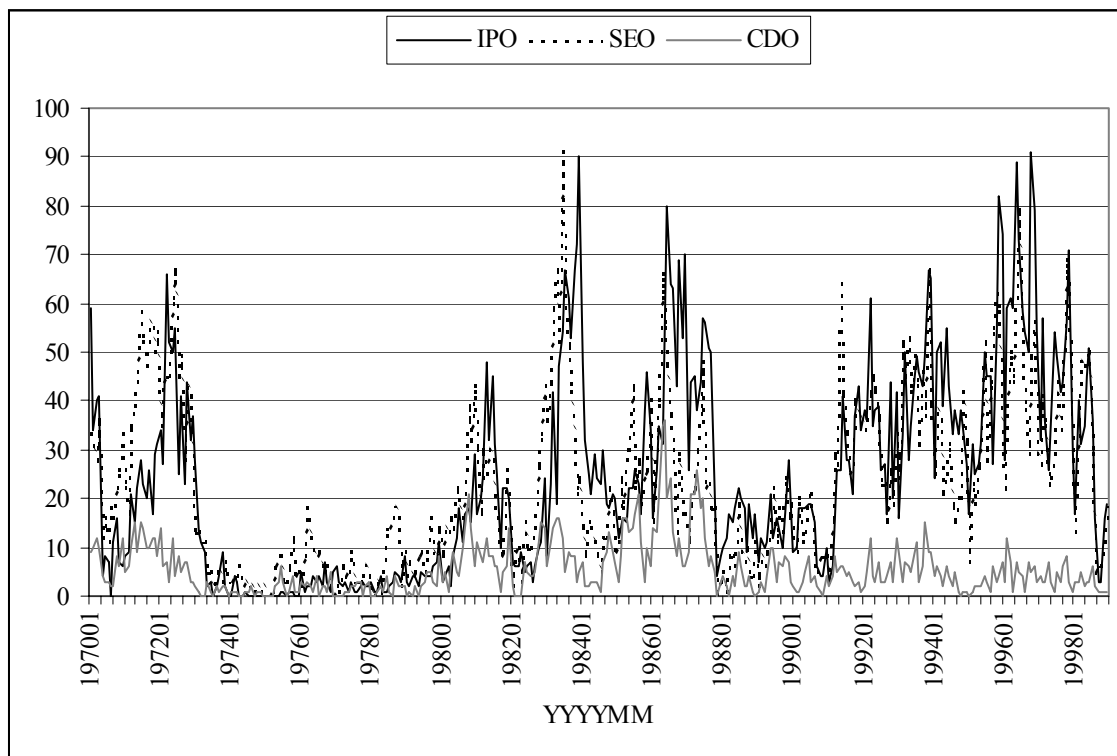


Fig. 2. Number of corporate financings. The three series represent the monthly number of U.S. IPOs, SEOs, and CDOs reported by SDC.

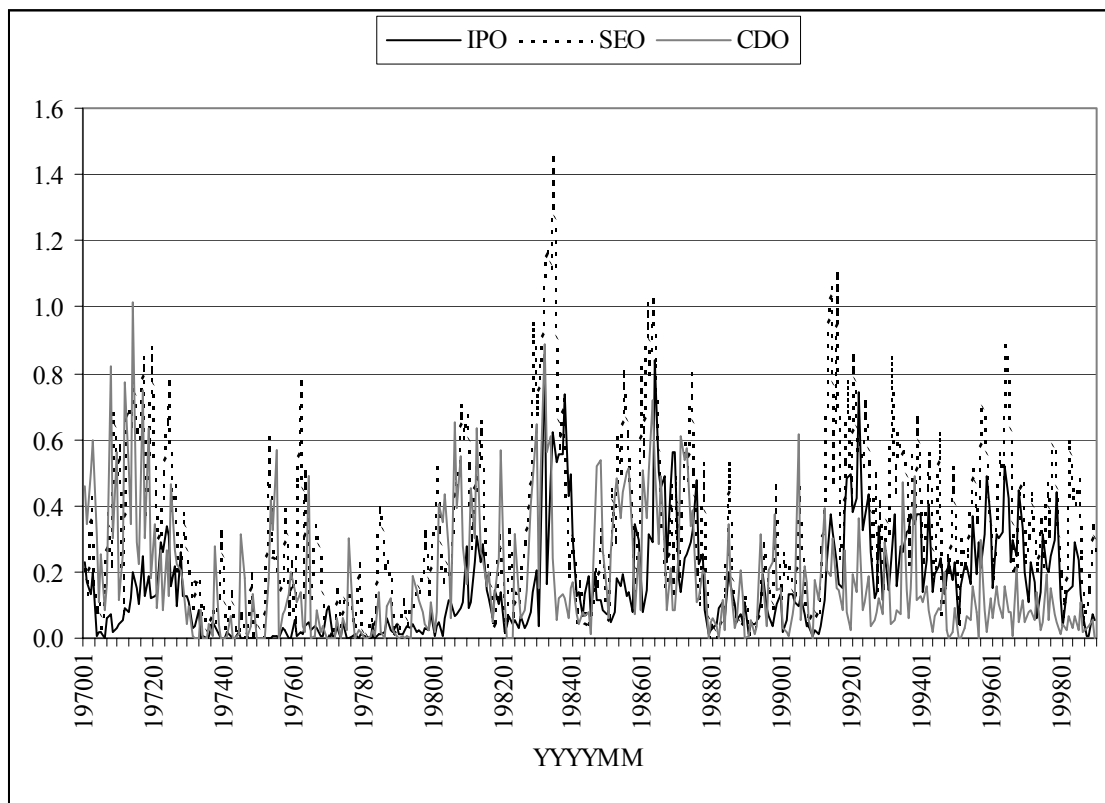


Fig. 3. Relative dollars of corporate financings. The three series represent the monthly total proceeds of U.S. IPOs, SEOs, and CDOs reported by SDC multiplied by 1000 and divided by the market capitalization of the CRSP market portfolio.