AN EXAMINATION OF SEASONED EQUITY OFFER PLACEMENT EFFORT

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Altınkılıç and Hansen (2000) show that underwriter spreads in seasoned equity offerings (SEOs) overwhelmingly reflect variable costs. This research attempts to begin filling the gap created by this result, as to what are the important constituents of the variable costs. In particular, I investigate the hypothesis that an important part of underwriter compensation is partial payment for anticipated market making activities in the secondary market, once the offer begins. I show that lead underwriter market making activities following an SEO are partly paid through the spread. The lower bound cost estimates show that the spreads for firms likely to require the most market making services are on average 100 basis points higher than those requiring the least services. On average, the compensation for market making activities amounts to 20% of the lead underwriter's total compensation. The results are robust to several considerations.

CONTENTS

1. INTRODUCTION

The role of the underwriter in firm underwritten offerings is to provide capital raising services to the issuer before and during the offer period. These services include monitoring the issuing firm, certification of the offering price, marketing the new shares, and bearing the risk of any proceeds held in inventory during the selling period. In return for their services, underwriters receive compensation expressed as a percent of the capital raised, the "spread". Altınkılıç and Hansen (2000) show that spread has fixed and variable cost components and estimate the variable component to be 85% of the spread. This is surprising since, as they note, virtually all prior studies have presumed that most of the spread is fixed cost. Fixed costs, which add up to 15% of the spread, include state and federal taxes and fees, expert fees, SEC registration fees, and other setup expenses. Further, they show for a given firm that the variable costs are likely to be rising as more underwriting services are provided. There is now a wide gap in the spread literature, as there is a need for new evidence to explain the elements in the spread's large variable cost. Therefore it is essential to analyze the factors that give rise to the variable cost component of the spread.

This study focuses on the hypothesis that a part of underwriter compensation is for placement services that take place once the offer has begun. Because lead underwriter post-offer trading activity data are not available, I use the abnormal trading volume in the issuer's common stock as the instrumental variable for lead bank post-offer placement effort. The higher the abnormal volume, the greater is the effort, and hence the cost of placing the offering. The offering is considered more successful when fewer new shares are flipped back into the secondary market by initial buyers, and post-offer trading volume reaches its new normal level more quickly.

The sample examined in this study consists of 941 NYSE/AMEX and 1793 NASDAQ firm underwritten seasoned equity offerings by industrial firms, between January 1985 and December 1997.

Earlier literature has partially explained spread by proxying for monitoring, certification and marketing functions that the underwriter provides before and during the offer period. After controlling for a number of the established determinants of the spread I show that the abnormal volume after the seasoned equity offer (SEO) is an important determinant of the spread. In particular, I find that the higher the abnormal volume after the offering the higher is the spread. This result supports the idea that the underwriter placement effort continues after the offer. It is consistent with the conclusion that the spread at least partly compensates the underwriter for providing support of the offering in the market after the offer date as a market maker.

The results are robust to the different time periods within the sample period, to several reasonable measures of abnormal volume, and they are not driven by outliers in the abnormal volume measures. I show that the spread is highly sensitive to abnormal volume in the offer week, and it is also affected by subsequent abnormal volume. However, the primary impact is from offer week abnormal volume. The evidence suggests the underwriter provides market making in the offer week, and in the following week. These results hold for issues on the NYSE/AMEX exchanges, and they hold for NASDAQ issues.

This is thus the first study to demonstrate a link between market making after an equity offer and the underwriter spread.

I assume that the underwriters are charging a fair fee for the services they provide. In other words the spread reflects the underwriters' costs plus a normal profit. In a competitive market for underwriters the quasi-rents for a marginal investment bank will be competed away (Smith, 1977, Booth and Smith, 1986). Hansen (2001) does not find evidence of investment bank monopoly in the IPO

market, and he concludes that the IPO market is competitive. Over the last decade the banks that rank in the top 15 in the IPO industry are almost identical with the top 15 banks in the SEO industry. I thus conclude that the similar patterns of entrance and exit by underwriters in the SEO and IPO industries is evidence consistent with the presumption of competition in the SEO industry.

Estimates drawn from the multivariate analyses suggest that about 20% of the lead underwriter's compensation is to cover market making activities in the immediate post-offer period. Moreover, the estimates indicate rising costs as the issuing firm is less liquid in the secondary market. For example, for the most liquid issuing firms, the results suggest there is little compensation for market making present in the spread. In contrast, for the less liquid issuing firms, the results suggest that a full percentage point of the spread, and thus a third of the lead bank's compensation, is to cover market making activity. These estimates are shown to be robust, and they appear to be conservative.

Although there has been no study of SEO lead bank market making activity in the post-offer period, a number of studies have examined post-offer market making activities by the lead underwriters in initial public offerings (IPOs) (Aggarwal, 2000, Cao, Ghysels and Hatheway, 2000, and Ellis, Michaely and O'Hara, 2000). However, the connection between the costs incurred by the underwriter and the spread has not been clearly established in these studies. While some underwriter market making data has been examined, the studies can not establish the important empirical link mainly because the spreads in the IPO market are standardized at seven percent (Chen and Ritter, 2000, Hansen, 2001). In contrast, I establish an economically and statistically important relationship between the spread and the market making activities. These findings provide evidence of one important part of the variable cost component in the spread.

The paper proceeds with Chapter 2, a literature review in the underwriting area, followed by the hypothesis in Chapter 3. Chapter 4 discusses the sample in detail and the Chapter 5 explains selection of a proxy for market making and how it is built. Chapter 6 discusses the underwriter spread regressions and contain regression results, followed by Chapter 7 including robustness and specification tests. The paper concludes with Chapter 8.

2. LITERATURE REVIEW

This section reviews the underwriting literature as it relates to this study. First I discuss the theory of underwriting. Later, I go over the recent literature documenting the market making activity performed in the post-offer period, mainly by lead underwriters.

A. Underwriting Theory

The literature, categorizes the underwriter services provided by the underwriter into four main groups: risk, certifying, marketing and monitoring, and focuses more on the pre-offer activities of the underwriter. More recent IPO literature investigates offer period and post-offer activities performed by the underwriter.

Most of the earlier theories of equity issuance exclude the role of underwriters in the capital raising process. For example, the models of Myers and Majluf (1984), and Miller and Rock (1985) view firms as raising capital in capital markets without the need for the services provided by underwriters. But the fact is that underwriters are employed in over 90 percent of the offerings (Smith, 1977).

Smith (1977) analyzes rights versus underwritten offerings and finds that although rights offerings seem to be the cheaper means of issuance, underwriters are employed in an overwhelming number of issues. Hansen and Pinkerton (1982) argue that the rights offerings are conducted only by firms that have a significant cost advantage in marketing their shares because they have a buyer (or buyers) who pre-commit to buy most, often over 90%, of the offering. So, in these offers there is never a need for post-offer market making activities by the lead underwriter. In the typical case, issuers lack such pre-commitments and thus hire underwriters. Eckbo and Masulis (1991) make the case that the underwriters are hired to reduce the

adverse selection problem arising when informed issuers sell shares to less well informed investors.

In the firm commitment underwritten offering, the underwriting syndicate purchases the new shares from the firm at an agreed upon price, and offers the shares for resale at the offer price. If the shares cannot be sold at the offer price, they are sold at whatever price they will bring. The underwriters thus bear the risk associated with adverse price movements, while guaranteeing the proceeds to the firm. Smith (1977) argues that the difference between the offer price and the price to the firm (i.e., the spread) is expected to compensate the underwriter for bearing the risk, in which the case risk premium component of the spread represents a put option. Yeoman (2000) also depicts the underwriter fee as primarily consisting of the put option.

Booth and Smith (1986) and Beatty and Ritter (1986) argue that the underwriter puts its reputation, which is a significant determinant of its future income, on line to certify that the offer price is fair. In consequence, the spread contains a premium reflecting the quasi-rents paid for the reputation capital. Booth and Smith (1986) emphasize the role of the investment banker in certifying the pricing of equity and risky debt issues. Issuing firms are viewed as effectively 'leasing' the brand name of an investment banker's reputation to certify that the issue price reflects available inside information. Thus, this reputation-backed certification is used as a bonding mechanism. Beatty and Ritter (1986) argue that the underwriters must perform the activities for which they charge. Spreads cannot be a unfair since banks return to the market again and again, and therefore face the risk of loosing repeat business. They note if the investment bankers 'cheat', they cannot earn returns on their reputation.

Easterbrook (1984) and Hansen and Torregrosa (1991) argue that the lead underwriters provide monitoring in addition to certifying the fairness of the offer

price, and the syndicates' marketing services. The monitoring by the lead bank substitutes for internal monitoring mechanisms and supplements capital market monitoring of the issuer. Top managers prefer lead bank monitoring because it adds value by producing new measurements and information about managerial effort and internal assessment mechanisms. Stockholders prefer monitoring because it raises share price.

Merton (1987) develops an equilibrium model of capital markets which is consistent with the investment banker providing valuable marketing services. Investment banks have broad distribution capabilities, which help firms in both raising new capital and increasing their investor bases. And in return for these services banks are compensated for their costs. Merton (1987) gives reputation of the investment bank as a possible explanation for its ability to expand the firm's investor base at a lower cost than if the firm attempted to do so on its own.

Chemmanur and Fulghieri (1994) is one of the latest theoretical models in the underwriting area. They model investment banks as intermediaries who convey information to the market. The source of information comes from their strict evaluation of the firm. The banks are under pressure to protect their reputation, which is basically the source of their fees.

Altınkılıç and Hansen (2000) argue that the spread consists of certifying, monitoring and marketing components, and model the spread to capture these components. They find that the spread represents mainly the expenses for these services and that the marginal spread is rising. This view contradicts the conventional wisdom of economies of scale in the underwriter spreads, and supports a spectrum of U-shaped cost curves for the spread.

B. Post-offer Marketing Services

In the post-offer period the syndicate works to place the offer with investors. Competition induces the lead underwriter to be concerned with placing the offer efficiently, keeping costs to their minimum. Stabilizing is one post-offer activity that is allowed and strictly defined by law, that can facilitate a less disruptive placement of the offer. The SEC issued Regulation M, effective April 1, 1997, replacing 10b-7. Rule 104 refers to stabilization as: "The term stabilizing as defined in Rule 100 as the placing of any bid, or the effecting of any purchase, for the purpose of pegging, fixing, or otherwise maintaining the price of a security." Stabilizing activities are conducted by the lead underwriter following an offering to give price support to the offer in case the market price falls below the offer price. Several studies argue that stabilization is frequently used by underwriters to support the offer price and prevent the market price from falling below the offer price. They suggest that stabilizing may last for 20 trading days following the offer (Hanley, Kumar and Seguin 1993, Benveniste, Busaba and Wilhelm, 1996, Asquith, Jones, and Kieschnick, 1998, Wilhelm 1999).

Aggarwal (2000) examines market making after IPOs and argues that underwriters are reluctant to make stabilizing bids since they carry identifying flags, which will send a clear signal to the market that the offering is weak enough to require stabilization. She does not find any evidence that underwriters use pure stabilization. However, she reports strong evidence that the underwriters carry naked short positions following an IPO. This is partially explained by the existence of the overallotment option, which gives the lead bank the right to sell an additional 15% of the shares after the offering if there is high demand for the shares in the aftermarket. The overallotment option has to be exercised within 30 days of the offer. The underwriters can thus go short to help ease demand for the shares and use the option to cover their short positions. However, Aggarwal finds that in some cases the short

positions of the underwriters last up to 60 days, and this cannot be explained by the overallotment option alone.

Another post-offer activity of the lead underwriter is examined by Ellis, Michaely and O'Hara (2000), who also examine market making after IPOs. They report that the lead underwriter is the dominant market maker following the offer date in NASDAQ IPOs for up to three months following the issue. They find that the lead underwriter handles about 60% of the trading volume in the first few days after the stock has begun trading, and about 50% of the total volume when measured over the first few months of trading. The lead underwriter takes substantial inventory positions in the stock; accumulating, on average, 4% of the issue after the first day of trading, and at the end of the first trading month inventory levels climb up to 22% of the issue. After 60 days depending on the performance of the issue, the lead underwriter still carries inventory ranging from 3% to 16.5% of the issue.

Aggarwal and Conroy (2000) also find that the lead underwriter plays an important role as a market maker in the aftermarket in the IPOs. The lead underwriter is found to be improving more than one fifth (22.96%) of the bid quotes in the pre-opening period, which is the five minutes before the market opening. They argue that significant learning and price discovery continue during that five-minute window, and that the lead underwriter learns from the quoting pattern of other market makers.

Another recent study by Cao, Ghysels and Hatheway (2000) argues that IPO and SEO underwriters' short-term association with market making activity does not spill over into longer horizons for the actively traded stocks. They report that the lead banks contribute a small fraction to price discovery during the immediate pre-opening period. Price discovery is based on that day's contribution to the cumulative absolute price change over the entire sample period, from October 1995 until September 1996 in NASDAQ.

All of the above studies use proprietary data in analyzing the behavior of single market makers, especially the lead underwriter. While these are data is very useful in documenting the post-offer market making activities, at this time they are not available for use by other researchers.

3. HYPOTHESIS

The central hypothesis is that the lead underwriter is paid in part through the underwriter compensation for some of the expenses of market making activities in the post-offer period. In particular, the more market making activities that a lead underwriter is expected to perform, the higher is the spread they must charge. One recent attempt to break down the spread into two main components is by Altınkılıç and Hansen (2000). They show that about $200,000 to $250,000 of the spread paid to the underwriters in seasoned equity offerings is fixed cost, so that the spread can be partitioned roughly into 15% fixed cost and 85% variable cost. To be concrete, let's take an example of a seasoned equity offering for gross proceeds of $50 million. It, on average, will be charged a spread of 6% so that in dollar terms the total compensation is equal to $3 million. A 15% fixed cost is $450,000, which leaves $2,550,000 as variable cost.

Altınkılıç and Hansen (2000), following the prior literature, suggest that the variable cost consists of compensation for risk bearing, monitoring of the issuing firm, certification of the offer price, and marketing the new shares. The focus of this research is on an element of the marketing cost component, the market making component. Thus I decompose the marketing cost component into its timing within the pre-offer period, the offer period and the post-offer period. During the pre-offer period the underwriters spend time and effort searching for information about demand for the offer and at the same time try to persuade investors to buy the security. These activities are mostly carried out during the road shows. Road shows are used to help the underwriter to collect information about the demand for the issue. We know that relatively larger issues require more marketing effort, as do more risky issues. Further, while bringing more issues to market might suggest lower costs, due to scale economies, they could also suggest higher fees if "crowding" raises the cost of placement.

During the offer-period, when the new securities are actually sold, the underwriters' marketing activities involve pricing the offer and conveying credible information to the investors about any remaining misvaluation of the firm. Altınkılıç and Hansen (2001) suggests that much of this is accomplished through the pricing of the offer. From the start of the offer period, and throughout the post-offer period, the market making activities that are the focus of this research take place. In fact, as soon as the offering starts, the lead underwriter takes its place on the exchange floor as a market maker.

One natural question that arises is what market making activities are performed by the underwriter? We know that the lead underwriter goes on to the exchange floor and starts trading the security as the offer begins. Further, there is huge trading volume on the offer day and for several weeks following the issue. The underwriter handles most of the abnormal volume. Over this time period, which extends sometimes beyond ten weeks following the issue, the lead underwriter also maintains substantial inventory, which is costly. However, to our knowledge, there is no evidence revealing the exact activities of the lead banks, nor their inventories.

A second intuitive question that arises is why should some part of the market making costs be paid in the underwriter spread, rather than through the bid-ask spread? Since the underwriter is bearing the costs of market making activities, they must be compensated for it some way. While this compensation may occur in part through charging higher bid-ask spreads, and possibly through lower stock price levels in the post-offer period, when the compensation takes this form it can raise the cost of trading in the secondary market above normal during the post-offer period, until the newly offered shares have ultimately "settled" into the portfolios of new investors. That is, the extra flow of new shares from the offering that spill over onto the secondary market impose an externality on secondary market buyers and sellers, and this disruption ultimately becomes costly for the firm (Lease, Masulis and Page,

1991). By absorbing some of the market making costs up front in the underwriter compensation, the market making costs in the post-offer secondary market are reduced, restoring at least in part the normal liquidity of that market. Note that the SEO case differs from the case of IPOs where the lead underwriter is also engaged in trying to help *establish* the secondary market for the new shares.

Strong evidence of lead bank market making has been reported for IPOs. We know from the IPO literature that 50-60% of the traded stocks in the immediate post-offer period are handled by the lead underwriter, whereas trading by the co-managers of the syndicate is not found to be statistically different than other market makers' trading activity. Where authors have had some success in obtaining samples of the post-offer trading activity of some underwriters, they show that the lead underwriter maintains inventory levels that range from 4% up to 22% of the offering size every day for several weeks following the issue, where this fraction peaks at day 21 following the offer day (Ellis, Michaely and O'Hara, 2000). Sixty days after the issue the lead underwriter's inventory levels still range from 3% to 11.7%. They also find that the lead underwriters incur substantial losses in making the market in one out of four IPOs ranging up to $4 million. Both these results are clear evidence that the lead banks incur substantial market making costs after the offer day. They claim that the underwriters' revenues mainly come from fees (i.e. spread), not the market making activities, which turn out to be not profitable. But they fall short of testing the hypothesis if market making activities are paid through the spread, since in the case of IPOs the spread is fixed at 7% in most of the cases (Chen and Ritter, 2000 and Hansen, 2001).

Market-making costs that enter into underwriter compensation must be evident within the lead bank's share of compensation. We know that approximately 60% of the spread goes to the lead underwriter (Bialkin and Grant, 1985, Yeoman, 2000). Going back to our example of a $50 million offer, where total compensation

is $3 million, the 60% means that the lead's portion is $1,800,000. If we suppose this also contains the lead's fixed cost portion of $270,000 this leaves $1,530,000 as variable cost. It is this part of total compensation that should contain compensation for the market making activities.

The following sections will take up testing the market making hypothesis. They will also test for robustness of the results. Further, they will attempt to provide lower bound estimates of the market-making portion of underwriter compensation.

4. THE SAMPLE

A. Sample Description

The offer data is obtained from Securities Data Company (SDC), Worldwide New Issues Data Base. SDC reports 8,621 SEOs between January 1985 and December 1997. The offerings that are underwritten and negotiated, neither shelf offerings nor private offerings are kept. Offerings with units and warrants attached are also excluded. After these screens there are 5,572 issues. These firms are then matched with the Center for Research in Security Prices (CRSP), Chicago Graduate School of Business. As a result 4,439 firms that were listed in NYSE, AMEX or NASDAQ with share codes 10 or 11 are kept for further analyses.

The offers with an offer price of $5 or less are dropped out of the sample. Also excluded are offers with missing data or apparent coding errors by SDC. Thus offers with missing lead bank data or missing spread and spreads less than two percent are eliminated. So are offers whose reported shares exceed shares outstanding before the offer. Further, any firm that does not have volume data for one half year following the offering is dropped out of the sample. In addition, prices around the offer, starting ten days before the offering going after twenty days after the offer have to be greater than $5. A screen on underpricing was also used to remove SDC errors. Underpricing is the percentage difference between the closing price on the offer date and the offer price. The underpricing variable is screened with an upper limit of 40% to eliminate a split on the day of the offering, and a lower limit of -0.9% eliminating a couple of observations with infrequent trading before the offering.

This leaves 3799 industrial, utility and financial SEOs between January 1985 and December 1997.

Table 1 Panel A illustrates the industry and exchange breakdown of the sample. Panel B shows the number of offerings by year separately in each exchange. Except for the slow down in 1988 through 1990 following the 1987 crash, the number of offers have steadily increased over the sample period, especially after 1991. NASDAQ has experienced the largest growth in number of issues compared to the NYSE and AMEX.

For the rest of the paper I combine the NYSE and AMEX offers in our analysis and analyze NASDAQ separately.

B. Offer Statistics

Table 1 Panel C reports descriptive statistics by exchange listing for offers. The NYSE/AMEX sample consists of 941 industrial firms with a mean (median) size of $1,870 million ($517 million). The mean (median) relative offer size , dollar offer size divided by the dollar market capitalization of the firm, is 19.2% (15.7%). The mean (median) offer price for all the firms during the sample period was $26.27 ($24.00). The mean and median spread are very close at 4.5%.

The NASDAQ industrial firm sample has 1793 offerings over the sample period. The mean (median) size of the firms in this sample are about one sixth (one fourth) of the mean (median) of NYSE/AMEX firms, $301 million ($166 million). On the other hand the relative size of the offering on NASDAQ on average was larger at 24.3% and the median was 21.7%. Mean (median) offer price was $20.54 ($18.00). Also for NASDAQ issues the mean and median spread values are very close to 5.5%. But the spread for NASDAQ issues is a whole percentage point higher than the spread paid for NYSE/AMEX issues. As discussed later these firms are on average are riskier than the NYSE/AMEX firms and therefore their spreads are considerably higher.

C. Weekly Data:

For ease in the computational process the daily stock market data is first converted into weekly data. This is done by aggregating every fifth trading day for each relevant variable (volume, return, market volume, market return). This important simplification follows Lo and Wang (2000) who also aggregate daily volume data into weekly volume data. The offer day as given on SDC is aligned to be always the first day of the offer week.

There are at least three advantages of using weekly data which eliminate several concerns with using daily data. First, as Altınkılıç and Hansen (2001) show, the offer day reported on the SDC is not the correct offer day 50% of the time. This is often because the announcement of the offer effectiveness is made after the close of the markets. Thus the correct offer day is these cases is one day later. By using weekly data the extremely pronounced offer date effect is captured in any case in the offer week. Second, in many cases the offering starts in the middle of the daily trading hours. In those cases even though the offering starts on the SDC date, all of the offer day volume effect may not be captured with just a couple hours of trading, and there will certainly be a spill over into the following trading day. Using weekly data also eliminates this concern. Finally, using weekly data eliminates the extremely large computer space and time needs when using daily computations. For example, in many programs, the computations required in sorting using daily data were either not possible, or required often over 100 times as much computer time.

There is the concern that a five day week does not correspond to a calendar week. Using a five day week eliminates the potential problem with using calendar weeks, some of which will have less than five trading days, which may bias the results based on comparisons between weeks.

D. Weekly Volume and Return Calculations:

The event period around the seasoned offer is the 151 week interval starting 50 weeks before the offer week, which is denoted as week zero, and extending 100 weeks after the offer week.

For each week, daily volume is measured relative to shares outstanding and denoted *rvol*, are added for every five days in the data to calculate weekly relative volume:

$$\mathrm{Re}\, lvol_{i,w} = \sum_{d=1}^{5} rvol_{i,d} \qquad (1)$$

where

$rvol_{di,}$ is the daily relative trading volume of firm *i* on day *d*

$Relvol_{i,w}$ is the weekly relative volume for firm *i* in week *w*, in thousands.

Daily returns denoted as *ret*, are compounded for every five days in the data in the following way to calculate the weekly returns, *wret*:

$$wret_{i,w} = \prod_{d=1}^{5} (1 + ret_{i,d}) \qquad (2)$$

where

$ret_{i,d}$ is the daily return for firm *i* on day *d*,

$wret_{i,w}$ is the weekly return for firm *i* in week *w*.

5. MARKET MAKING PROXY

Before proceeding with how to build the abnormal volume, the question of why abnormal volume is a good proxy for market making activities has to be addressed. This section provides this rationale and develops the abnormal volume measures.

A. Selection of a Proxy

As noted above when the offer begins the lead underwriter engages directly in trading activities, handling most of the unusually high trading volume. Thus, the trading activity that occurs in the post-offer period should be highly correlated with how much market making, both trading volume and inventory, is needed from the underwriter. This activity cannot be proxied by the firm's shares outstanding nor by the number of shares offered in the SEO. Both measures fall short in explaining how much trading activity is followed after an offer. Trading volume itself is not a perfect proxy, since the trading activity following an offer for a given stock may be high, but it might not be relatively high given that firm's trading activity in other times, specifically compared to a benchmark trading activity of that firm itself. Therefore, first measuring a benchmark normal trading volume for the firm is necessary. I then calculate how much the trading volume following the offer deviates from this benchmark. This provides the abnormal volume for a stock in a given week. The following two sections will discuss first the benchmark normal volume and then the abnormal volume in detail.

B. The Benchmark Normal Volume

This section discusses four measures of normal volume for issuers, each of which will be used as a benchmark for measuring abnormal volume around the offering period.

Karpoff (1986) defines "normal" trading volume as "the state in which no unanticipated information enters the market". For this study, this suggests normal volume is the firm's relative volume sufficiently far on either side of the offer week. Thus, "normal" volume will be measured from two different time periods that are sufficiently far away from the offering period, in two ways in each of the periods.

First a pre-period is used which spans the forty week period that begins 50 weeks before the offering and ends 11 weeks before the offering. Second is a 70 week post-period, starting 31 weeks after the offering week and ending 100 weeks after the offering week.

One way the normal volume is measured is with he mean of weekly relative volume for the firm in each of the respective periods.

$$mnorvol_{i,pr} = \frac{\sum_{w=-50}^{-11} relvol_{i,w}}{40} \tag{3}$$

$$mnorvol_{i,po} = \frac{\sum_{w=31}^{100} relvol_{i,w}}{70} \tag{4}$$

where the variables are defined as follows,

$mnorvol_{i,pr}$ Mean normal volume for firm *i* in the pre-period, *pr*

$mnorvol_{i,po}$ Mean normal volume for firm *i* in the post-period, *po*

$relvol_{i,w}$ Relative volume for firm *i* in week *w*

Tkac (1999) suggests that the best way to generate a measure of firm specific "normal" trading activity is a combination of firm-specific and market adjustments, rather than a simple mean adjustment for market volume. This suggests a second way to measure normal volume using a multivariate model. Tkac'(1999) argues volume variables are the size of the firm, institutional ownership of the common stock, S&P inclusion and option availability. She finds the effect of S&P inclusion,

to be insignificant and that the institutional ownership variable yields conflicting results. Bessembinder, Chan and Seguin (1996) find that the absolute deviation of firm returns from market returns has a significant effect on the spot volume of stocks.

Normal volume is thus also calculated measured using the following multivariate regression models for the respective pre- and post-periods:

$$norvol_{i,pr,w} = a_i + b_i turnover_{j,w} + c_i size_i + d_i wret_{i,w} + e_i \quad (5)$$

$$norvol_{i,po,w} = a_i + b_i turnover_{j,w} + c_i size_i + d_i wret_{i,w} + e_i \quad (6)$$

where the variables are defined as follows,

$norvol_{i,pr}$	Week w volume for firm *i* in the pre-period *pr*
$norvol_{i,po}$	Week w volume for firm *i* in the post-period *po*
$turnover_i$	Market turnover specifically in the exchange *j* where the firm is traded
$size_i$	Natural logarithm of the size of firm *i* (size is equal to the average weekly price times the shares outstanding before the offering)
$wret_i$	Weekly return for firm *i*
e_i	Error term.

Lo and Wang (2000) analyze volume data from July 1962 to December 1996, and find that the weekly turnover data are skewed and autocorrelated. After using several methods to detrend and normalize the data, they find that the log-linearly detrended turnover is less variable but seems to possess a periodic component and the remaining series seem heteroskedastic. For these reasons, they recommend the

use of raw turnover rather than its first difference or any other detrended turnover. I therefore use raw turnover in my analyses.

C. Firm Abnormal Volume Calculations

The instrumental variable used for market making by the lead bank, abnormal volume, is equal to the difference between a given week's relative volume around the offering period, and one of the four normal volume benchmark measures. The first two measures of abnormal volume use the pre- and post-period mean normal volume as the benchmark.

$$mabvol_{i,pr,w} = \mathrm{Re}\, lvol_{i,w} - mnorvol_{i,pr} \quad (7)$$

$$mabvol_{i,po,w} = \mathrm{Re}\, lvol_{i,w} - mnorvol_{i,po} \quad (8)$$

$mabvol_{i,pr,w}$ Abnormal volume for firm *i* in week *w* calculated using pre-period mean normal volume, henceforth Abvol1

$mabvol_{i,po,w}$ Abnormal volume for firm *i* in week *w* calculated using post-period mean normal volume, henceforth Abvol2

$Relvol_{i,w}$ Relative volume for firm *i* in week *w*

$mnorvol_{i,pr}$ Mean normal volume for firm *i* in the pre-period *pr*

$mnorvol_{i,po}$ Mean normal volume for firm *i* in the post-period *po*

The second two measures of abnormal volume use the parameters from the fitted models for the pre- and post-period normal volume, respectively.

$$abvol_{i,pr,w} = relvol_{i,w} - (\hat{a} + \hat{b} \times turnover_{i,w} + \hat{c} \times size_{i,w} + \hat{d} \times ret_{i,w}) \quad (9)$$

$$abvol_{i,po,w} = relvol_{i,w} - (\tilde{a} + \tilde{b} \times turnover_{i,w} + \tilde{c} \times size_{i,w} + \tilde{d} \times ret_{i,w}) \quad (10)$$

$abvol_{i,pr,w}$ Abnormal volume for firm *i* in week *w* using pre-period fitted normal volume, henceforth Abvol3

$abvol_{i,po,w}$ Abnormal volume for firm *i* in week *w* using post-period fitted normal volume, henceforth Abvol4

Throughout, abnormal volume analyses will be reported by issuer exchange type, NYSE/AMEX or NASDAQ. It is well known that due to the extra trading that takes place between dealers on the NASDAQ, NASDAQ volumes tend to be higher than NYSE volumes. This makes it impossible to pool firms across the respective exchanges when examining their abnormal volumes in cross-sectional analyses. Although Bassin (2000) analyzes firms that switch from NASDAQ to NYSE and concludes that valid comparisons of their reported volumes can be made, provided that the fraction of reported NASDAQ volume attributable to investor-to-investor trading can be calculated. However, in this study such calculations are not possible. Moreover, the sample is not for firms that are switching exchanges.

Table 2 Panel A reports means and medians of the four abnormal volume measures by exchange type for industrial SEOs. Post-period mean abnormal volume, has the lowest mean (median), 12.86 (9.86) among the four different abnormal volume measures, where the pre-period mean abnormal volume has the highest mean (median) of 24.13 (19.40). NASDAQ abnormal volume measures are much higher compared to NYSE/AMEX sample; the lowest measure being the pre-period abnormal volume with a mean (median) of 24.13 (19.40), and the highest is the pre-period mean abnormal volume with a mean (median) of 26.37 (22.01).

The Pearson correlation coefficients reported in Table 2 Panel B show that all four different measures of abnormal volume are very highly correlated. For the NYSE/AMEX sample the correlations are all above 0.90, ranging from 0.975 to 0.900. In the NASDAQ sample the correlations are also very high and range from 0.962 to 0.882.

D. Relative Volume Around the Offer

Figure 1 illustrates that the relative volume for NYSE/AMEX issuers changes over time, starting 45 weeks before the issue and ending 100 weeks after. The relative volume values are multiplied by 1000 for display purposes. There is an extreme spike in the offer week relative volume, followed by several successively smaller, but still relatively large spikes in the following weeks. The relative volume in the offer week exceeds 17 (the figure is cutoff at 7 for display purposes). By contrast, the mean normal volume is around 4.5 during relative weeks 75 to 150. In the first week following the issue week relative volume is around six, and for the next eight weeks the relative volume stays above 4.5.

One year before the offer the relative volume is around 3.5 and stays like that for half a year. The level of relative volume increases to four starting 15 weeks before the offering and stays at that level until the offer week. Four months after the offering the relative volume seems to have settled, except some relative highs, at 4.5 and continues to stay at that level for two years following the issue.

Figure 2 shows the relative volume for the NASDAQ industrial firm offers for the sample period. The relative volume shows an increasing trend for several weeks before the offer and seems to increase from almost eight to 10 just before the offering. In the offer week it jumps suddenly to 34 (the figure is cutoff at 14 for display purposes). In the first week following the issue relative volume is around 14; slowly it falls in the second and third week to 12 and stays around 11 for several weeks following the issue.

The increase in the relative volume in the weeks leading to the offering is more pronounced in the NASDAQ sample in contrast to the NYSE/AMEX sample. The relative volume climbs from seven starting around 25 weeks before the offer to 10 in the pre-period. Following the offering, the NASDAQ offers take a longer time to settle compared to NYSE/AMEX offers. In the first year following the offering,

the relative volume stays around 11, and in the second year after the offering it settles around 10. Figure1 and 2 provide a simple picture of how much the relative volume changes in the offer week and that the substantially increased volume persists for several weeks thereafter.

In several cases the shares outstanding data in CRSP is not adjusted on the same day of the offering for the new shares issued. Therefore I use a second measure of shares outstanding from SDC and adjusted that for the number of shares issued for the first week. The relative volume values were robust to the use of this variable. I continue to use the shares outstanding obtained from CRSP because it is adjusted for any distributions such as splits and stock dividends over the 150 weeks of sample period.

A fair concern is that this pattern of the relative volume around the offering could be driven by a group of firms and possibly small firms that are traded several times their shares outstanding. To examine this concern data is grouped into size quintiles. Figure 3 shows NYSE/AMEX firm relative volume according to firm size quintiles around the offer starting a month before and ending four months after the offer. In the smallest firm size quintile, quintile I, firms seem to have the highest relative volume but the offers in the largest firm quintile V also have very high relative volume in the offer week.

Figure 4 shows firm relative volume starting four weeks before and ending 16 weeks after the issue for NASDAQ issues. In the smallest size quintile 40% of firms' shares outstanding is traded in the offer week, whereas for the largest firms on NASDAQ about 30% their shares outstanding are traded in the offer week.

The next figures show the same results for different time periods. The sample is cut in half, the first half covers January 1985 - June 1991 and the second half covers July 1991 - December 1997. Figure 5 and 6 respectively show NYSE/AMEX and NASDAQ offerings' weekly relative volume according to size quintiles during

the first half of the sample. Figures 7 and 8 respectively show NYSE/AMEX and NASDAQ offerings' weekly relative volume according to size quintiles during the second half of the sample. The figures illustrate the increase in the level of relative volume in the second half of the sample compared to its first half, both in NYSE/AMEX and NASDAQ samples.

While the figures provide some visual perspective still the need to test if the relative volume in the offer week and following weeks is significantly different than the benchmark weeks remains. Tkac(1999) regresses turnover of market volume on turnover of the firm volume, and also suggests the use of firm specific variables such as size. Since the regressions are run for within size category, size of the firm is not included and it is expected to have a positive relationship with relative volume.

The following regression is run separately for NYSE/AMEX and NASDAQ issues:

$$\begin{aligned} Relvol_i = a + b\ln size_i + cRelsize_i + dTurnover_t + \\ +\delta_{-5}Week_{-5} + ... + \delta_0 Week_0 + \\ ... + \delta_{25}Week_{19} + error_i \end{aligned} \qquad (11)$$

where

$Relvol_i$	Weekly volume divided by shares outstanding of firm *i*
$lnsize_i$	Natural logarithm of firm size *i*
$Relsize_i$	Offerings size divided by the size of firm *i*
$Turnover_t$	Total number of shares traded in the market divided by the total number of shares outstanding in the market at offer time *t*

$Week_w$ Weekly dummy variables starting five weeks before the offer, and ending 19 weeks after the offer, where offer week is denoted as week zero.

Table 3 reports the pooled regressions of relative volume, which is run for a 36 week period, starting 10 weeks prior to the offering ending 25 weeks after the offering. The regression results report the coefficients on the weekly dummies starting five weeks before the offer, ending 19 weeks after the offer. The relative volume for NYSE/AMEX firms stays statistically significantly positive for 10 weeks after the offering, including the offer week, whereas the same effect lasts one week shorter on NASDAQ. Therefore the results do not seem to differ from exchange to exchange.

To address the concern that this pattern of the relative volume around the offering could be driven by a group of firms and possibly small firms the cross-sectional relative volume regressions are run for different size quintiles. Table 4 reports the results of the relative volume regressions for NYSE/AMEX issuers. Firm size quintiles are listed from the smallest quintile I to the largest quintile V. Results show that the relative week coefficients vary from 21 to 8 respectively and all of the coefficients are significant at one-percent level and continue to be significant in the second week. For the smallest size group of NYSE/AMEX firms relative volume stays significant until the end of the fifth week following the issue. For all of the size categories the relative volume stays for three weeks significantly above normal.

Table 5 reports the relative volume regression results for NASDAQ firms. None of the weeks leading to the offer week have significant relative volume except the week before for the smallest two quintiles. Relative volume seems to be increasing in the smallest quintile whereas it seems to be decreasing in the second smallest quintile. The increasing trend in the relative volume charts is not supported by the regression results. The offer week and the following week is significant in all

the size categories. Only in the largest size quintile the second week is not significant. The difference between NYSE/AMEX firms and NASDAQ firms in the charts is not apparent in the regressions. Only at the offer week the first highly significant relative volume is seen that lasts for more than one week in three quintiles.

6. THE UNDERWRITER SPREAD

In this section first the basic spread regression is discussed, specifying the relationship of specific variables used with the spread. Then the spread regression is expanded into capturing the market making activities the lead underwriter performs in the post-offer period.

A. Specifying the Spread Model

To provide a basic spread regression model in which to examine the influence of post-offer market making activity, I follow Altınkılıç and Hansen (2000), who run the following spread regression:

$$spread_i = a + b\frac{1}{proc_i} + c\frac{proc_i}{size_{i,t}} + d\left(eqflow_t\right) + e\left(volat_{i,t-}\right) + error_i \qquad (12)$$

where the variables are defined as follows:

$spread_i$	percentage of proceeds paid to the underwriter for the services they provide for offering *i*
$proc_i$	proceeds raised by firm i
$size_{i,t}$	size of firm i at the time of the offering t
$eqflow_t$	sum of the total equity coming into the market during a three month period before the offering
$volat_{i,t-}$	volatility of returns of the firm i in a forty-week pre-period starting 51 weeks before the offering ending 11 weeks before.

Table 6 reports the Pearson correlation coefficients of the variables used in the spread regressions. The highest correlation exists between the spread and the inverse of the proceeds, which is 0.622 for NYSE/AMEX sample and 0.647 for the

NASDAQ sample. All the independent variables seem to have very low correlations, and the only relatively highly correlated pair is proceeds over size and Abvol4 with 0.539 and 0.449 for NYSE/AMEX and NASDAQ samples respectively. I will address this issue later by orthogonalizing these two variables.

B. Spread Regressions

Table 7 Column 1 reports the results for the basic spread regression. The coefficient of the inverse of the proceeds captures the estimate of fixed costs. Fixed costs, include state and federal taxes and fees, expert fees, SEC registration fees and other setup expenses that are independent of the issue size, which may include the reports of analysts, syndicate departments, which includes prospectus preparation and distribution, and expenses for basic legal and litigation activities. As the proceeds increase, fixed costs paid per dollar of the proceeds decreases. The coefficient on the inverse of proceeds times 100,000 represent the fixed cost, estimated at $240,650.

The proceeds over size variable has a significant positive coefficient of 3.528, which indicates that the larger the relative size of the offering the higher is the spread that is paid to the underwriter. Altınkılıç and Hansen (2000) suggest this variable captures the rising costs of providing certification, marketing and monitoring services.

Equity flow, which is the sum of equity entering the market in the three months prior to the offering has a positive significant coefficient of 0.0676. this agrees with the crowding story where at times of high equity flow it is harder to find additional willing investors, thereby raising the cost of marketing the issue.

Volatility of returns is a proxy for the riskiness of the firm. The higher the volatility of returns of an issuing firm the higher is the spread paid to the underwriter. This is consistent with the view that the underwriters are paid to bear

the put option risk that is associated with holding inventory. It is also consistent with increasing information asymmetry between managers and investors as volatility of a firm's returns increase. The coefficient on volatility is positive, 6.460, and highly significant.

All in all, riskier firms that issue relatively large sizes of equity in times of high equity flow will be paying higher spreads compared to less risky firms with relatively small offerings where equity issuance is less busy in the market.

C. Testing the Market Making Cost Hypothesis

To test the hypothesis that the lead underwriter's market making activities are compensated through the spread the spread, regression is augmented to include abnormal volume, to yield the following model.

$$spread_i = a + b\frac{1}{proc_i} + c\frac{proc_i}{size_{i,t}} + d\left(eqflow_t\right) + e\left(volat_{i,t-}\right) + f\left(abvol_{i,ow}\right) + error_i \qquad (13)$$

where

$abvol_{i,ow}$ Abnormal volume of firm *i* in the offer week *ow*.

It is assumed that the higher the abnormal volume following an offer the more market making activities the lead underwriter has to provide, which are costly to the underwriter. Thus, the market making cost hypothesis predicts that the abnormal volume coefficient should be positive.

Table 7 reports the results for each of the four different abnormal volume measures, in regression models 2 through 5. The NYSE/AMEX industrial SEO sample consists of 927 offers. All four estimates yield similar results coefficients that are each significantly positive in the spread regressions. The higher the abnormal volume, the higher is the spread paid to the underwriters. This is strong evidence that

the underwriter is compensated through the spread for the post market making activities they perform in the offer week.

The model is again fitted for 1,765 NASDAQ industrial issues. The regression results in Table 8 for NASDAQ industrial firm issues in the offer week are qualitatively similar to the results in Table 7 of NYSE/AMEX industrial firm issues. The fixed cost component is estimated to be $186,550, which is lower compared to the NYSE/AMEX issues. The difference in this results might seem large but the difference only translates to 34 basis points of the total spread ((260,650-186,655) / 260,650) x 0.15). The coefficient on volatility is significant at the one-percent level. More importantly, all four different abnormal volume regression coefficients on different abnormal volume measures are positive and statistically very significant.

For the rest of the paper I will report only the results on Abvol4, post-period abnormal volume measure, since using the other abnormal volume measures yield qualitatively similar results.

7. ROBUSTNESS TESTS

In this section, I will show that the results are robust to the use of different proxies and different cuts of data.

A. Secondary Offerings

In prior studies of equity offerings it is common practice to exclude secondary offerings from the analyses. In the case of secondary offerings the proceeds go to the blockholders selling shares, whereas in primary offerings the proceeds go to the firm. Thus secondary offerings are not often seen as containing new information about the investment opportunities for the firm, and therefore the market's reaction to them will be different when compared to primary offerings. Primary offerings, on the other hand, are often seen as a signal about the firms' investment opportunities. Secondary offerings also may have larger implications for changes in corporate control, as they frequently involve the dissolution of a large blockholder (Mikkelson, Partch and Shah, 1997).

Offerings with more than 25 percent secondary shares are excluded and the spread regressions are again estimated. Table 9 reports the results for the NYSE/AMEX sample. The first column uses only industrial offerings. The same spread regression as reported in Table 7 Column 5 is reported again for ease of comparison. The coefficients on the abnormal volume variable is statistically significant and economically as strong as the results reported for the industrials sample. Therefore, retaining secondary offerings does not affect the results, yet with their inclusion abnormal volume coefficients remain statistically significant at one percent level in all the tests as in Table9.

Table 10 reports the results when secondary offerings are excluded in the NASDAQ sample. The abnormal volume coefficient is still very significant for industrials and for the full sample.

B. Foreign Tranche

The sample is also not limited to the firms that raise equity solely in domestic U.S. markets; as some firms simultaneously offer a significant portion of their shares in more than one country. SDC reports the percentage of shares offered in the foreign tranche. In these global offerings where there is a foreign tranche, some portion of the spread is charged for marketing and selling the shares abroad. This might suggest our results are biased because they might ignore any differences induced by the foreign tranche. There is no evidence that the lead underwriter may be providing foreign market making activities (e.g. trading on the floor of a foreign exchange).

Table 9 reports the spread regression for NYSE/AMEX industrial issues excluding the foreign tranche. Once again, the coefficient on the abnormal volume is both larger and still statistically highly significant. The last columns of Table 9 and 10 report regression results excluding both secondary and foreign offerings for 406 NYSE/AMEX industrial and for 769 NYSE/AMEX full sample offerings, and 995 NASDAQ industrial and for 1244 NASDAQ full sample offerings. Excluding both secondary and foreign tranche offerings does not alter the results.

C. Utilities and Financials

Another consideration is whether the results will hold up for all offerings from across all major industries, not just the industrial issuers. Table 11 and 12 report spread regressions for the full sample, after including utilities and financials with industrials for NYSE/AMEX and NASDAQ issues. The results are qualitatively similar to the results for industrial offerings reported in Table 9 and 10. Furthermore, the inclusion of secondaries or the exclusion of foreign tranche does not seem to weaken the magnitude of abnormal volume coefficient.

D. Subperiods

The possibility exists that there can be a shift in the trend of the data over time that may drive the findings. Furthermore, the data may be qualitatively different in one period compared to other periods which is causing the results. For example, the spread-abnormal volume relationship in the 1980's can be different than in the 1990's because of changes in the business cycles, changes in regulations (e.g. Rule 10(b)-6 adoption), or the significant changes in volume or mix of offers in the primary equity markets. Or the results can differ due to shocks in the sample period, so that one subperiod is influencing and biasing the results. For example, perhaps the upheaval 1987 crash is driving the results. Alternately, perhaps the recovery from recessions in the early 1990's drives the results.

To detect if the results are driven by any of the subperiod events, data will be divided into two subperiods. The midpoint of the data is June 1991, so the sample is partitioned into one sample of offers from January 1985 until the end of June 1991and the second sample from July 1991 until end of December 1997.

Table 13 reports results for spread regressions in the two subperiods for NYSE/AMEX full sample and industrial offers. Table 14 reports results for spread regressions in the two subperiods for NASDAQ full sample and industrial offers. The results for abnormal volume are quantitatively very similar in both periods. In both of the sample periods the coefficient on the equity flow is statistically not significant both in NYSE/AMEX and NASDAQ samples. This can be explained with the time trend in the data, and that the equity flow is capturing the change from one half of the sample period into the other half of the sample. Instead of proxying only for the equity flow coming into the market at a given time, it is proxying for the change in the level of equity flow between the two subperiods. Therefore, the variable does not have a significant coefficient.

E. Winsorized Abnormal Volume

In order to address concerns with extreme values in the abnormal volume measure, the relative volume variables are winsorized. This also addresses the concern raised by Lo and Wang (2000) that the turnover data is skewed and therefore use of medians rather than means in turnover regressions will reduce the influence of outliers. Winsorizing is done by setting the values below the lower 5^{th} and upper 95^{th} percentiles, to their cutoff 5^{th} and 95^{th} point values for each of the relative volume measures. This process is repeated also at the 15^{th} and 85^{th} fractiles. The purpose of the winsorizing is to see if any of the results are driven by outliers or extreme observations in the abnormal volume variable. This has the advantage of not eliminating any observations compared to throwing away any outliers that exist in the data.

Table 15 reports the results of spread regressions using winsorized abnormal volume data for NYSE/AMEX and NASDAQ industrial offerings. The results are robust to the use of winsorized abnormal volume data; in the spread regressions all four different measures of abnormal volume have significant positive coefficients. The results are almost identical in the samples that winsorize the data at 5^{th} and 95^{th}, and 15^{th} and 85^{th} fractiles. Further, neither the signs nor statistical significance of any of the other independent variable is affected by the winsorizing. Therefore, I conclude that the results are not driven by any outliers in the abnormal volume measures.

F. Preliminary Cost Estimates

To provide a preliminary measure of the estimated costs from the market making activity, the data are sorted by their abnormal volume into quartiles. The zero-one dummy variables AbvolII, AbvolIII and AbvolIV represent the second, third and fourth quartiles, using the post-period abnormal volume measure. To further remove the effects of collinearity between the prosize variable and the

abnormal volume variable, prosize is first orthogonalized by running the following regression:

$$prosize_i = a + bAbvol_{i,w} \quad (14)$$

And then the residual is calculated, called Prosize2, by subtracting the predicted value from the actual:

$$prosize2_i = prosize_i - (\hat{b} \times Abvol_{i,w}) \quad (15)$$

$prosize2_i$ Residual of regression (14)

Table 16 reports spread regressions using this new measure of proceeds over size. The results show that the spread increases the most for the largest abnormal volume, and least for the quartile II firms relative to the lowest abnormal volume issuers. These results are consistent with the hypothesis that the higher the abnormal volume the higher is the spread paid to the underwriter. The results are different in NYSE/AMEX and NASDAQ samples in terms of magnitude, as the NASDAQ coefficients are about half as large as NYSE/AMEX coefficients in every quartile.

The estimates for the NYSE/AMEX issuers suggest that for over half the sample the market making activities contribute in excess of a one half of one percent to the spread. Thus, for an offer having a 5% spread, the lead bank's share is 3%, and after deducting the fixed costs, the estimates make up about 25% of the lead's compensation. For the offerings in the highest quintile, the market making compensation adds up to a full percentage point, which translates into about 35% to 40% of the lead's compensation.

Notice that the cost estimates for NASDAQ issues average about one-half he cost for NYSE/AMEX issuers. While they still indicate a strong monotonic relation between spread and market making, I believe the lower level may be largely due to errors in the instrumental variable for the market making activity of the lead bank. This is because on the NASDAQ there are multiple market makers in each firm's

stock, and probably more so during SEOs. As a result, the correlation between the lead bank's inventory and trading activity, involving the new shares, and abnormal volume will be weakened. Consequently, the measure of abnormal volume will be a poorer proxy for those market making activities.

8. CONCLUSION:

Altınkılıç and Hansen (2000) show that underwriter spreads in SEOs overwhelmingly reflect variable costs. This research attempts to begin filling the gap created by this result, as to what are the important constituents of the variable costs. In this study I establish an empirical relationship between the underwriter spread and market making activities after the SEO begins. In particular, I show that underwriter spreads are larger for issuers requiring greater market making services. These results provide evidence of one important part of the variable cost component of the spread. They are consistent with theories that the greater the post-offer abnormal volume, the greater will be underwriter post-offer placement effort, hence, the higher will be the spread. The results from these spread regressions are not affected and therefore robust to the different measures and specifications of the abnormal volume variable. The lead underwriter is partly compensated through the spread for the market making activities they perform following the offering. The lower bound cost estimates show that the spreads for firms likely to require the most market making services are on average 100 basis points higher than those requiring the least services. On average, the compensation for market making activities amounts to one fifth of the lead underwriter's total compensation.

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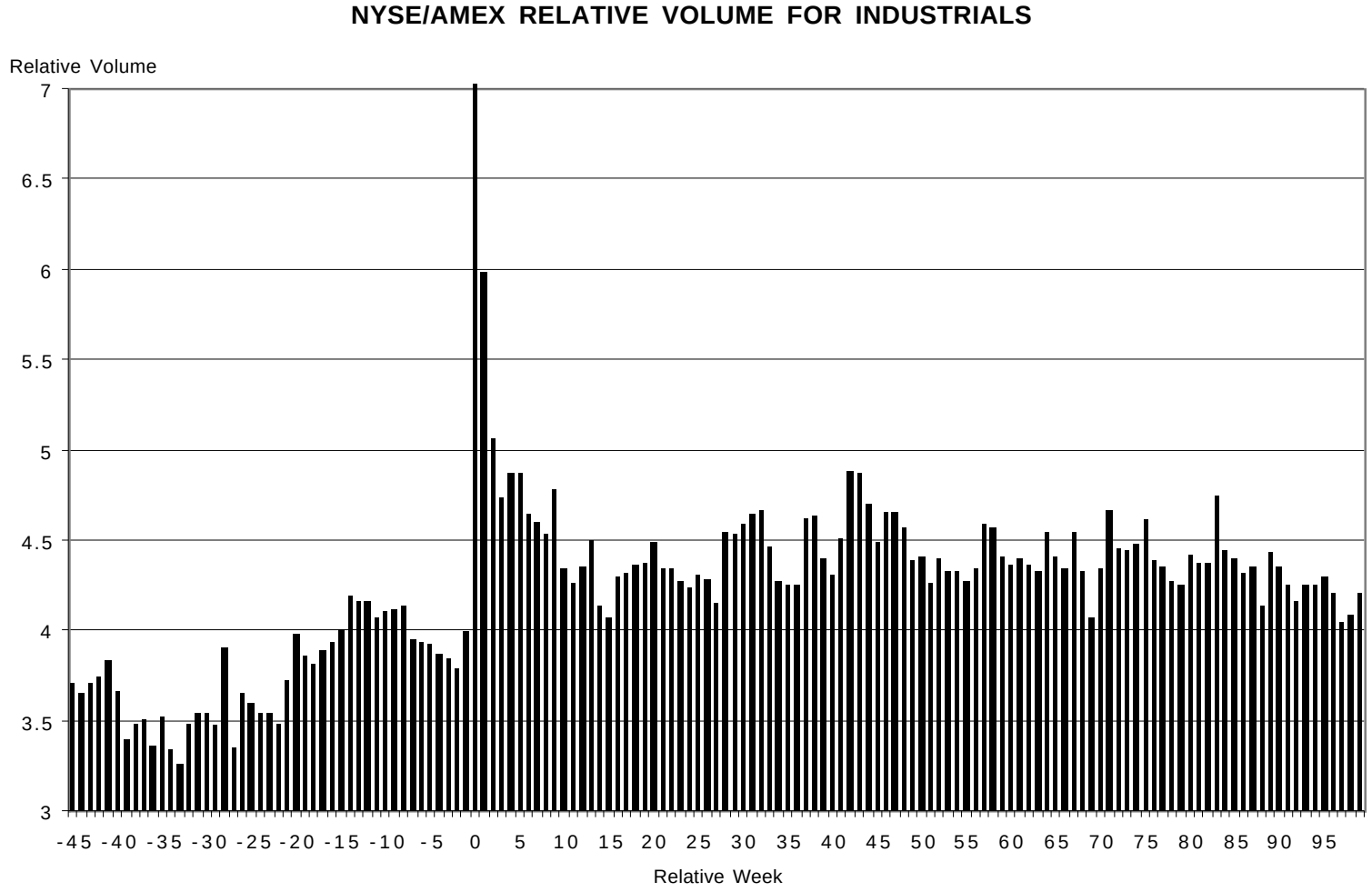

Figure 1. Weekly Relative volume for NYSE/AMEX issues, 1985-1997. Offer week is denoted as week zero with a relative volume of 17.17 (the relative volume axes is cutoff at 7 for display purposes). Relative volume is multiplied by 1000.

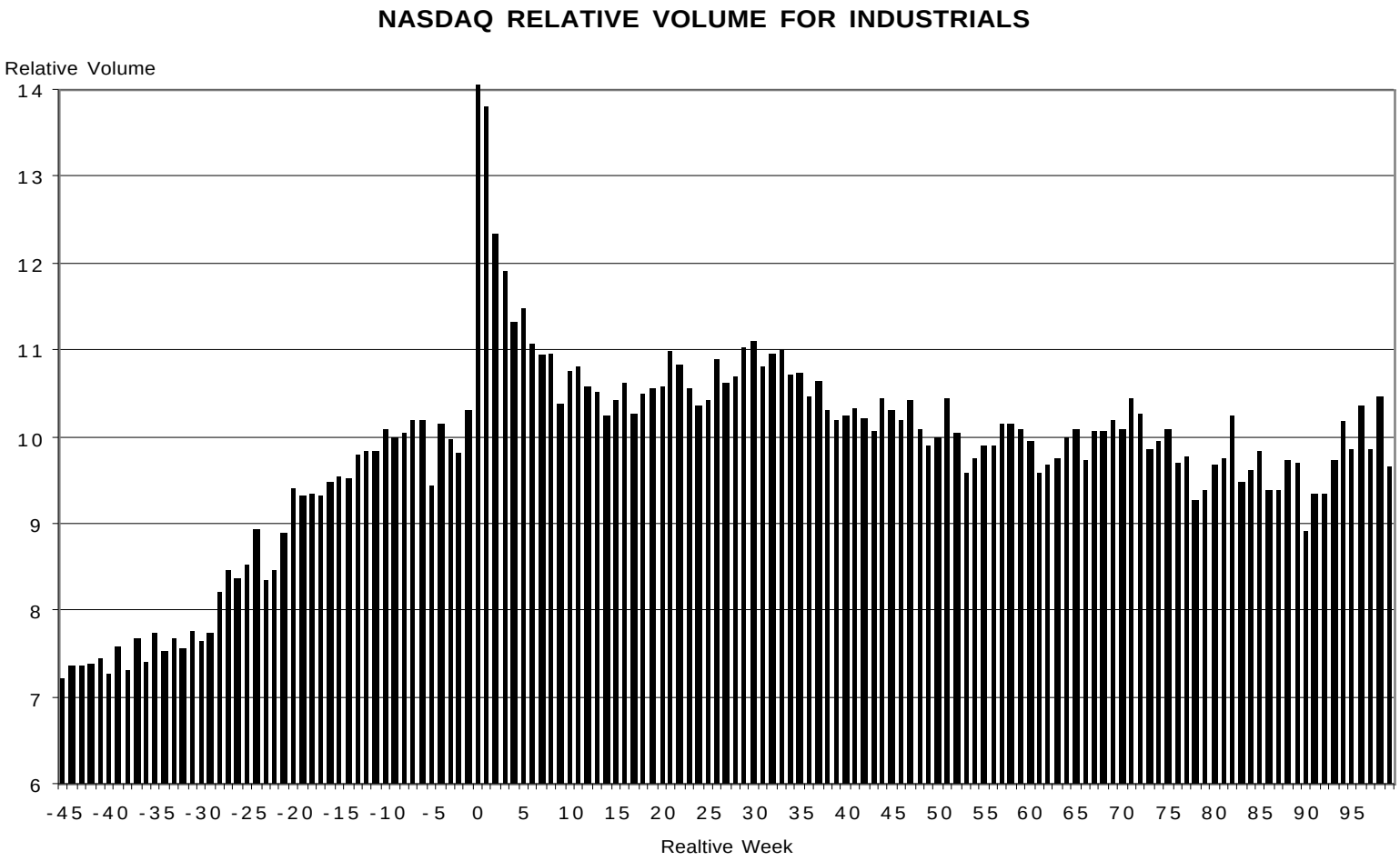

Figure 2. Weekly Relative volume for NASDAQ issues, 1985-1997. Offer week is denoted as week zero with a relative volume of 34.36 (the relative volume axes is cutoff at 14 for display purposes). Relative volume is multiplied by 1000.

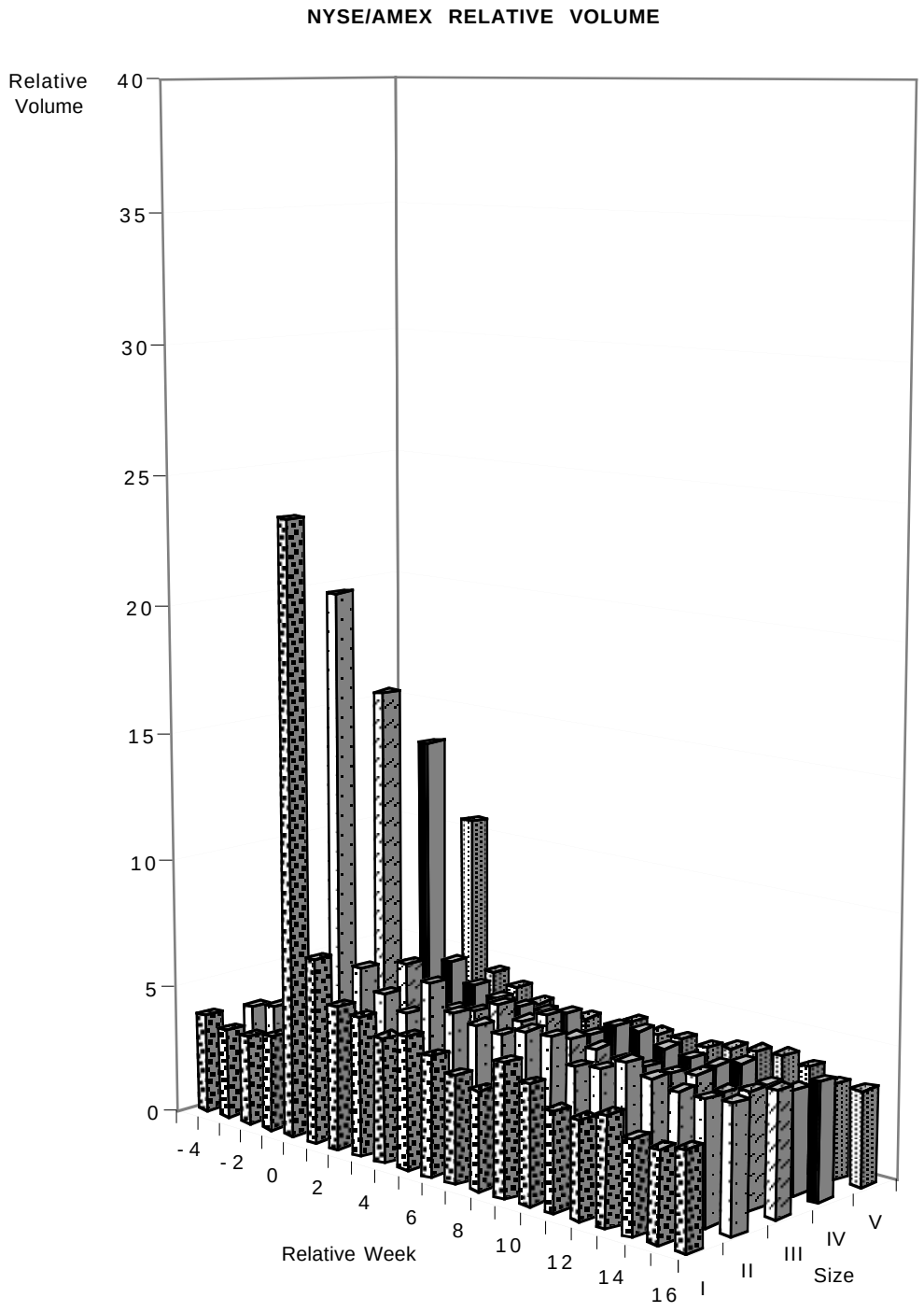

Figure 3. Relative volume of NYSE/AMEX industrial issues across size quintiles, 1985-1997. The sample is sorted into quintiles based on the market value of the firms at the time of the offer, where I is the lowest size quintile and V is the highest size quintile. Offer week is denoted as week zero. Relative volume is multiplied by 1000.

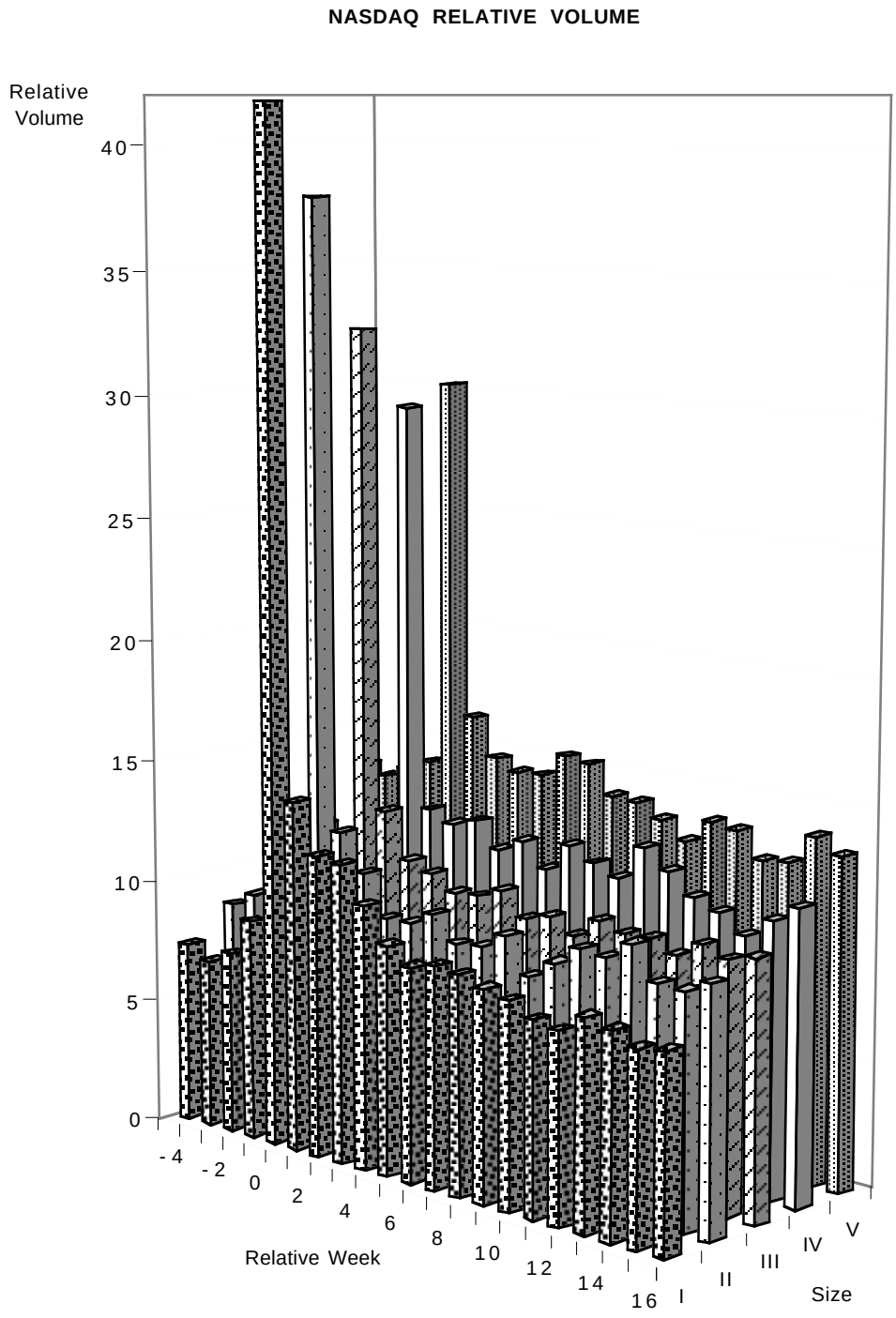

Figure 4. Relative volume of NASDAQ industrial issues across size quintiles, 1985-1997. The sample is sorted into quintiles based on the market value of the firms at the time of the offer, where I is the lowest size quintile and V is the highest size quintile. Offer week is denoted as week zero. Relative volume is multiplied by 1000.

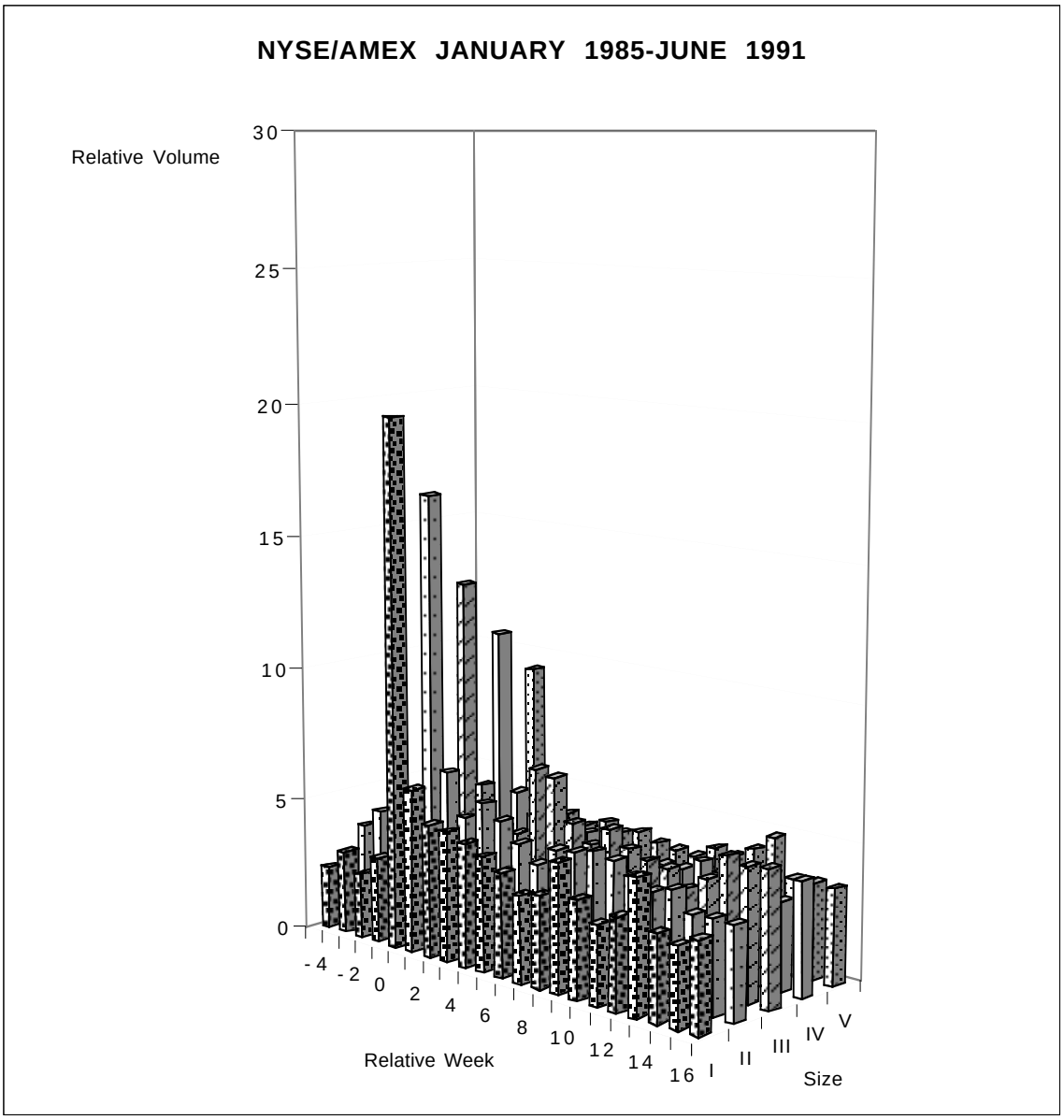

Figure 5. Relative volume of NYSE/AMEX industrial issues across size quintiles, January 1985-June 1991. The sample is sorted into quintiles based on the market value of the firms at the time of the offer, where I is the lowest size quintile and V is the highest size quintile. Offer week is denoted as week zero. Relative volume is multiplied by 1000.

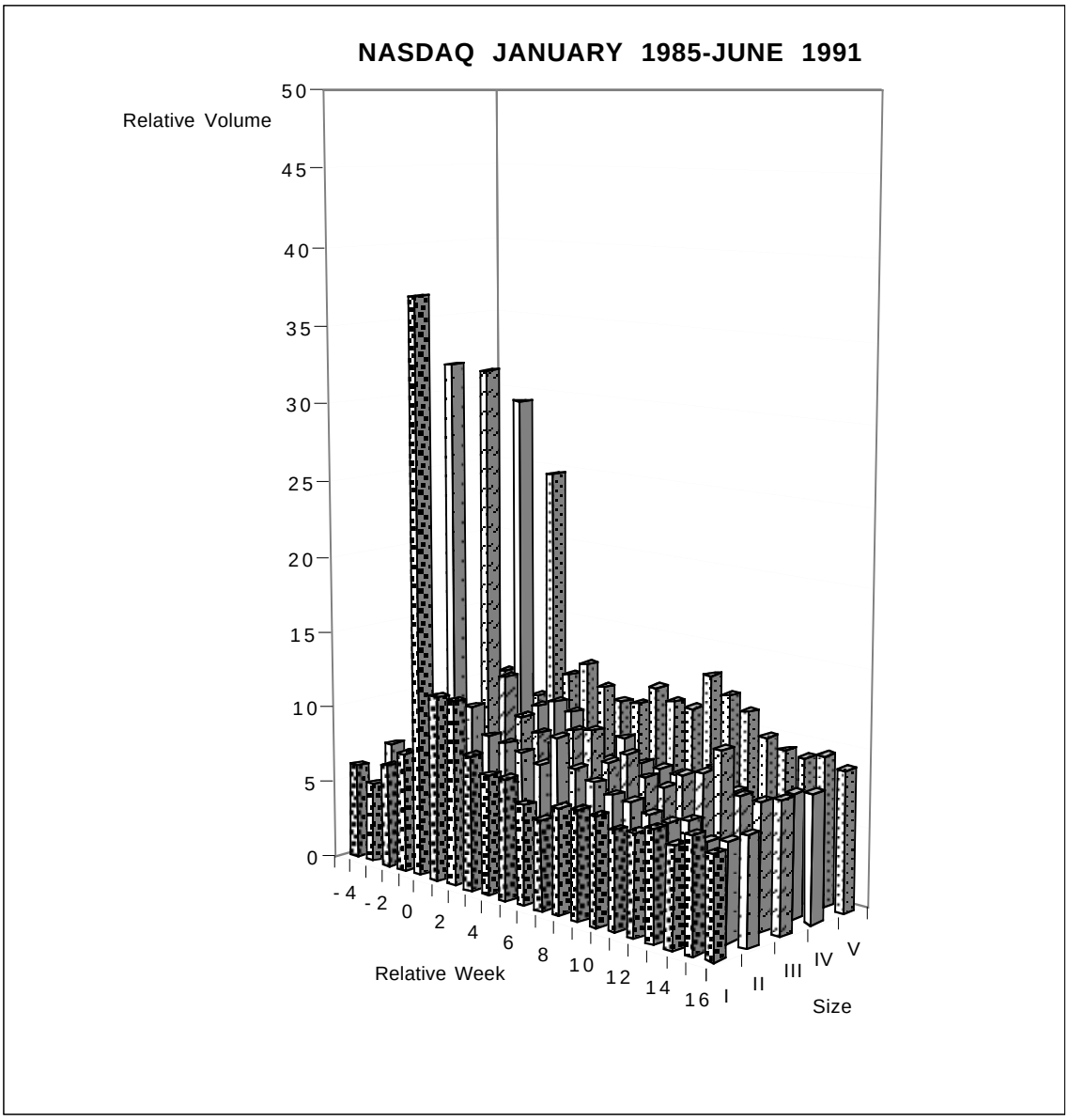

Figure 6. Relative volume of NASDAQ industrial issues across size quintiles, January 1985-June 1991. The sample is sorted into quintiles based on the market value of the firms at the time of the offer, where I is the lowest size quintile and V is the highest size quintile. Offer week is denoted as week zero. Relative volume is multiplied by 1000.

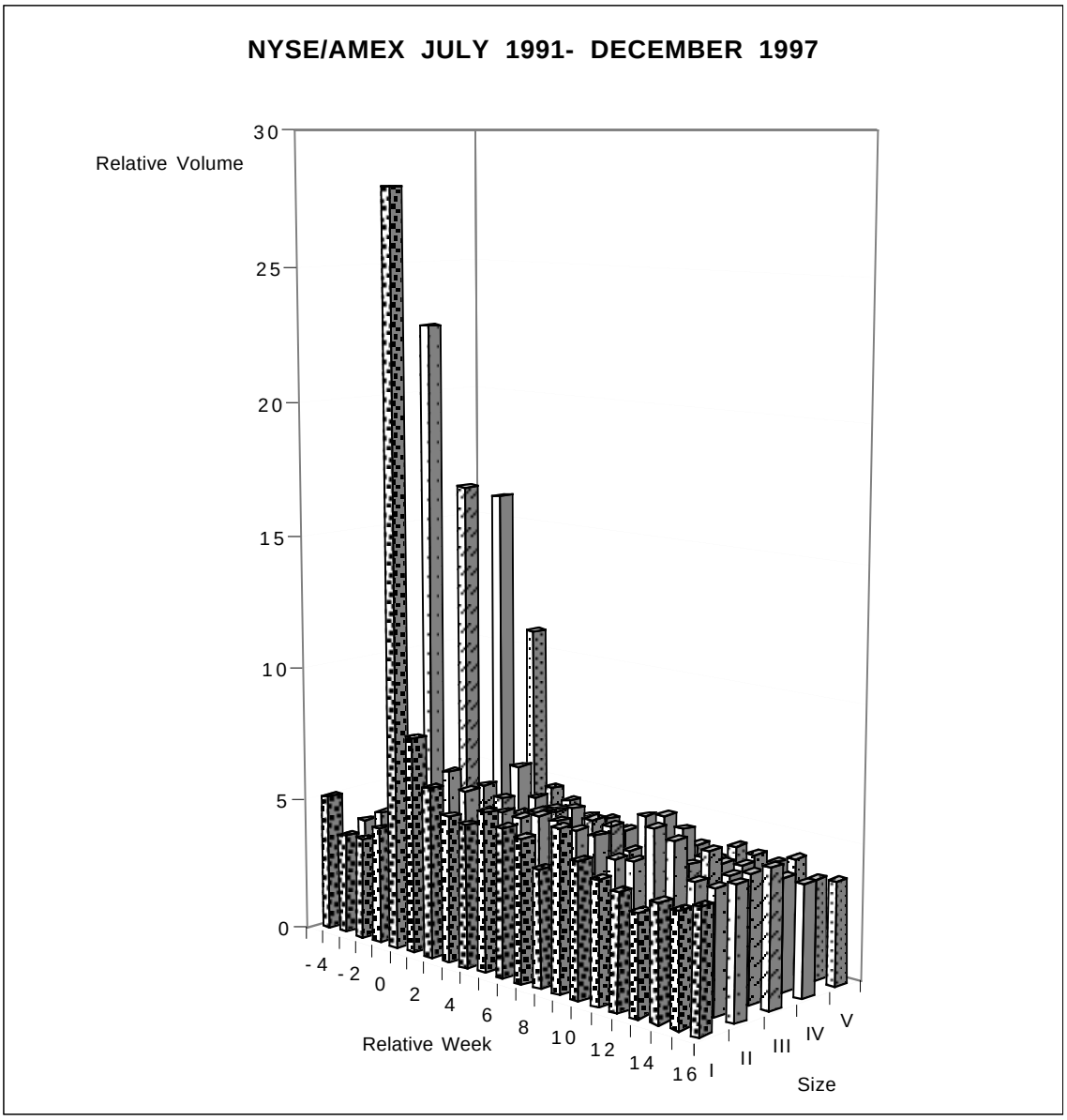

Figure 7. Relative volume of NYSE/AMEX industrial issues across size quintiles, July 1991-December 1997. The sample is sorted into quintiles based on the market value of the firms at the time of the offer, where I is the lowest size quintile and V is the highest size quintile. Offer week is denoted as week zero. Relative volume is multiplied by 1000.

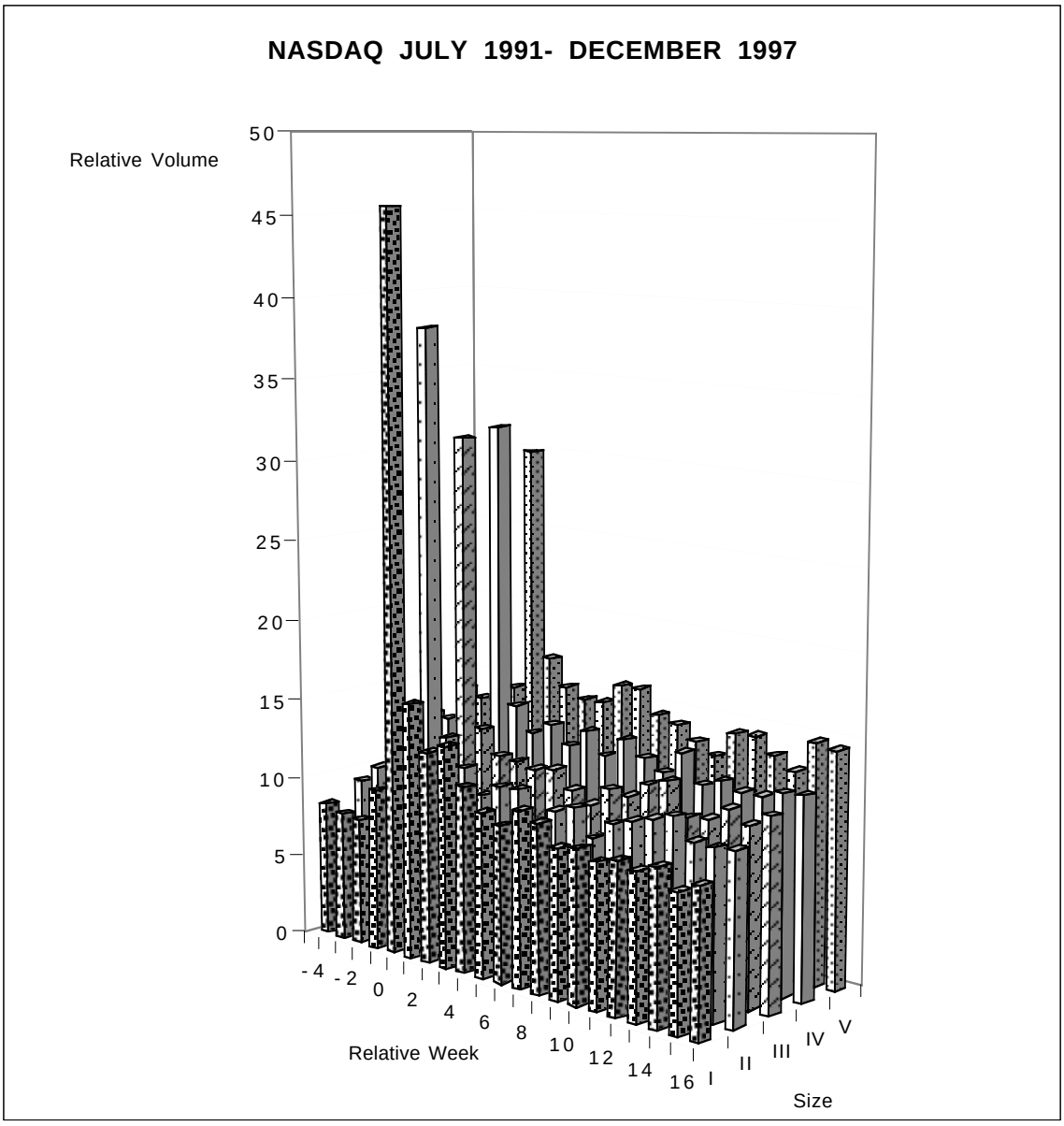

Figure 8. Relative volume of NASDAQ industrial issues across size quintiles, July 1991-December 1997. The sample is sorted into quintiles based on the market value of the firms at the time of the offer, where I is the lowest size quintile and V is the highest size quintile. Offer week is denoted as week zero. Relative volume is multiplied by 1000.

Table 1.

Sample Statistics

Panel A: Exchange and Industry Breakdown of SEOs Between 1985 and 1997:

	Industrials	Utilities	Financials	TOTAL
NYSE	741	285	275	1301
AMEX	200	17	37	254
NASDAQ	1793	180	271	2244

Panel B: Number Of Industrial Seasoned Equity Offers Per Year By Exchange

	NYSE	AMEX	NASDAQ	TOTAL
1985	30	16	72	118
1986	56	19	118	193
1987	49	19	64	132
1988	19	10	25	54
1989	15	17	66	98
1990	22	10	47	79
1991	80	18	156	254
1992	70	22	121	213
1993	90	16	198	304
1994	75	11	130	216
1995	68	13	267	348
1996	89	16	291	396
1997	78	13	238	329
TOTAL	**741**	**200**	**1793**	**2734**

Panel C: Descriptive Sample Statistics
The sample consists of 941 NYSE/AMEX and 1793 NASDAQ industrial offers. Means and medians are reported on the offer price, size, relative size (dollar offer size divided by dollar market capitalization of the firm) and spread (percentage of proceeds paid to the underwriters) of the offerings.

		N	Mean	Median
NYSE/AMEX				
	Offer Price ($)	941	26.266	24.00
	Size ($ mil)	932	1870	517
	Relative Size	932	0.192	0.157
	Spread (%)	941	4.580	4.526
NASDAQ				
	Offer Price ($)	1793	20.535	18.00
	Size ($ mil)	1781	301	166
	Relative Size	1781	0.243	0.217
	Spread (%)	1793	5.567	5.50

Table 2

Abnormal Volume Statistics

This table shows means and medians for four abnormal volume measures during the offer week separately for NYSE/AMEX and NASDAQ industrial SEOs. Abvol1 is obtained using the pre-period mean normal volume in the abnormal volume calculations, Abvol2 is calculated using the post-period mean normal volume. Abvol3 is obtained using pre-period fitted normal volume model whereas Abvol4 uses post-period fitted normal volume.

Panel A: Descriptive Statistics*

	N	Mean	Median
NYSE/AMEX			
Abvol1	911	13.593	10.483
Abvol2	913	12.861	9.864
Abvol3	903	13.050	10.500
Abvol4	905	12.960	10.327
NASDAQ			
Abvol1	1727	26.372	22.010
Abvol2	1730	24.390	19.746
Abvol3	1716	24.131	19.401
Abvol4	1719	24.365	19.771

Panel B: Pearson Correlation Coefficients

	N	Abvol1	Abvol2	Abvol3
NYSE/AMEX				
Abvol1	929	-		
Abvol2	929	0.975 (0.00)	-	
Abvol3	929	0.959 (0.00)	0.941 (0.00)	-
Abvol4	929	0.923 (0.00)	0.950 (0.00)	0.900 (0.00)
NASDAQ				
Abvol1	1766	-		
Abvol2	1766	0.953 (0.00)	-	
Abvol3	1766	0.962 (0.00)	0.916 (0.00)	-
Abvol4	1766	0.908 (0.00)	0.940 (0.00)	0.882 (0.00)

* Abnormal volume is multiplied by 1000.

Table 3

Relative Volume Regressions for NYSE/AMEX and NASDAQ Industrial Firms Before and After SEOs

The table reports the results separately pooled cross-sectional regressions for NYSE/AMEX and NASDAQ listed industrial stocks with SEOs between 1985 and 1997. The dependent variable is the relative volume (multiplied by 1000), weekly trading volume divided by the number of shares outstanding. The independent variables are logarithm of size, relative size of the offering, weekly market turnover, and week dummies for weeks starting the five weeks before the offer and ending 19 weeks after. p-values are in parentheses.

	The Dependent Variable is Relative Volume			
	NYSE/AMEX		NASDAQ	
Independent Variables	(1)	(2)	(3)	(4)
Intercept	-0.621 (0.39)	2.926 (0.39)	-46.710 (0.00)	4.751 (0.00)
Lnsize	0.173 (0.00)		2.720 (0.00)	
Prosize	5.405 (0.00)	4.414 (0.00)	10.959 (0.00)	-0.954 (0.02)
Turnover	1.864 (0.00)	2.139 (0.00)	6.628 (0.00)	11.994 (0.00)
Week-5	-0.150 (0.53)	-0.149 (0.53)	-1.037 (0.00)	-0.892 (0.01)
Week-4	-0.240 (0.31)	-0.234 (0.32)	-0.321 (0.37)	-0.164 (0.65)
Week-3	-0.293 (0.22)	-0.285 (0.23)	-0.720 (0.05)	-0.545 (0.14)
Week-2	-0.334 (0.16)	-0.326 (0.17)	-0.570 (0.11)	-0.391 (0.28)
Week-1	-0.171 (0.47)	-0.163 (0.49)	-0.198 (0.47)	-0.075 (0.84)
Week 0	14.483 (0.00)	14.484 (0.00)	26.065 (0.00)	26.164 (0.00)
Week1	2.020 (0.00)	2.023 (0.00)	3.587 (0.00)	3.725 (0.00)
Week2	0.988 (0.00)	0.994 (0.00)	2.075 (0.00)	2.215 (0.00)
Week 3	0.726 (0.00)	0.731 (0.00)	1.496 (0.00)	1.648 (0.00)
Week4	0.892 (0.00)	0.897 (0.00)	1.049 (0.00)	1.181 (0.00)
Week 5	0.881 (0.00)	0.886 (0.00)	0.880 (0.01)	1.021 (0.01)
Week 6	0.493 (0.04)	0.501 (0.03)	0.431 (0.23)	0.565 (0.12)
Week 7	0.442 (0.06)	0.446 (0.06)	0.372 (0.30)	0.518 (0.15)
Week 8	0.462 (0.05)	0.466 (0.05)	0.499 (0.16)	0.594 (0.10)
Week 9	0.730 (0.00)	0.735 (0.00)	-0.163 (0.65)	-0.062 (0.86)
Week 10	0.050 (0.83)	0.055 (0.82)	0.035 (0.92)	0.117 (0.75)
Week 11	0.162 (0.49)	0.166 (0.48)	0.265 (0.46)	0.318 (0.38)
Week 12	0.202 (0.39)	0.205 (0.39)	0.205 (0.57)	0.244 (0.50)
Week 13	0.334 (0.16)	0.335 (0.15)	-0.086 (0.81)	-0.072 (0.84)
Week 14	-0.112 (0.63)	-0.114 (0.63)	-0.181 (0.61)	-0.172 (0.63)
Week 15	-0.123 (0.60)	-0.122 (0.60)	-0.239 (0.50)	-0.250 (0.49)
Week 16	0.050 (0.83)	0.051 (0.83)	-0.067 (0.85)	-0.083 (0.82)
Week 17	0.026 (0.91)	0.024 (0.92)	-0.292 (0.41)	-0.333 (0.36)
Week 18	0.053 (0.82)	0.050 (0.83)	-0.025 (0.94)	-0.084 (0.82)
Week 19	0.101 (0.67)	0.098 (0.68)	0.103 (0.77)	0.035 (0.92)
N	23640	23668	49263	49263
F	0.00	0.00	0.00	0.00
Adj. R-Square	0.16	0.16	0.15	0.14

Table 4

Relative Volume Regressions for NYSE and AMEX Industrial Firms Before and After SEOs, by Firm Size Quintiles

The table reports the results of five size cross-sectional regressions for 941 NYSE and AMEX listed industrial stocks with SEOs between 1985 and 1997. The dependent variable is the relative volume (multiplied by 1000), weekly trading volume divided by the number of shares outstanding. The independent variables are relative size of the offering, weekly market turnover, and week dummies for weeks starting the five weeks before the offer and ending 19 weeks after. p-values are in parentheses.

Independent Variables	The Dependent Variable is Relative Volume				
	I	II	III	IV	V
Intercept	1.461 (0.00)	2.291 (0.00)	2.886 (0.00)	3.201 (0.00)	3.229 (0.00)
Prosize	6.026 (0.00)	5.814 (0.00)	7.795 (0.00)	6.553 (0.00)	4.290 (0.00)
Turnover	1.105 (0.18)	4.751 (0.00)	1.061 (0.06)	0.643 (0.13)	2.578 (0.00)
Week-5	-0.424 (0.49)	-0.451 (0.48)	0.157 (0.77)	0.173 (0.67)	-0.337 (0.38)
Week-4	0.765 (0.21)	-1.223 (0.06)	-0.455 (0.40)	-0.316 (0.44)	0.031 (0.94)
Week-3	0.097 (0.88)	-0.609 (0.33)	-0.658 (0.23)	-0.255 (0.53)	-0.147 (0.70)
Week-2	-0.134 (0.83)	-0.554 (0.38)	-0.140 (0.80)	-0.563 (0.18)	-0.378 (0.32)
Week-1	0.555 (0.37)	-0.709 (0.26)	-0.037 (0.94)	-0.513 (0.22)	-0.178 (0.65)
Week 0	21.372 (0.00)	17.339 (0.00)	14.851 (0.00)	10.933 (0.00)	8.003 (0.00)
Week1	3.437 (0.00)	2.497 (0.00)	1.689 (0.00)	1.456 (0.00)	1.071 (0.01)
Week2	1.729 (0.00)	1.117 (0.08)	0.695 (0.20)	0.762 (0.07)	0.622 (0.10)
Week 3	1.570 (0.01)	0.704 (0.27)	0.883 (0.10)	0.290 (0.48)	0.188 (0.63)
Week4	1.349 (0.02)	0.370 (0.57)	1.957 (0.00)	0.693 (0.09)	0.095 (0.80)
Week 5	1.619 (0.01)	1.536 (0.02)	0.942 (0.12)	0.242(0.56)	0.202(0.60)
Week 6	0.671 (0.26)	0.797 (0.21)	0.236 (0.67)	0.531 (0.20)	0.193 (0.61)
Week 7	0.552 (0.34)	0.897 (0.16)	0.539 (0.45)	0.206 (0.62)	0.148 (0.70)
Week 8	-0.027 (0.96)	0.657 (0.30)	0.740 (0.17)	1.113 (0.01)	-0.188 (0.62)
Week 9	1.658 (0.01)	0.842 (0.18)	0.410 (0.45)	0.925 (0.02)	-0.147 (0.70)
Week 10	0.276 (0.64)	0.064 (0.92)	0.151 (0.79)	0.001 (0.99)	-0.223 (0.56)
Week 11	-0.085 (0.89)	0.291 (0.89)	0.254 (0.64)	0.516 (0.20)	-0.189 (0.63)
Week 12	-0.071 (0.90)	-0.405 (0.53)	0.276 (0.62)	0.276 (0.49)	0.120 (0.76)
Week 13	0.693 (0.23)	-0.412 (0.52)	-0.026 (0.96)	0.197 (0.63)	0.431 (0.27)
Week 14	-0.170 (0.77)	-0.130 (0.84)	0.092 (0.87)	-0.413 (0.31)	-0.046 (0.91)
Week 15	-0.289 (0.62)	-0.139 (0.83)	0.089 (0.87)	-0.087 (0.83)	-0.411 (0.30)
Week 16	-0.295 (0.61)	-0.304 (0.63)	0.633 (0.25)	0.238 (0.56)	-0.580 (0.14)
Week 17	-0.016 (0.98)	-0.330 (0.60)	0.011 (0.98)	0.146 (0.71)	-0.371 (0.36)
Week 18	-0.555 (0.34)	-0.203 (0.75)	0.062 (0.91)	0.565 (0.16)	0.000 (0.99)
Week 19	-0.176 (0.76)	-0.897 (0.16)	0.161 (0.77)	0.093 (0.82)	-0.394 (0.31)
N	4570	4743	4777	4789	4785
F	0.00	0.00	0.00	0.00	0.00
Adj. R-Square	0.25	0.15	0.16	0.14	0.10

Table 5

Relative Volume Regressions for NASDAQ Industrial Firms Before and After SEOs, by Firm Size Quintiles

The table reports the results of five size cross-sectional regressions for 1793 NASDAQ listed industrial stocks with SEOs between 1985 and 1997. The dependent variable is the relative volume (multiplied by 1000), weekly trading volume divided by the number of shares outstanding. The independent variables are relative size of the offering, weekly market turnover, and week dummies for weeks starting the five weeks before the offer and ending 19 weeks after. p-values are in parentheses.

Independent Variables	The Dependent Variable is Relative Volume				
	I	II	III	IV	V
Intercept	0.679 (0.13)	2.045 (0.00)	3.120 (0.00)	5.454 (0.00)	12.008 (0.00)
Prosize	7.964 (0.00)	11.545 (0.00)	16.752 (0.00)	9.622 (0.00)	-11.548 (0.00)
Turnover	8.673 (0.00)	7.578 (0.00)	5.826 (0.00)	7.440 (0.00)	9.044 (0.00)
Week-5	-1.358 (0.08)	-0.854 (0.23)	-0.892 (0.27)	-1.369 (0.09)	-0.826 (0.35)
Week-4	-0.747 (0.34)	-0.066 (0.93)	-0.557 (0.49)	-0.324 (0.69)	-0.007 (0.99)
Week-3	-1.217 (0.12)	-0.576 (0.42)	-0.748 (0.35)	-1.083 (0.18)	-0.134 (0.88)
Week-2	-0.613 (0.43)	-1.222 (0.09)	0.033 (0.97)	-1.151 (0.15)	-0.022 (0.98)
Week-1	1.571 (0.04)	-1.348 (0.06)	0.195 (0.50)	-1.036 (0.20)	-0.331 (0.71)
Week 0	35.900 (0.00)	32.379 (0.00)	25.445 (0.00)	19.294 (0.00)	17.828 (0.00)
Week1	6.469 (0.00)	4.709 (0.00)	2.975 (0.00)	1.481 (0.08)	2.461 (0.01)
Week2	4.838 (0.00)	1.987 (0.01)	2.407 (0.00)	1.097 (0.18)	0.281 (0.75)
Week 3	4.685 (0.00)	1.105 (0.13)	0.782 (0.31)	0.445 (0.58)	0.676 (0.44)
Week4	3.067 (0.00)	0.907 (0.21)	1.504 (0.05)	-0.016 (0.98)	-0.025 (0.98)
Week 5	1.625 (0.03)	0.816 (0.26)	0.928 (0.23)	-0.345 (0.67)	1.435(0.11)
Week 6	0.486 (0.51)	0.623 (0.39)	0.685 (0.39)	-0.521(0.52)	0.937 (0.29)
Week 7	0.887 (0.23)	0.940 (0.19)	-0.481 (0.54)	0.915 (0.25)	-0.346 (0.70)
Week 8	0.902 (0.21)	1.076 (0.14)	0.216 (0.77)	0.940 (0.25)	-0.733 (0.40)
Week 9	0.906 (0.21)	-0.332 (0.65)	-0.402 (0.61)	-0.657 (0.42)	-0.424 (0.63)
Week 10	0.697 (0.34)	0.277 (0.70)	0.114 (0.88)	0.614 (0.45)	-1.621 (0.07)
Week 11	0.078 (0.92)	0.365 (0.62)	0.767 (0.33)	0.876 (0.28)	-0.951 (0.28)
Week 12	0.253 (0.73)	0.758 (0.29)	0.683 (0.38)	-0.013 (0.99)	-0.822 (0.36)
Week 13	1.109 (0.125)	0.457 (0.53)	0.399 (0.60)	-0.553 (0.50)	-2.067 (0.02)
Week 14	0.883 (0.22)	0.089 (0.90)	0.691 (0.37)	-1.370 (0.10)	-1.363 (0.13)
Week 15	0.285 (0.69)	-0.248 (0.73)	-0.524 (0.50)	-0.358 (0.66)	-0.566 (0.53)
Week 16	0.295 (0.68)	0.331 (0.65)	0.490 (0.54)	-0.416 (0.62)	-1.190 (0.19)
Week 17	-0.859 (0.23)	-0.222 (0.76)	-0.304 (0.70)	0.017 (0.98)	-0.308 (0.73)
Week 18	-0.169 (0.81)	0.534 (0.45)	-0.209 (0.79)	0.060 (0.94)	-0.600 (0.51)
Week 19	0.069 (0.92)	-1.346 (0.06)	1.765 (0.03)	0.776 (0.34)	-0.824 (0.37)
N	9448	9833	9924	10019	10035
F	0.00	0.00	0.00	0.00	0.00
Adj. R-Square	0.24	0.20	0.13	0.06	0.05

Table 6

Pearson Correlation Coefficients

This table shows the Pearson correlation coefficients of the variables spread, the percentage amount paid to the underwriters of the proceeds, inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume.

	N	Spread	Inverse Proceeds	Prosize	Equity Flow	Volatility
NYSE/AMEX						
Spread	929	-				
Inverse Proceeds	929	0.622	-			
Prosize	929	0.386	0.174	-		
Equity Flow	929	-0.038	-0.267	0.051	-	
Volatility	928	0.318	0.182	0.167	0.061	-
Abvol4	929	0.342	0.049	0.539	0.168	0.041
NASDAQ						
Spread	1782	-				
Inverse Proceeds	1782	0.647	-			
Prosize	1767	0.295	0.056	-		
Equity Flow	1782	-0.056	-0.253	0.071	-	
Volatility	1780	0.141	-0.033	0.057	0.110	-
Abvol4	1767	0.191	0.023	0.449	0.088	-0.077

Table 7

Underwriter Spread Regressions for NYSE and AMEX Industrial SEOs

The table shows the results for spread regressions for 927 NYSE and AMEX industrial firms with a SEO between 1985 and 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume, measured in pre-period as well as in the post period. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread				
Independent Variables	(1)	(2)	(3)	(4)	(5)
Intercept	2.774	2.777	2.768	2.777	2.767
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	24.065	24.197	24.056	24.062	24.040
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	3.528	2.879	2.800	3.043	2.900
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.067	0.052	0.052	0.057	0.052
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
Volatility	6.460	6.376	6.684	6.445	6.788
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Abvol1		11.263			
		(0.00)			
Abvol2			12.744		
			(0.00)		
Abvol3				8.628	
				(0.00)	
Abvol4					10.941
					(0.00)
Adj. R-square	0.58	0.59	0.59	0.59	0.59
N	927	927	927	927	927

Table 8

Underwriter Spread Regressions for NASDAQ Industrial SEOs

The table shows the results for spread regressions for 1765 NASDAQ industrial firms with a SEO between 1985 and 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume, measured in pre-period as well as in the post period. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread				
Independent Variables	(1)	(2)	(3)	(4)	(5)
Intercept	3.869	3.862	3.856	3.867	3.857
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	18.655	18.703	18.665	18.655	18.637
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	2.052	1.908	1.864	1.928	1.870
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.048	0.046	0.045	0.046	0.045
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Volatility	3.756	3.786	3.939	3.800	3.937
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Abvol1		1.580			
		(0.00)			
Abvol2			2.037		
			(0.00)		
Abvol3				1.367	
				(0.00)	
Abvol4					1.984
					(0.00)
Adj. R-square	0.55	0.55	0.55	0.55	0.55
N	1765	1765	1765	1765	1765

Table 9

Underwriter Spread Regressions for NYSE and AMEX Industrial SEOs

The table shows the results for spread regressions for the industrial NYSE and AMEX firms with a SEO between 1985 and 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
Independent Variables	Total	No Secondary Offers	No Foreign Offers	No Secondary or Foreign Offers
Intercept	2.767	2.780	2.839	2.912
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	24.040	25.115	22.445	24.541
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	2.900	2.682	2.679	2.143
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.052	0.094	0.082	0.116
	(0.01)	(0.00)	(0.00)	(0.00)
Volatility	6.788	5.956	6.593	5.267
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol4	10.941	9.740	11.206	12.766
	(0.00)	(0.00)	(0.00)	(0.00)
Adj. R-square	0.59	0.61	0.55	0.58
N	927	588	613	406

Table 10

Underwriter Spread Regressions for NASDAQ Industrial SEOs

The table shows the results for spread regressions for the industrial NASDAQ firms with a SEO between 1985 and 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
Independent Variables	Total	No Secondary Offers	No Foreign Offers	No Secondary or Foreign Offers
Intercept	3.857	3.948	3.951	4.027
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	18.637	18.599	17.826	18.026
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	1.870	1.825	1.763	1.712
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.045	0.048	0.047	0.045
	(0.00)	(0.00)	(0.00)	(0.00)
Volatility	3.937	4.155	3.754	4.105
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol4	1.984	1.667	2.172	1.961
	(0.00)	(0.04)	(0.00)	(0.02)
Adj. R-square	0.55	0.59	0.53	0.58
N	1765	1075	1618	995

Table 11

Underwriter Spread Regressions for Industrial, Financial and Utility NYSE and AMEX SEOs

The table shows the results for spread regressions for the full sample and industrial NYSE and AMEX firms with a SEO between 1985 and 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
Independent Variables	Total	No Secondary Offers	No Foreign Offers	No Secondary or Foreign Offers
Intercept	2.402	2.286	2.374	2.286
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	22.352	22.980	21.138	22.098
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	3.361	3.313	3.195	3.066
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.068	0.100	0.084	0.100
	(0.01)	(0.01)	(0.00)	(0.00)
Volatility	9.826	10.448	10.930	11.544
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol4	10.470	9.337	12.255	12.059
	(0.00)	(0.00)	(0.00)	(0.00)
Adj. R-square	0.54	0.59	0.52	0.53
N	1484	1037	1027	769

Table 12

Underwriter Spread Regressions for Industrial, Financial and Utility NASDAQ SEOs

The table shows the results for spread regressions for the full sample of NASDAQ firms with a SEO between 1985 and 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
Independent Variables	Total	No Secondary Offers	No Foreign Offers	No Secondary or Foreign Offers
Intercept	3.665	3.615	3.749	3.677
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	18.126	18.311	17.280	17.719
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	2.085	2.038	1.998	1.953
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.050	0.060	0.052	0.059
	(0.00)	(0.00)	(0.00)	(0.00)
Volatility	5.166	6.267	5.008	6.235
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol4	1.683	1.427	1.865	1.696
	(0.00)	(0.07)	(0.00)	(0.04)
Adj. R-square	0.53	0.56	0.51	0.55
N	2126	1338	1950	1244

Table 13

Underwriter Spread Regressions for NYSE and AMEX SEOs by Time Period

The table shows the results for spread regressions for the full sample and industrial NYSE and AMEX firms with a SEO. The first half of the sample is from January 1985 to end of June 1991, and the second half of the data is from July 1991 to end of December 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
	January 1985-June1991		July 1991-December 1997	
Independent Variables	Full Sample	Industrials	Full Sample	Industrials
Intercept	2.374	2.850	2.613	2.946
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	22.572	22.097	22.988	30.156
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	4.018	3.494	2.915	2.553
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	-0.048	-0.125	0.027	0.002
	(0.26)	(0.02)	(0.26)	(0.93)
Volatility	9.923	6.372	10.315	7.606
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol4	7.072	11.925	11.996	9.203
	(0.04)	(0.01)	(0.00)	(0.00)
Adj. R-square	0.63	0.63	0.47	0.61
N	549	332	934	594

Table 14

Underwriter Spread Regressions for NASDAQ SEOs by Time Period

The table shows the results for spread regressions for the full sample and industrial NASDAQ firms with a SEO. The first half of the sample is from January 1985 to end of June 1991, and the second half of the data is from July 1991 to end of December 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
	January 1985-June1991		July 1991-December 1997	
Independent Variables	Full Sample	Industrials	Full Sample	Industrials
Intercept	3.360	3.526	3.934	4.092
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	16.386	16.580	20.609	20.861
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	2.199	2.168	1.929	1.658
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.015	0.032	0.008	0.010
	(0.66)	(0.37)	(0.55)	(0.47)
Volatility	8.935	7.281	3.834	2.893
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol4	2.251	2.310	1.475	1.894
	(0.11)	(0.13)	(0.02)	(0.00)
Adj. R-square	0.58	0.59	0.47	0.55
N	616	459	1509	1305

Table 15

Underwriter Spread Regressions Winsorized for NYSE/AMEX and NASDAQ SEOs

The table shows the results for spread regressions for the full sample and industrial NYSE and AMEX firms with a SEO. The normal volume measures are winsorized at the 5th and 95th and fractiles at 15th and 85th fractiles. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed costs, proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume, which is the difference between the relative weekly volume and the post period volume. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
	NYSE/AMEX		NASDAQ	
Independent Variables	winsorized at 5th and 95th	winzorized at 15th and 85th	winsorized at 5th and 95th	winsorized at 15th and 85th
Intercept	2.692	2.695	3.850	3.851
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	24.469	24.494	18.652	18.664
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize	2.921	2.905	1.893	1.894
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.058	0.059	0.044	0.043
	(0.26)	(0.26)	(0.26)	(0.26)
Volatility	6.753	6.644	3.962	3.929
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol4	12.653	12.849	2.002	2.010
	(0.04)	(0.04)	(0.00)	(0.00)
Adj. R-square	0.59	0.59	0.55	0.55
N	937	937	1765	1765

Table 16

Underwriter Spread Regressions for NYSE and AMEX SEOs

The table shows the results for spread regressions for the full sample and also industrial NYSE and AMEX firms and NASDAQ firms separately, with a SEO between 1985 and 1997. The dependent variable is the spread, the percentage amount paid to the underwriters of the proceeds. The independent variables are inverse of proceeds as a measure of fixed cost, orthogonalized proceeds over size as a measure of variable costs, equity flow, total amount of proceeds for SEOs in a given year, volatility of returns measured in the post-period, abnormal volume dummies for second, third and fourth quartiles of Abvol4. p-values are in parentheses.

	The Dependent Variable is Underwriter Spread			
	NYSE/AMEX		NASDAQ	
Independent Variables	Full sample	Industrials	Full sample	Industrials
Intercept	2.624	2.927	3.984	4.154
	(0.00)	(0.00)	(0.00)	(0.00)
Inverse Proceeds	22.492	24.431	18.231	18.746
	(0.00)	(0.00)	(0.00)	(0.00)
Prosize2	3.166	2.863	2.151	1.954
	(0.00)	(0.00)	(0.00)	(0.00)
Equity Flow	0.062	0.049	0.052	0.047
	(0.00)	(0.01)	(0.00)	(0.00)
Volatility	9.587	6.774	4.884	3.654
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol II	0.277	0.369	0.150	0.137
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol III	0.656	0.639	0.337	0.317
	(0.00)	(0.00)	(0.00)	(0.00)
Abvol IV	9.887	9.816	4.590	4.137
	(0.00)	(0.00)	(0.00)	(0.00)
Adj. R-square	0.54	0.59	0.52	0.55
N	1484	927	2126	1765

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