

# Revisiting the Liquidity Discount Controversy: Establishing a Plausible Range

*by*

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## **Overview**

Firm A is a closely-held firm whose securities are not listed on a highly liquid exchange like the New York Stock Exchange (NYSE). Firm B is equivalent in every way to Firm A except its shares trade on the NYSE. Assuming that the financial prospects of both firms are known to both private and public market participants, Firm A shares will trade at a discount to those of Firm B because the former are far less liquid than those of the latter. This discount is known as the liquidity or marketability discount.<sup>1</sup>

The valuation of closely-held firms is often carried out in two steps. First, the securities are valued as if they trade on a highly liquid exchange. Second, this value is reduced by the size of the estimated liquidity discount. The size of this discount has been debated, with almost no consensus on how to estimate it or what a plausible range might be. Indeed, the size of the discount has been measured to exceed 40% and be as small as 7.2%. This paper reviews some of the more important research by financial economists and uses the results of this review to establish a plausible range for the size of the liquidity discount. Our analysis suggests five fundamental conclusions:

- 1) When valuing minority shares of a privately-held C corporation, the liquidity discount should be in the neighborhood of 14%.
- 2) Minority shares of S corporations are less liquid than shares of an equivalent C corporation. Hence, discounts applied to minority S shares should be greater than discounts applied to minority C shares.

- 3) When valuing control shares of a free-standing C corporation, discounts should be in the neighborhood of 20% and incrementally higher for S shares.
- 4) Discounts in excess of 30% for either minority or control shares are simply not supported by peer-reviewed research.

### ***Does Liquidity Effect Asset Prices? Setting the Stage***

Studying the pricing effects of liquidity is a major issue in both theoretical and empirical finance. While lack of liquidity affects the value of private securities, it also influences the prices of securities that trade in organized markets. Finance research has even suggested that portfolios of less liquid stocks provide investors with significantly higher returns, on average, than highly liquid stock portfolios, even after adjusting for risk<sup>ii</sup>. This research suggests that the liquidity factor may be as important as risk in determining stock returns. Yakov Amihud and Haim Mendelson also note that higher returns on less liquid securities translate to a price discount relative to more liquid securities.

Why does liquidity affect stock returns? The most straightforward answer is that investors price securities according to their returns net of trading costs; and they thus require higher returns for holding less liquid stocks to compensate them for the higher costs of trading. Put differently, given two assets with the same cash flows but with different liquidity, investors will pay less for the asset with lower liquidity.<sup>iii</sup>

The size of the price concession due to lack of liquidity and the factors that determine it are of special interest to those that value private securities. Unlike the public firm discount literature, the interest in the size of the discount applicable to private securities is primarily, although not exclusively, related to “on- the- ground” practical issues. These include what the IRS will allow when valuing private shares for estate planning purposes, charitable gifting, and estimating capital gains taxes due when private firms are transacted. Because there is a great deal of controversy surrounding some of the more common liquidity benchmarks, valuation analysts are always concerned that the value applied will be contested by the IRS at worst or at the very least seriously questioned. To begin our analysis, we appeal to a liquidity literature that has not generally been brought to bear on the debate of the size of liquidity discount as it relates to privately-held securities.

## **Measuring Illiquidity in the Public Security Markets**

Availability of liquidity is a key determinant of assets prices in public security markets. Organized exchanges like the New York Stock Exchange create liquid trading environments because they offer investors a number of benefits including:

1. Establishing a set of rules for listing a security on an exchange.
2. Ensuring that the number of shares available to be exchanged is a significant percentage of the total available.
3. Ensuring that the firms listing meet minimum standards of financial performance and that their information disclosure is consistent with SEC requirements.

4. Ensuring that the costs of transacting are low relative to the price of an average share.
5. Ensuring that the costs associated with listing are low relative to the liquidity benefits that accrue to the shareholders of the listing firm.

In a perfect exchange world, market participants have full information about the securities being exchanged, prices would reflect this information, and bid-asked spreads would be a tiny percentage of the bid price. Thus, the spread would only reflect the production costs of executing a transaction. In this stylized world, there are no information asymmetries, prices of securities are therefore efficiently priced, that is security prices reflect all known information about risks and opportunities. In the real world, things are not this tidy.

The public security markets are made up auction markets like the New York Stock Exchange (NYSE) where prices are directly determined by buyers and sellers and dealer markets, like the over the counter market (OTC), where a network of dealers stand ready to buy and sell securities at posted prices. Transactions not handled on large liquid auction markets like the NYSE are handled in the OTC market. This market handles unlisted securities or securities not listed on a stock exchange, although some listed securities do trade in the OTC market. Securities of over 35,000 firms are traded in this market, most of which are thinly traded, highly illiquid stocks that do not have a significant following. Prices of these stocks may be reported once per day or even less frequently on what is termed Pink Sheets, hence, the name pink sheet stocks.

Prior to the establishment of the Nasdaq Stock Market, OTC firms could obtain the benefits of maximum liquidity only if they could list their shares on the NYSE. At one time, the major benefit of moving from the OTC to the NYSE was that the greater liquidity of the NYSE would result in a higher share price, all else equal. The ratio of the resulting price increase to the NYSE price is equal to the price of liquidity, or the liquidity discount. For example, if it was announced that an OTC listed firm was listing on the NYSE, and the share price increased by \$1 per share on the announcement date, say from \$20 to \$21, then the price of liquidity would be 4.8% ( $\$1/\$21$ ).

Although increased liquidity may be the primary reason a share price increases when a firm moves from the OTC to the NYSE, it is also possible that the increase is the result of information signaling. In this case, when a firm is accepted to list on the NYSE, it is akin to having a seal of approval. As a result, investors perceive that expected future financial results are now more certain. This means that the listing “signal” has high informational value, which leads to greater certainty about future firm performance in the post -listing environment, a lower cost of equity capital, and therefore a higher share price. Thus, the price increase and the implied discount that results when firms move from a quasi-private firm status to listing on a major exchange, may in part or in total be the product of information signaling.

There are several important strands of research that shed light on these issues and an examination of each will help us place boundaries on the price of liquidity. However,

before presenting these results, we need to review a basic research design used by financial economists so their reported results can be interpreted properly.

## **Event Study Methodology**

In order to study the impact of a particular event on share prices, researchers have developed an event study methodology. This method isolates the impact of the event, in this case the listing announcement, on the listing stock's return. To implement the procedure properly, all confounding events around the event window, a period prior and subsequent to the event date, need to be controlled for. Confounding events include movements in the overall market and/or firm-specific events like acquisitions or divestitures. If an acquisition or other major firm-specific event took place within the event window, the firm is usually removed from the sample or, if it is kept, the researcher uses some other approach to control for the influence of the confounding event on the study's results. The firms that remain are those whose share prices have changed because the overall market moved or because of the event being studied, which in this case is the listing announcement.

To remove the influence of movements in the overall market, researchers calculate an abnormal return, which is defined below.

$$AR_{jt} = R_{jt} - (\hat{a}_j + \hat{B}_j * R_{mt})$$

where:

$AR_{jt}$  = abnormal return, stock j at time t

$R_{jt}$  = rate of return, stock j at time t

$\hat{B}_j$  = Estimated Beta, firm j

$R_{mt}$  = rate of return, market index

$\hat{a}_j$  = constant term from regression model used to estimate Beta

Event studies require the measurement of returns on a daily or weekly basis around the event date. If  $P_b$  and  $P_a$  are prices before and after event respectively, then  $P_a$  is equal to  $P_b * (1 + AR_a)$ . The ratio of  $P_b/P_a$  is  $1/(1 + AR_a)$  so the implied discount is  $1 - (1/(1 + AR_a))$  or  $AR_a/(1 + AR_a)$ . Therefore, if the abnormal return is measured as 20%, then the liquidity discount is  $(.20/1.20) * 100 = 16.7\%$ .

Using event study methodology, Sanger and McConnell<sup>iv</sup> studied the impact on abnormal returns of OTC stocks that listed on the NYSE over the period 1966-1977. This period spans the introduction of the National Association of Securities Dealers Automatic Quotation (NASDAQ) system in the OTC market. For our purposes, of particular interest is the magnitude of the abnormal return responses for firms moving to the NYSE from the OTC prior to the introduction of NASDAQ.<sup>v</sup> These results are reported in Table 1.



**Table 1**

Summary of Abnormal Returns Analysis of 153 OTC Stocks that Listed on the NYSE over the Period 1966-1970 for the 105 Event Weeks Surrounding the Week of Announcement

<u>Event Week (a)</u>	<u>Average Abnormal Return</u>	<u>Z-Statistic</u>	<u>Cumulative Average Abnormal Return (d), begins in week -52</u>	<u>Percent Nonnegative</u>
-9	0.0108	3.01**	0.1639	0.58**
-8	0.0087	2.52*	0.1725	0.56**
-7	0.0079	2.15*	0.1804	0.52
-6	0.0079	2.06*	0.1883	0.51
-5	-0.0018	-0.62	0.1865	0.42
-4	0.006	1.7	0.1925	0.54*
-3	0.0003	0.3	0.1928	0.46
-2	0.0056	1.5	0.1984	0.53*
-1	0.0104	2.73**	0.2088	0.51
0	0.0088	2.44*	0.2176	0.52
1	0.0088	2.32*	0.2263	0.52
2	0.0012	0.52	0.2275	0.45
3	0.0031	0.78	0.2306	0.49
4	0.0098	2.76**	0.2404	0.52
5	0.0116	2.55*	0.252	0.52
6	-0.0003	-0.31	0.2517	0.48
7	0.0064	2.19*	0.2581	0.48
8	0.0082	1.62	0.2663	0.51

\*Significant at the 0.05 level;\*\*Significant at the 0.01 level; (a) Week relative to the week of listing on the NYSE

The table measures abnormal returns over the event window, 52 weeks prior to the listing event (week 0) and 52 weeks subsequent to it. The cumulative abnormal return registered increases long before the event, and reached its maximum about 8 weeks after the event. In efficient security markets, we would expect the bulk of the increase to occur around the announcement date. The abnormal return pattern indicates a very slow information diffusion process during the 1966 –1970 period. This is no surprise however. During this time period markets were highly inefficient because of lack of technology and the high cost of obtaining and processing information. Hence, a liquidity adjustment took far

longer to impact share prices then, then a similar event would today. But it is precisely this type of lab experiment that one needs to evaluate because going from pink sheet status during the 1966-1970 period is closely akin to a private firm listing on a public market today.

The cumulative abnormal return reaches a maximum of .2663 (26.63%) 8 weeks after the listing announcement, and then tapers of to .2568 (not shown) one year after the event. If we conclude that on average share prices of firms in the sample rose by 25% as a result of moving from the OTC to the NYSE, then this implies a discount of 20%.

The question remains, how much of this share price increase is due to improved liquidity and how much is due to information signaling. To better understand the influence of each determinant, we turn to a paper by Richard Edelman and Kent Baker.<sup>vi</sup> Their study examined market behavior of common stocks transferring from the NASDAQ stock market to the NYSE from 1982 to 1989. Using event study methodology, the authors show that stocks that are characterized by low liquidity (wide bid-asked spreads) and high informational signaling value (expected poor earnings prospects during the pre-listing period) have a cumulative abnormal return of 7% or a discount of 6.5%. Since firms on the NASDAQ that make the transition to the NYSE are likely to be followed by multiple analysts and therefore have low informational signaling value during the pre-listing period, it is more than likely that the price increase is a direct result of greater liquidity. This is further supported by the fact that charters of many mutual and pension funds preclude them from investing in non-NYSE listed stocks. By moving to the NYSE,

firms significantly increase the demand for their stock by the institutional investor community. Hence, one can reasonably conclude that the average 7% price rise is predominately due to greater liquidity during the post listing period. If we assume that moving from pink sheet status to the NASDAQ has the same liquidity benefit that moving from the NASDAQ to the NYSE does, then moving from the OTC to the NYSE amounts to a minimum 14% price appreciation with the remaining 11% (25%-11%) due to information signaling. This 14% translates into a discount of 12.2%. This means that the pure liquidity affect on a minority share of stock traded on the OTC results in a price discount of 12.2% relative to its price if it were trading on the NYSE. Since a minority share of stock of a closely-held firm is more illiquid than a share of an equivalent firm listed on the OTC, the discount applied to the former should be in excess of 12%.

But what should the size of the private firm discount increment be? Put differently, what is the liquidity premium a share would command by moving from closely-held status to “pink sheet” status? Although a precise estimate is not available, a premium of 3% does not appear to be unreasonable. This means that a share of equity trading on the NYSE is likely to be at least 17% more valuable than a share of an equivalent closely-held firm. Alternatively, a minority share of the closely-held firm is, at a minimum likely to sell at a 14.5% discount to its public firm counterpart. The question is how does this compare with other reported results on the size of the liquidity discount.

## ***Studies of the Liquidity Discount***

The most often quoted studies of the liquidity discount include the pre-IPO studies of Emory<sup>vii</sup>, and the restricted studies of Silber<sup>viii</sup> and Hertz and Smith<sup>ix</sup>. Emory consistently reports median discounts that exceed 40%, while simple simulations of Silber's regression model indicate discounts of 35% or more. Hertz and Smith report a coefficient of 13.5 in their regression that can be interpreted as a restricted stock discount due to illiquidity of 13.5%. The first question that arises is why there is so much disparity in the reported results. Let us briefly address this issue.

### **IPO Studies**

Emory's work compares prices of stock transactions occurring within five months prior to the initial stock offering (IPO), that is when the firm was private, to its IPO price. He asserts that the percentage difference between the private transaction price and the IPO price is the discount for lack of marketability. Emory also reports that the longer time between the private transaction and the IPO, the greater the discount.

There are several serious problems with Emory's research design. First, the private transactions are with insiders and are generally not done at arm's length. These prices are often reduced to reflect compensation to insiders. Moreover, the transactions do not represent a cash transaction so the price base to which the IPO price is compared is likely to be too low and the discount too large. Measures of liquidity should be unrelated to

time. Hence, one of the reasons that Emory reports such large discounts is that he does not adjust pre-IPO prices for the time value of money. That is, if a private transaction established a \$10 share price today, all else equal, this same share will be worth more in the future simply because of the time value of money. Hence, at a minimum, the base prices used by Emory should be adjusted upward by the time value factor. This would raise the private transaction price and reduce the size of the reported discount. In short, the results of the various Emory studies are not estimates of discounts for lack of liquidity.

### **What do Private Placement Studies Tell Us?**

Firms that have issued equity in the public security markets, for a variety of reasons, also sell equity in the private placement market. By comparing the private placement issue price to the equity price in the public market, one can measure the private placement discount. Sales to the private market include both securities that are registered and thus have few if any transaction restrictions, as well as restricted securities issued under SEC Rule 144. Rule 144 imposes a two- year holding period before investors can sell their restricted stock, hence restricted private equity, all else equal, is less liquid than private placement equity that do not have these restrictions.

In the liquidity discount literature, it has been assumed that the restricted stock discount emerges due to lack of liquidity. Silber notes that “ companies issuing restricted stock alongside registered securities trading in the open market usually offer a price discount in

the restricted securities to compensate for their relative illiquidity”. However there are other reasons why a restricted stock discount might exist. From the supply side, the purchasers of privately placed securities, including restricted stock, are very often large institutions like life insurance companies and pension funds. These buyers have a long-term investment horizon, and, therefore, place a low value on liquidity. Given their investment preferences, it is not sensible to think they would require a deep discount to purchase stock that would only be illiquid for two years. So if illiquidity is not the primary or even the secondary reason for the discount, then why does it exist at all?

Myers and Majluf<sup>x</sup> research supports the view that the private placement market offers an opportunity for firms to signal that their publicly traded securities are undervalued.

Prices of restricted stock are established through direct negotiation between the issuer and the investor. These negotiations focus on evaluating both public and private information concerning firm prospects. Costs of obtaining and evaluating target firm information, that is often proprietary, are often quite significant and the price concession that emerges is likely to represent compensation to the long-term investor for bearing these costs. This hypothesis suggests that the discount is not due to illiquidity but, rather, represents a return to the investor for the information search investment being made.

Interestingly, Wruck<sup>xi</sup> reports that firms placing equity privately are associated with positive abnormal returns averaging 4.4% around the announcement date. The likely reason for this reaction is that public market participants perceive these firms to be less risky since “expert” private investors with large research budgets would not invest in

these securities unless their review of private and public information supported it. Hence, privately placed equity, while sold at some discount, also positively influences shares of the firm's publicly traded equity.

In their restricted stock study, Hartzel and Smith estimate an econometric model where one of the coefficients is interpreted to be a direct measure of the liquidity discount. The size of this coefficient is 13.5% and it is statistically significant. In an update of this study by Bajaj et al<sup>xii</sup>, the coefficient, while still significant, declined to 7.2%. Despite the fact that many valuation professionals have "globbed" on to these values, Hartzel and Smith are not convinced that the coefficient is a measure of a liquidity discount. They state:

Discounts on restricted shares, though commonly characterized as "liquidity" discounts are unlikely to be due entirely to the two year restriction on resale under SEC Rule 144. Liquidity discounts of such magnitudes would provide strong incentives for firms to register their shares prior to issuing or to commit to quickly register shares after the private sale. Given the substantial resources of institutions that do not value liquidity highly such as life insurance companies and pension funds, it is not obvious that investors would require substantial liquidity discounts just for committing not to resell quickly.

William Silber's restricted study, in contrast to those of Hartzel and Smith and Bajaj, does not estimate the liquidity discount directly. Rather he estimates an econometric model that relates the natural logarithm, LN, of the restricted equity price discount,  $P^r$  (restricted stock price at issue date)/P (exchange-traded price at issue date) to a set of explanatory variables. He then simulates the model under a set of assumptions about the

values of the explanatory variables and obtains various values for the discount. The model estimated by Silber is shown below.

**Table 2**  
Silber Cross-Section Model of Restricted Stock Discount

$\text{LN}(P^f/P) = 4.33 + .036*\text{LN}(\text{REV}) - .142*\text{LN}(\text{RBT}) + .174*\text{DERN} + .332*(\text{DCUST})$ <p style="text-align: center;"> <span style="margin-right: 40px;">(.13)</span> <span style="margin-right: 40px;">(.013)<sup>1</sup></span> <span style="margin-right: 40px;">(.051)<sup>1</sup></span> <span style="margin-right: 40px;">(.108)</span> <span>(.154)<sup>1</sup></span> </p> <p><b>R<sup>2</sup> = .29; Standard Error of Regression = .358; F= 8.1; <sup>1</sup> = coefficient statistically significant; Variable Names:1) REV= firm revenues, 2) RBT = restricted block to total shares outstanding, 3) DERN = dummy variable equal to 1 if earnings are positive, 0 otherwise, 4) DCUST = dummy variable = 1 if there is a customer relationship between the investor and the firm issuing the restricted stock, 0 otherwise.</b></p> <p><b>Time Interval: 1981- 1988; Data: Security Data Corporation: 69 private placements of common stock of publicly traded companies</b></p>
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The coefficients of the explanatory variables are statistically significant from zero, that is, the ratio of each coefficient to its standard error (SE-shown in parentheses) exceeds the critical t-test value of 2 except for the DERN variable, which is slightly lower. The regression model's R<sup>2</sup> indicates the model explains less than the 30% of the variation in the discount. This means that 70% of the variation is not explained by the model. The relatively low explanatory power shows up in the standard errors of the coefficients. Although the coefficients are statistically significant, the "true coefficients lie within very large boundaries around these estimates. This means that the size of any predicted discount from the model can vary quite widely even if a firm's revenue and percent of equity placed is fixed.

To better understand this point, we simulated the Silber model. Following Silber, we assumed that the firm in question generates \$40 million in revenue, has a market



capitalization of \$54 million, is placing restricted stock that amounts to 13% of common stock outstanding, and DERN and DCUST are equal to 1 and 0 respectively. We then assumed that the coefficients on the variables revenue and percent placement of common outstanding vary by plus or minus one standard error (SE) around their respective estimated coefficient values. The results of these simulations are shown in Table 3 below.

**Table 3**

Restricted Stock Discounts Under Varying Assumptions About the Size of Coefficients of the Silber Model

PERCENT RESTRICTED STOCK	REVENUE		
	MEAN -1SE	MEAN	MEAN +1SE
	COEFFICIENT		
MEAN +1SE	22%	18%	14%
MEAN	32%	28%	24%
MEAN-1SE	40%	37%	34%

The results indicate that restricted stock discounts reported by Silber can vary from a low of 14% to a high of 40%. This variation is simply a function of the wide dispersion of the estimated coefficients around their estimated mean values. It stretches credulity to think that an institutional investor considering purchasing 13% of the stock of a firm with a market capitalization of \$54 million would require a discount as high as 40% simply because the stock can not be sold for two years. Moreover, institutional purchasers typically have large and very well diversified portfolios. Purchasing 13% of a \$54 million firm represents a very small part of their overall portfolio. Hence, in relative terms, the

risk is quite small. Moreover, unless the firm issuing the restricted stock is forced to do so, it does not seem sensible that management, knowing the risks faced by institutional investors, would agree to such an arrangement. In short, the Silber results are informative and useful, but they do not measure the price of liquidity.

### ***Is the Liquidity Discount Greater in a Control Transaction?***

Silber's research supports the conclusion that the private placement discount increases with the relative size of the restricted stock placement. While it would be natural to use the model to test what the discount would be for a control transaction, say 51%, such a simulation would not be appropriate if the sample did not include observations that included control transactions.<sup>xiii</sup> Since Silber's sample did not include control transactions, we need to look to other research as a guide to what a liquidity discount might be for a control transaction.

Koeplin et al<sup>xiv</sup>, hereafter referred to as Koeplin, have addressed this question. Koeplin notes:

We further limited the sample to all transactions in which a controlling interest was acquired in the transaction. Next, for each of these transactions, we identified an acquisition of a public company in the same country and the same year and the same industry. ---- For every acquisition of a private company, we attempted to find an acquisition of a publicly traded company in the same four digit SIC code. For 13% of the transactions, the matching firms were not in the same 4 digit SIC code.

Koeplin estimates the private firm discount as  $1 - (\text{private firm target multiple} / \text{public firm target multiple})$ . Table 4 reproduces these results.

Table 4: Estimates of Liquidity Discounts for Control Transactions						
	<u>Private Targets</u>		<u>Public Targets</u>		<u>Discount</u>	
	Mean	Median	Mean	Median	Mean	Median
Panel A: Domestic Transactions						
Enterprise Value/EBIT	11.76	8.58	16.39	12.37	28.26*	30.62*
Enterprise Value/EBITDA	8.08	6.98	10.15	8.53	20.39*	18.14*
Enterprise Value to Book Value	2.35	1.85	2.86	1.73	17.81*	7.00
Enterprise Value to Sales	1.35	1.13	1.32	1.14	-2.28	0.79

The table indicates that private firm discounts are statistically different from zero. The average (median) discounts based on EBIT and EBITDA multiples are 28%(31%) and 20% (18%) respectively. Although the average book value multiple is statistically significant, and in line with the values of the other estimated discounts, the median is very low and not statistically significant. There is no obvious reason for such a disparity. The discounts based on sales multiples are not significant as well. This suggests that, at least for these transactions, revenue differences are not a good indicator of value differences. Nevertheless, Koeplin's results taken as a whole suggest that liquidity discounts associated with control transactions are not likely to exceed 30%. Finally, Koeplin concludes:

One problem with our approach is that the employment contracts for the key managers may be different in an acquisition of a private company

relative to that for a public company. Specifically, the owners of a private company, who are likely to be senior management of the company, may receive part of their compensation in the form of an employment contract. To the extent that these employment contracts entail above-market compensation, the observed private company valuations will be less than the fair market valuations, which should include any excess value associated with these contracts. Therefore, our estimates should be considered as an upper bound on the private company discount.

## ***Summary and Conclusions***

In the private valuation community, the size of the liquidity discount has been debated extensively. Estimates of the size of the discount range from 40% on the high side to 7.2% on the low side. These differences in the main arise from the use of different research designs as well as differing research assumptions made by the investigators. We have taken a different approach, and have tried to synthesize the results that have been produced as well as add additional research intended to anchor the various values that are often used in private valuation settings. Our conclusions can be summed up as follows.

1. Using an event study methodology, the impact of liquidity on value was estimated by measuring the extent to which the share prices of listing firms responded to announcements that they were moving from a quasi-private market environment, like the OTC prior to the establishment of the Nasdaq, to the NYSE. This experiment indicated that after controlling for influences other than the listing announcement, share prices rose by 25% implying a liquidity discount of 20%. Part of this price rise, however, was unrelated to improved liquidity but rather the result of information signaling. When the impact of this effect was removed, we

concluded that the pure liquidity effect on a share of minority stock was approximately 14%.

2. While this result is approximately equal to the 13.5% first reported by Herzel and Smith in their restricted stock study, we suggested that their results are more consistent with the information signaling hypothesis than a measure of illiquidity. The reason is that the purchasers of restricted stock are typically institutional investors that have a long investment horizon, and are not likely to require a 13.5% discount for not being able to sell the stock within a two year window.
3. Liquidity discounts for control shares are likely to be greater than for minority shares. Koeplin's work, taken together, supports the general view that pure liquidity discounts for controlling interests much in excess of 20% do not appear to be reasonable.
4. Although we have not addressed the issue in the body of this paper, our analysis also implies that shares of S corporations are likely to be less liquid than shares of C corporations. When making an S election, the firm is limited to 75 shareholders, and none of which can be institutional investors. By virtue of these constraints, S shares are less liquid than C shares. Therefore, one would expect that when valuing an S corporation, the estimated liquidity discount would necessarily be larger than for an equivalent C corporation. While there is no research that might provide guidance as to what the size of the incremental discount might be, based on the analysis presented here, it does not appear likely that the increment would exceed 5%. Thus, if the sale of a 100% stake in a private C firm commands a

discount of 20%, the liquidity discount for an equivalent S corporation would likely be in the neighborhood of 25%.

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<sup>i</sup> We use the terms liquidity discount and marketability discount interchangeably in this paper as it has been customary to do in this literature.

<sup>ii</sup> Amihud, Yakov and Haim Mendelson, "Asset Pricing and the Bid-Ask Spread", *Journal of Financial Economics*, Vol.17,1986: pp223-249. Also, "The Effects of Beta, Bid-Ask Spread, Residual Risk and Size on Stock Returns", *Journal of Finance*, June 1989, pp. 479-486.

<sup>iii</sup> Amihud, Yakov and Haim Mendelson, "Liquidity and Cost of Capital: Implications for Corporate Management", *The New Corporate Finance, Where Theory Meets Practice*, edited by Donald H. Chew, Jr. (McGraw-Hill, 1993), pp. 117-125.

<sup>iv</sup> Gary C. Sanger and John J. McConnell, "Stock Exchange Listings, Firm Value, and Security Market Efficiency: The Impact of NASDAQ", *The Journal of Financial and Quantitative Analysis*, Volume 21, Issue 1 (March 1986),pp 1-25.

<sup>v</sup> The reason is that observing price behavior of an OTC stock at the time it moves to the NYSE is akin to a private firm today initially listing with a business broker and then subsequently listing on the NYSE. During the period prior to the NASDAQ, there was no electronic posting, no internet, and pink sheet stocks were made available to investors only through the retail broker community. Hence, this research offers an important source of knowledge about the impact of liquidity, or lack thereof, on the prices of minority shares of quasi-private firms.

<sup>vi</sup> Richard B. Edelman and H. Kent Baker, "The Impact of Company Pre-Listing Attributes on the Market Reaction to NYSE Listings", *The Financial Review*, Vol. 28, No. 3, August 1993, pp. 431-448.

<sup>vii</sup> John D. Emory Sr., F.R. Dengell III and John D. Emory Jr., "Discounts for Lack of Marketability, Emory Pre-IPO Discount Studies 1980-2000(As Adjusted October 10, 2002), *Business Valuation Review*, December 2002, pp. 190-193.

<sup>viii</sup> William L. Silber, "Discounts on Restricted Stock: The Impact of Illiquidity on Stock Prices", *Financial Analysts Journal*, July, August 1991, pp. 60-64.

<sup>ix</sup> Michael Hertz and Richard Smith, "Market Discounts and Shareholder Gains for Placing Equity Privately", *The Journal of Finance*, Volume 48, Issue 2 (June 1993), pp.459-485.

<sup>x</sup> S.C. Myers and N.S. Majluf, "Corporate Financing and Investment Decisions When the Firm Has Information that Investors Do Not Have", *Journal of Financial Economics* 13, pp187-221.

<sup>xi</sup> K.H. Wruck, "Equity Ownership Concentration and Firm Value: Evidence from Private Equity Financings", *Journal of Financial Economics*, 23, pp.3-28.

<sup>xii</sup> Mukesh Bajaj, David J. Denis, Stephen P. Ferris, and Atulya Sarin, "Firm Value and Marketability Discounts", *Journal of Law and Economics*, 2002.

<sup>xiii</sup> Regression coefficients are a function of sample characteristics. This means that simulating models under conditions that were not present during the estimation period will result in biased simulation results. In the case of simulating the Silber model under an assumption of a control placement, the simulated discounts would be much too large.

<sup>xiv</sup> John Koeplin, Atulya Sarin, and Alan Shapiro, "The Private Company Discount", *Journal of Applied Corporate Finance*, Volume 12, Number 4, Winter 2000, pp. 94-101.