The Discount for Lack of Marketability in Privately Owned Companies: A Multiples Approach

Article *in* Journal of Business Valuation and Economic Loss Analysis · January 2010

DOI: 10.2202/1932-9156.1089 · Source: RePEc

2 authors:

John Paglia
Pepperdine University
12 PUBLICATIONS **47** CITATIONS

SEE PROFILE

Maretno A. Harjoto
Pepperdine University
59 PUBLICATIONS **1,841** CITATIONS

SEE PROFILE

The Discount for Lack of Marketability in Privately Owned Companies: A Multiples Approach

Maretno Agus Harjoto
Assistant Professor of Finance
Pepperdine University

and

John K. Paglia
Associate Professor of Finance
Pepperdine University

Department of Finance
The Graziadio School of Business and Management
Pepperdine University
24255 Pacific Coast Highway
Malibu, CA 90263
310.506.7352
805.497.2689
E-mail: Maretno.harjoto@pepperdine.edu
E-mail: John.paglia@pepperdine.edu

The Discount for Lack of Marketability in Privately Owned Companies: A Multiples Approach

Abstract

This study investigates a liquidity discount, also known as the discount for lack of marketability (DLOM) for private firms. By matching private company transaction values with publicly traded company valuations, we find discounts that were nearly 70% in some sectors of the economy. This is significantly larger than the DLOM findings estimated from restricted stock, IPO, and acquisition studies. This study also finds that professional services tend to have higher DLOMs (66% to 68%) while the healthcare sector has lower DLOMs (30% to 41%). Larger size (net sales) and more profitable private firms have lower DLOMs. When the buyers of private companies are public companies, the DLOM is lower by about 17% to 18%. Private firms with positive net profits also have lower DLOMs.

Keywords: discount for lack of marketability, private company discount, liquidity discount, MVIC, market multiples

JEL Classifications: G10; G23; G24

The Discount for Lack of Marketability in Privately Owned Companies: A Multiples Approach

I. Introduction

Privately-held businesses account for more than 90% of all businesses in the United States. Valuation of these businesses poses certain challenges since they have no publicly traded stocks or bonds from which to obtain an indication of market value. Furthermore, the lack of the ability to buy and sell equity quickly contributes to certain valuation adjustments. One particular adjustment-- the discount for lack of marketability-- can have a significant influence on the value of the business.

The two major strands of literature on this topic --Restricted Stock and IPO-- address this discount but do so with a focus on public companies. Other literature addresses acquisition approaches, which frequently are contaminated with strategic value components. Our research makes direct comparisons between publicly traded companies and privately held firms from 1994 to 2008 and identifies discounts for lack of marketability in privately held companies. Our dataset, which consists of 431 matched pair observations, provides a comprehensive and direct investigation into the discounts for private companies on a controlling interest basis using the most recent data.

Specifically, we measure the discounts for lack of marketability (DLOM) by comparing the ratios of market value of invested capital (MVIC) to sales and also to earnings before interest, taxes, depreciation and amortization (EBITDA). We do this by comparing a private firm with a matched pair of a publicly traded firm. We provide evidence on the magnitudes of discounts for lack of marketability and also observe that they vary over time and across different

sectors. Furthermore, we identify several factors that explain the size of these observed discounts.

The paper is organized as the following. The next section II summarizes current methods of evaluating DLOM from existing studies. Section III describes sample selection process, matching, and methodology of research that is used in this study. It also lays out our a priori hypotheses of factors that may influence the discounts. Section IV discusses our sample, univariate test, trend and variation of DLOM across sector aggregates and regression results. And section V concludes the main findings of this study.

II. Current Approaches to Determine the Discount for Lack of Marketability

Several approaches have been used to help identify the size of a marketability discount for private companies. Two major bodies of literature include initial public offerings (IPOs) and restricted stock studies (RSOs). Additionally, other approaches, such as using acquisition multiples and options analysis, have gained some traction. We provide a background on each below.

A. Restricted Stock Studies

Restricted stock is the term frequently used for the stock of a publicly traded company that is restricted under rule 144 of the Securities Act of 1933. Rule 144 prevents the resale of unregistered stock in the public marketplace unless it has been registered, or after a holding period, which is currently one year. These studies are based upon comparing share prices of two claims on the same underlying asset, where one claim is marketable and the other is not.

Restricted stock studies have gained wide acceptance with practitioners and tax courts alike. In 1977, the IRS issued revenue ruling 77-287, which recognized restricted stock studies as empirical evidence for quantifying lack of marketability discounts. The Courts continue to rely on restricted stock studies today.

Pratt (2008) identifies twelve different restricted stock studies spanning the late 1960s through 1998,, which indicate a lack of marketability discount range from 13.0% to 45.0%. The discount has narrowed in recent years, with the most recent study indicating a 13.0% discount, which is reflective of the change from a two-year to a one-year waiting period for resale under Rule 144A. Silber (1991) found that the size of the price discount tended to be higher for private placements that were larger as a percentage of the shares outstanding. Other studies identified general firm and industry characteristics as influential to the size of the discount (Trout 1972, Moroney 1973, and others).

Summary of Restricted Stock Studies

Empirical Study	Years Covered in Study	Number of Transactions	Average Price Discount (%)
SEC overall average (a)	1966-1969	398	25.8
SEC nonreporting OTC companies (a)	1966-1969		32.6
Gelman (b)	1968-1970	89	33.0
Trout (c)	1968-1972	60	33.5
Moroney (d)	N/A	148	35.6
Maher (e)	1969-1973	33	35.4
Standard Research Consultants (f)	1978-1982	28	45.0
Willamette Management Associates (g)	1981-1984		31.2
Silber (h)	1981-1988	69	33.8
Management Planning, Inc. (i)	1980-1996	53	27.1
FMV Opinions, Inc. (j)	1980-1997	230	22.3
Bruce Johnson (k)	1991-1995	70	20.0
Columbia Financial Advisors (l)	Jan 1996-April 1997	23	21.0

a. "Discounts Involved in Purchases of Common Stock (1966-1969)," *Institutional Investor Study Report of the Securities and Exchange Commission*, H.R. Doc. No. 64, Part 5, 92nd Congress, 1st Session, 1971, pp. 2444-56.
b. Gelman, Milton, "An Economist-Financial Analyst's Approach to Valuing Stock in a Closely Held Company," *Journal of Taxation*, June 1972, p. 353.
c. Trout, Robert R., "Estimation of the Discount Associated with the Transfer of Restricted Securities," *Taxes*, June 1977, pp. 381-85.
d. Moroney, Robert E., "Most Courts Overvalue Closely Held Stocks," *Taxes*, March 1973, pp. 144-55
e. Maher, J. Michael, "Discounts for Lack of Marketability for Closely Held Business Interests," *Taxes*, September 1976, pp. 562-71.
f. Pittock, William F., and Charles H. Stryker, "Revenue Ruling 77-276 Revisited," *SRC Quarterly Reports*, Spring 1983, pp. 1-3.
g. Willamette Management Associates study (unpublished)
h. Silber, William L., "Discounts on Restricted Stock: The Impact of Illiquidity on Stock Prices," *Financial Analysts Journal*, July-August 1991, pp. 60-64
i. Oliver, Robert P., and Roy H. Meyers, "Discounts Seen in Private Placements of Restricted Stock: The Management Planning, Inc., Long-Term Study (1980-1996)" (Chapter 5) in Robert F. Reilly and Robert P. Schweihs, eds. *The Handbook of Advanced Business Valuation* (New York: McGraw-Hill, 2000).
j. Espen, Robak, and Lance S. Hall, "Bringing Sanity to Marketability Discounts: A New Data Source."
k. Johnson, Bruce, "Restricted Stock Discounts: 1991-95," *Shannon Pratt's Business Valuation Update* (March 1999): 1-3; and "Quantitative Support for Discounts for Lack of Marketability," *Business Valuation Review* (Dec. 1999): 152-155.
l. Aschwald, Kathryn F., "Restricted stock discounts decline as result of 1-year holding period," *Shannon Pratt's Business Valuation Update* (May 2000): 1-5

Source: Pratt, Reilly and Schweihs, *Valuing a Business,* Fourth Edition (New York: McGraw-Hill, 2000), p. 404, updated from *Shannon Pratt's Business Valuation Update*

Bajaj et al (2001) also uses restricted stock to perform a liquidity analysis and concludes that the discount is estimated to be 7.23%. The underlying premise of the Bajaj paper is that if private placements of registered stock sell at a discount from the public price it must be for reasons other than lack of marketability since registered stock can be sold in the public marketplace. Bajaj assumes however that registered stock is liquid and ignores the impact of the Rule 144 dribble-out provision.

Restricted stock studies exhibit some drawbacks, however. The restricted stock studies utilize relatively small sample sizes with most studies using fewer than 100 observations. This limited sample makes specific industry analysis challenging. Restricted Stock Studies may also include compensation for futures services, such as providing capital in the future or advisory services. Hertzel and Smith (1993) indicate that private placements are often undertaken by firms with limited tangible assets, engaged in speculative development of new products or in financial distress. These factors may bear on the amount of the discount. Additionally, it is unknown if these discounts, which are derived upon publicly traded company securities, apply to privately held companies.

B. Initial Public Offering Studies

Initial Public Offering Studies (IPO) compare share prices of firms following IPO to transaction prices in those same shares prior to the IPO. The idea behind IPO studies is that a lack of marketability discount can be calculated by comparing the trading prices prior to the initial public offering to share prices following the IPO. Companies that are going public disclose the three years of prior stock transactions. These prices are then compared to the IPO price and a discount is calculated. IPO studies are not without their drawbacks, however. These studies suffer from relatively small sample sizes and lack of information about the transaction parties, which may be related. Plus, the operating and financial characteristics of the company may change over the three year window prior to going public. Finally it is unknown if the results of this study are applicable to typical private companies as a selection bias exists.

Emory (1997) has extensively examined discounts based upon IPOs from 1980-2000 and reports a median discount of 47% with a low of 13% based upon a 1991-1993 study and a high of 68% based upon a 1980-1981 study.

A summary of Emory's nine studies are below.

Emory – Pre-IPO Studies

Discounts for Lack of Marketability

Study	Number of IPO Prospectuses Reviewed	Number of Qualifying Transactions	Mean Discounts %	Median Discounts %
1995-1997	732	91	43	42
1994-1995	318	46	45	45
1991-1993	443	54	45	44
1990-1992	266	35	42	40
1989-1990	157	23	45	40
1987-1989	98	27	45	45
1985-1986	130	21	43	43
1980-1981	97	13	60	66
All 8 Studies	2241	310	44%	43%

Source: John D. Emory, "The Value of Marketability as Illustrated in Initial Public Offerings of Common Stock (Eighth in a Series) November 1995 through April 1997," *Business Valuation Review*, vol. 16, no.3 (September 1997): 125, © 1997, American Society of Appraisers; John D. Emory Sr., F.R. Dengel, III and John D. Emory Jr.

C. Acquisition Multiples

Another group of literature (Koeplin et al (2000) and Block (2007)) addresses the discount for lack of marketability by comparing private and public company acquisitions. They base their study on a valuation multiplier approach in which they compare the ratio of enterprise value/EBIT among private and public companies to see if there is a discount. They examine 84 domestic transactions from 1984-1998 and identify the highest valuation discounts based upon

earnings related measures (EBIT of 30.62% and EBITDA of 18.14%) and lower for book value of -7.00% and sales of 0.79%. Their analysis is based upon a matched pair analysis in which the transaction is matched by year and industry.

Block (2007) extends the Koplin analysis to the time period from 1999-2006. Block breaks down his 91 transactions into 8 different industries and includes financial institutions and regulated utilities. He reports discounts of between 14.47 based upon Enterprise Value to Book Value and 24.49 based upon Enterprise Value to Revenue.

One major drawback of the acquisition multiples approach is the lack of sample sizes. In both the Koeplin and Block studies, sample sizes were under 100, which make it difficult to find a good match pair for acquisitions. In fact, Block reports the average sales for private firms of $205 million versus $867 million for public firms. Medians were better, which were $61 million for private versus $105 million for public firms. Furthermore it is unknown if any of the transactions included strategic components.

D. Options Studies

Other studies that have been proposed include Longstaff (1995), who proposes a model based upon lookback options that may be used to value the upper bound of the discount for lack of marketability. This study only provides an upper bound, however, and is based upon an unrealistic assumption that they hypothetical investor has perfect market timing ability. Bruner and Palacios (2004) explore the value of control and marketability right to explain the discounts for non-marketability using options and simulation. They find that control effect dominates the marketability effect to explain the discounts.

This study measure the discount for lack of marketability (DLOM) by comparing the ratio of market value of invested capital over its annual sales or EBITDA from a sale of a private firm with a matching public firm. By directly comparing the sale of private firms with current market value of invested capital for public firm within the same six digit NAICS, year, and comparable annual sales, we provide a cleaner measure of DLOM with less limitation to find a match pair of public firm for each private firm. Additionally, this study explains the factors that influence the DLOM based on firm's financial characteristics such as profit margin and sales, deal characteristics, such as buyer type, transaction type, and organization type (C corp, S corp, etc.).

III. Data and Methodology

A. Sample Selection Process

The sample of private firms and their financial data are collected from the Pratt's Stats database at Business Valuation Resources, LLC. Pratt's Stats compiles a database of private firms that are sold privately with deal sizes ranging from below $1 million to $16.6 billion from 1990 to present. We limit our focus on the private firms during 1994 to 2008 with annual net sales of $50 million or larger and we exclude utilities and other services firms. Our focus on companies with greater than $50 million in sales is interesting because these companies are potential candidates for being publicly traded. Therefore we are able to better isolate the "public" versus "private" valuation discount.

We collect our matching publicly traded firms from Compustat database. Our match pair criteria are based on six digits of North America Industry Classification System (NAICS), year, and annual net sales. We lag our public firms data by one year after the year of sale date of

private firms since financial data for private firms is usually lagged by one year as of the sale date. Furthermore, the time it takes to list and sell a private business averages between six and nine months. We require our matching public firms to remain listed on a stock exchange for at least three years after the matching year. Finally, we restrict our sample based on the size of discount for lack of marketability (see equations (1) and (2) in Methodology and Hypothesis) between 0 to less than 100 percent. Our final sample consists of 431 matched pair firms. Table 1 summarizes the means and medians (below the means) of our sample.

B. Methodology and Hypothesis

This study measures the discount for lack of marketability (DLOM) based on two market multiples: market value of invested capital (MVIC) over annual sales (MVIC/Sale) and MVIC over annual earnings before interest, taxes, depreciation and amortization (MVIC/EBITDA). Pratt' Stats records information of MVIC price based on the sales data for the private firms. We compute MVIC for matching public firms from Compustat as the sum of market value of equity (total common shares outstanding [CSHO] multiplied by fiscal year stock price [PRCCF]) plus book value of long term debt [DLTT] and book value of preferred stock [PSTK].

The following are two methods that we used to compute DLOM based on 431 match pair sample:

$$DLOMSALE(\%)=[1-(MVIC/Sale\ for\ private\ firm)/(MVIC/Sale\ for\ public\ firm)]x100 \quad (1)$$

$$DLOMEBITDA(\%)=[1-(MVIC/EBITDA\ for\ private\ firm)/(MVIC/EBITDA\ for\ public\ firm)]x100 \quad (2)$$

This study analyzes trend and variation of DLOM from these two measures across different sectors based on the two digits of NAICS consistent with the Bureau of Labor and Statistics standard for sector aggregation. Figure 1A indicates that there are outliers for DLOMSALE (and DLOMEBITDA). DLOM computed from equations (1) and (2) must fall between 0 to less than 100%. Therefore, we truncate our sample to 431 firms for DLOMSALE and 283 firms for DLOMEBITDA from an initial sample of 729 private firms. Figure 1B shows DLOMSALE distribution after a truncation.

We investigate further by examining factors that influence the DLOM using a multivariate regression analysis. Our empirical model is stated as the following:

$$DLOM(\%) = a + b_0(LOGSALE) + b_1(EBITDA/SALE) + b_2(POSITIVE\ INCOME) + b_3(PUBLIC\ BUYER) + b_4(ASSET\ PURCHASE) + b_5(CCORP) + Sector\ Dummy + Year\ Dummy + error \quad (3)$$

The estimation of empirical model in equation (3) is done using ordinary least square (OLS) with White heteroskedasticity correction and median regression. The median regression is used to check the robustness of the results from OLS since the sample is skewed with the existence of a few large firms.

The hypotheses from this regression model are:

1. Larger (indicated by net sales) and more profitable (EBITDA over sale) private firms have lower discounts.
2. Private firms with positive profits have lower discount

3. Private firms that are bought out by public firms have lower discount compared to those that are bought by private firms since public firms are more likely to pay synergies in strategic acquisitions.
4. Asset purchase has lower discount relative to stock purchase since legal risk and built-in gains tax considerations are reduced.
5. Private firms with C corporation status have higher discount relative to S corporation, LLC, LLP, etc. due to double taxation versus pass through entities.

IV. Empirical Findings

A. Descriptive Statistics

Table 1 provides sample statistics and univariate test of means and medians between private firms and matching public firms. The means of net sales for public and private firms are $189 million and $163 million with median $55 million and $52 million respectively. Since we utilize net sales as our matching criteria, naturally the net sales for private firms are not significantly different from their matching public firms. We find that matching public firms have higher total assets, gross profit, EBITDA, and book value of invested capital (BVIC) compared to private firms.

Examining the means and medians of market multiples, we find that all measures of market multiples (MVIC/Sale, MVIC/Gross profit etc.) for private firms are significantly lower than market multiples for public firms. This indicates the existence of market value discount for private firms relative to market value of public firms. Applying the formula of discount for lack of marketability from equations (1) and (2) on these multiples, we find that DLOMSALE is 75% (68% in median) and DLOMEBITDA is 50% (25% in median). These DLOMs are significantly

larger than previous studies in restricted stock, IPO and acquisitions multiples studies summarized in section II.

The means and medians of profit margins measures for private firms are generally more profitable than matching public firms (except the median of gross profit to sales). For instance, the median net income to net sales for private firms is 4.5% while the median net income to sale for public firms is only 2.5%. We find that these private firms are more profitable than their counterpart public firms.

Next, we explore the trend of DLOMSALE and DLOMEBITDA across the time period of our sample. We compare the means of two measures of DLOM with Small Cap Stock Index of Russell 2000 during the same period. Figure 2 presents this comparison. We find that DLOMSALE and DLOMEBITDA tend to move in the opposite direction of the Russell 2000 Index up to 2001. This finding is intuitive since the market for (large) private firms corresponds to the stock market for public firms with small market capitalization[1]. These large private firms could have chosen to go public instead of being sold privately. After 2001, the DLOM measures tend to remain constant (50% to 60%, except for 2008) while the Russell 2000 Index started to decline.

To examine the DLOM across different industries, we summarize two measures of DLOM across 14 different sector aggregations. Table 2 presents the means of DLOM across different sectors. Manufacturing (two digits NAICS 31) represents the largest group and art and entertainment (NAICS 71) represents the smallest group in our sample. Healthcare, mining and manufacturing have lower DLOM measured by DLOMSALE while retail trade, finance and staff support & waste management have higher DLOM. DLOM measured by DLOMEBITDA (profit)

[1] We choose our private firms sample with annual sales $50 million or larger. Practically, these large firms have a choice to go public instead of being sold through private transactions.

indicates that art & entertainment, healthcare and transportation have lower DLOM while food service, professional service and information technology have higher DLOM. In general, healthcare consistently has lower DLOMs while professional service has higher DLOMs. This examination of DLOM across different sectors has never been examined by current existing literature.

B. Regression Results

In order to examine factors that influence the DLOM, we conduct a regression analysis based on empirical model stated in equation (3). First, we estimate our model using the OLS method and Table 3 presents the results. We control for the firm characteristics based on size using the natural log of net sales (LOGSALE) and profit margin using EBITDA over net sale (EBITDA/SALE). We run the regression with and without controlling for structural differences across different sectors and different time periods. In this regression, we empirically test five hypotheses stated in section III.B. Results from the DLOMSALE indicate that DLOM is lower for firms with higher profit margin (EBITDA/SALE) which partially supports our first hypothesis. One unit increase in EBITDA/SALE reduces the DLOMSALE by approximately 20% (both with and without controlling for sector and time variations). We also find a support to our third hypothesis that public buyers pay 14% to 15% less discount compared to private buyers, but the impact of public buyers is only statistically significant at 10% level.

When we examine the DLOMEBITDA, we find stronger support to our first, second and third hypotheses. Larger and more profitable private firms have lower DLOMEBITDA. One percentage increase in net sales reduces DLOMEBITDA by 4% to 5% and higher EBITDA/SALE reduces DLOMEBITDA by 2%. Private firms with positive net income have

lower DLOMEBITDA by 14%, while private firms with public buyers have 33% to 38% lower DLOMEBITDA. We do not find evidence that transaction type (asset purchase as opposed to stock purchase) and type of organization (C corporation, S corporation, LLC etc.) influence our two measures of DLOM.

Investigating the difference of DLOMSALE across different year (slopes of year dummies, not reported on Table 3), we find that DLOM for 1997, 1998, 1999, 2000 and 2001 are significantly higher than earlier period. Based on Figure 2, these periods also represent declining period for Small Cap stock market index (Russell 2000). Therefore, this result is consistent with our earlier finding from Figure 2. If stock market for firms with smaller market capitalization decreases, the DLOM for private firm increases. We find DLOMEBITDA for professional service and accommodation and food service (service industry) are 24% larger while DLOMEBITDA for art and entertainment is 21% smaller than mining[2].

As shown in Table 1, the sample means of assets, profits, and market multiples are skewed to the right since there are a few large firms but mostly are smaller firms. When the data are skewed, OLS results tend to have larger standard errors and therefore the OLS results are less efficient. For robustness test, we conduct a median (quantile) regression (Koenker and Hallock, 2001). Table 4 presents the results from median regression and we find similar results as Table 3. DLOMSALE decreases by 21% to 24% as profit margin of private firms (EBITDA/SALE) increases by one unit. DLOMSALE also decreases by 17% to 18% if it is a public buyer. DLOMEBITDA loses some statistical significance, but after controlling for year and sector dummy variables, the results are stronger compared to OLS. The slope coefficients from median

[2] Estimated slope coefficients for year and sector dummies are not reported to conserve space and available upon request.

regression are comparable to OLS results. Therefore, we believe that our results are robust and unaffected by the skewness of our sample.

Overall regression results indicate supporting evidence for our hypotheses 1,2, and 3 that private firms with larger size, higher profit margin, positive profit, and sold to public buyers have significantly lower discounts. We do not find evidence that transaction and organization types influence the discounts.

V. Conclusion

Valuing private firms are important since a significant amount businesses are privately held firms. The main issue of valuing private companies is how to adjust some value indications for a lack of marketability. Standard business practice is to apply a discount from a sample of public firms in certain transactions such as restricted stocks, initial public offerings or acquisitions. However, there is a lack of studies that provide guidance on how much discount should be applied to private firms compared to public firms by directly examining public versus private firms. Most studies have limited sample sizes since it is harder to find matching firms if we conduct our comparison based on restricted stock, initial public offering or acquisition transactions of private firms versus public firms. This study examines the discount for lack of marketability (DLOM) by comparing private firms from Pratt's Stats transactions with public firms from Compustat based on their NAICS and net sales during 1994 to 2008.

The main contribution of this study is threefold. First, it provides a direct comparison of market value of invested capital (MVIC) between private firms and public firms independent of the event of transactions using MVIC multiples. Second, it provides guidance on the magnitudes of DLOM across different sector aggregates, across different time and how it relates to the trend

of stock market for firms with small market capitalization. Third, it presents the factors that influence the magnitude of DLOM.

This study finds that DLOMs, measured by MVIC/Sale and MVIC/EBITDA, are up to 75% and significantly larger than findings from existing studies. DLOM was related with the movement of stock market for firms with small market capitalization, but has become stable in recent years. We also find that DLOMs varies across sector aggregates with the most discount occurs in professional services and the least discount in healthcare sector. Last but not least, we find that larger, more profitable firms have lower DLOMs and firms with positive net income and those bought by publicly traded buyers receive less discount as well.

References

Bruner, R. and M. Palacios, 2004, “Valuing Control and Marketability,” Batten Institute Working Paper, University of Virginia.

Emory, John, 1997, “The Value of Marketability as Illustrated in Initial Public Offerings of Common Stock, *Business Valuation Review*, Vol.16, No.3, Sept.1997

Johnson, B., 1999, "Quantitative Support for Discounts for Lack of Marketability," *Business Valuation Review* 18 (No. 6, December),
152-155.

Koenker, R and K. Hallock, 2001, “Quantile Regression,” *Journal of Economic Perspectives* 15 (No. 4, Fall), 143-156.

Koeplin, J., A. Sarin, and A. Shapiro, 2000, "The Private Company Discount," *Journal of Applied Corporate Finance* 12 (No. 4, Winter), 94-101.

Maher, M.J., 1976, "Discounts for Lack of Marketability for Closely Held Business Interests," *Taxes* 55 (No. 2, June), 562-571.

Moroney, R., 1973, "Most Courts Overvalue Closely Held Stocks," *Taxes {March)*, 144-155.

Pearson, B.K., 2000, "Marketability Discounts as Reflected in Initial Public Offerings," *CPA Expert* 10 (No. 1, Spring), 1-6.

Pratt, S.P., 2001, *Business Valuation Discounts and Premiums*, New York, NY, John Wiley & Sons.

Pratt, S.P, R.F Reilly, and R.P. Schweits, 2000, *Valuing a Business: The Analysis and Appraisal of Closely Held Companies*, 4" Ed., New York, NY, McGraw-Hill.

Silber, W.L., 1991, "Discounts of Restricted Stock: The Impact of Illiquidity on Stock Price," *Financial Analysts Journal* 47 (No. 4, July-August), 60-64.

Trout, R.R., 1977, "Estimation of the Discount Associated with the Transfer of Restricted Securities," *Taxes* 55 (No. 2, June), 381-385.

Wruck, K.H., 1989, "Equity Ownership Concentration and Firm Value: Evidence from Private Equity Financings," *Journal of Financial Economics* 23 (No. I, June), 3-28.

Emory, J.D., 1997, "The Value of Marketability as Illustrated in Initial Public Offerings of Common Stock," *Business Valuation Review* 16 (No. 3, September), 123-131.

Feldman, S.F., 2005, *Principles of Private Firm Valuation*, Hoboken, NJ, John Wiley & Sons.

Gelman, M., 1972, "An Economist-Financial Analyst's Approach to Valuing Stock of a Closely Held Company," *Journal of Taxation* 81 (No. 6, June), 353-354.

Hertzel, M. and R.L. Smith, 1993, "Market Discounts and Shareholder Gains for Placing Equity Privately," *Journal of Finance* 48 (No. 2, June), 459-485.

Figure 1A. Frequency distribution for DLOMSALE prior to truncation

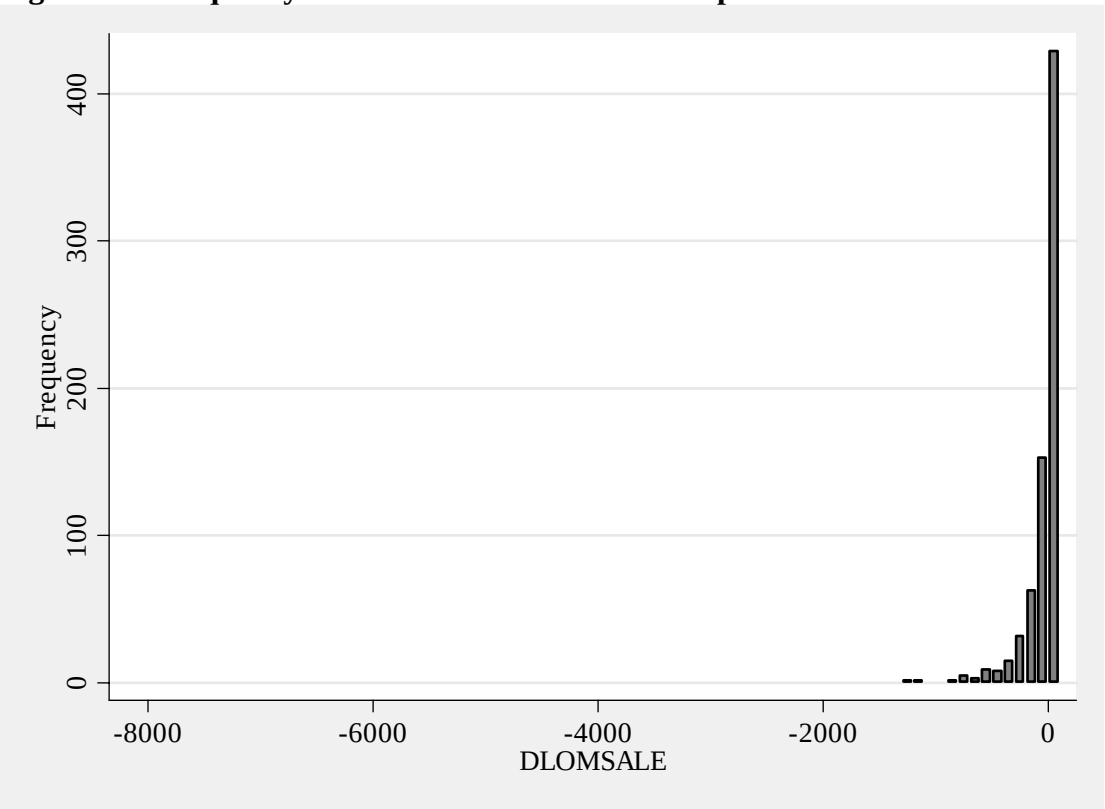


Figure 1B. Frequency distribution for DLOMSALE after truncation

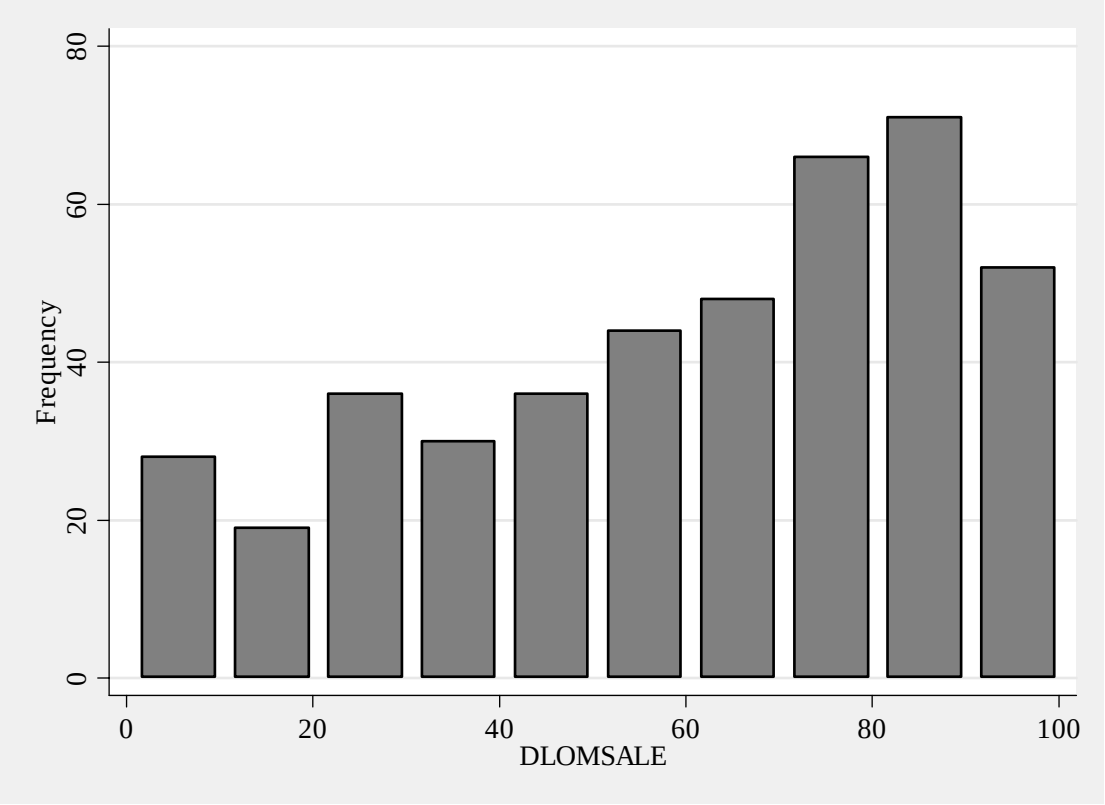
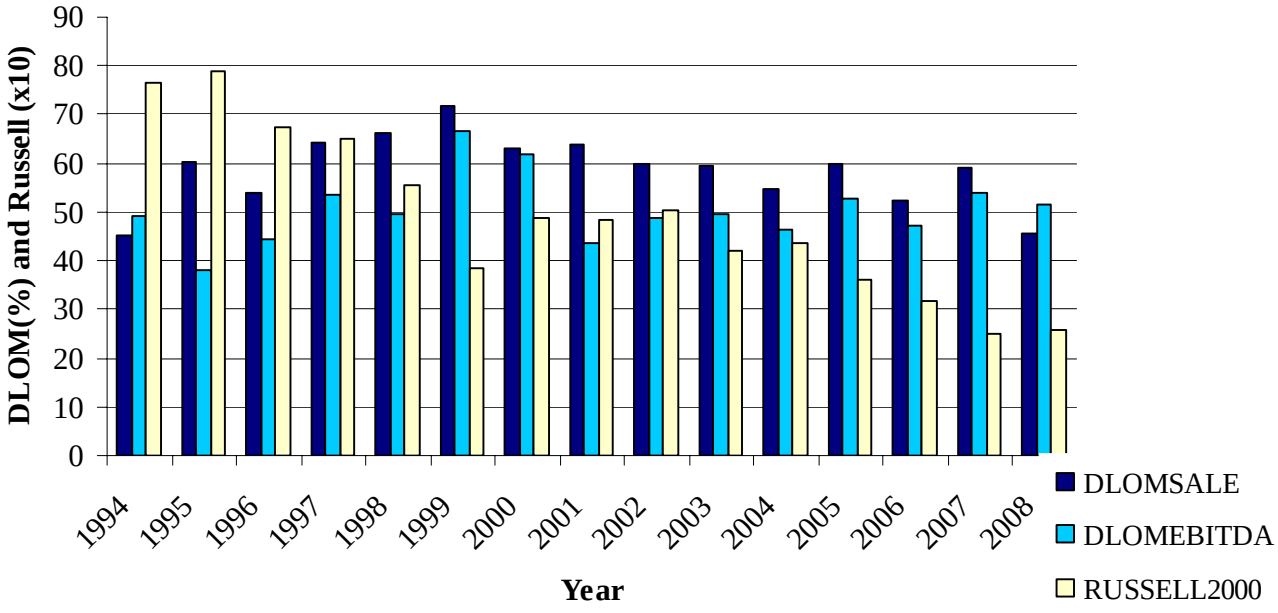


Figure 2. DLOM and Russell 2000 Index



Note:
DLOM is measured by DLOMSALE (equation 1) and DLOMEBITDA (equation 2) and stated in a percentage term.
Russell 2000 Index in this figure is rescaled by dividing the actual value of Russell 2000 Index by 10.

Table 1. Descriptive Statistics

This table presents sample statistics for public firms (Compustat firms) and private firms (Pratt's Stats firms) during 1994 to 2008. Gross profit is measured as the net sales minus cost of good sold. EBITDA is measured as net sales minus cost of good sold and selling and general administrative expense but before depreciation and amortization expense. BVIC (book value of invested capital) is measured as the total assets minus current liabilities. MVIC is measured as the MVIC price for private firms and market value of equity plus book value of debt and book value of preferred stock for public firms. MVIC/Sale is MVIC over Net Sales, MVIC/Gross profit is MVIC over gross profit etc. Gross profit to Sales is gross profit over net sales, EBITDA to Sales is EBITDA over net sales etc. ROA is net income over total asset and ROE is net income over total equity. ***, ** and * indicate statistical significant at 1%, 5% and 10%. The medians are presented below the means and rank test (z-test) is also reported below the t-test for means.

Variables	Public Firms	Private Firms	t-test (z-test)
Net Sales ($ million)	189.426	163.101	0.668
	55.494	52.011	0.793
Total Asset ($ million)	349.225	151.542	2.112**
	80.644	29.878	10.520***
Gross Profit ($ million)	63.621	68.910	-0.316
	24.335	17.037	2.759***
EBITDA ($ million)	28.585	8.785	4.467***
	7.074	3.643	4.550***
BVIC ($ million)	197.937	91.838	3.171***
	58.136	15.537	12.323***
MVIC ($ million)	493.440	140.164	5.426***
	147.337	42.000	12.882***
MVIC/Sale	4.685	1.161	6.487***
	2.381	0.761	15.503***
MVIC/Gross profit	7.807	3.062	2.375**
	4.951	2.373	11.360***
MVIC/EBITDA	6.099	3.056	5.085***
	9.811	7.399	3.688***
MVIC/BVIC	3.954	1.910	3.916***
	2.222	1.309	7.984***
Gross profit to Sales	0.418	0.430	-0.5753
	0.412	0.363	1.908*
EBITDA to Sales	0.074	0.067	0.0264
	0.120	0.168	-0.674
Net Income to Sales	-0.056	0.002	-2.105**
	0.025	0.045	-2.187**
ROA	-0.003	0.033	-1.692*
	0.042	0.045	-2.019**
ROE	-0.110	0.267	-1.818*
	0.079	0.169	-6.070***
Number of firms	431	431	

Table 2. Market Values (MVICs) and Degree of Lack of Marketability across Sectors

This table presents the variability of DLOM (measured by DLOMSALE and DLOMEBITDA) across 16 different sector aggregations defined by the Bureau of Labor and Statistics. DLOMSALE and DLOMEBITDA are calculated based on equations (1) and (2) and stated in a percentage. This table excludes Utility and Other Services sectors. Sample size for DLOMEBITDA decreases to 283 match pair firms due to a truncation of DLOMEBITDA must be between 0 to less than 100 percent.

Sectors	2 digits NAICS	Firms	DLOMSALE	Firms	DLOMEBITDA
Mining	21	20	55.24	14	47.96
Construction	23	14	65.46	12	53.14
Manufacturing	31	163	55.40	91	49.63
Wholesale trade	42	22	60.93	20	42.44
Retail trade	44	17	70.82	16	44.45
Transportation	48	9	57.54	9	28.99
Information	51	63	57.19	47	60.15
Finance and Insurance	52	22	70.02	13	48.08
Real Estate	53	5	65.51	6	53.13
Professional services	54	63	66.31	36	67.66
Staff support & Waste management	56	13	66.91	6	34.21
Healthcare	62	9	40.68	6	29.25
Art and Entertainment	71	2	60.25	2	17.93
Accommodation and Food services	72	9	58.89	5	68.47
Number of firms		431		283	

Table 3. OLS regression analysis for DLOM

This table presents OLS regression results for DLOM, measured by DLOMSALE and DLOMEBITDA. LOGSALE is the natural log of net sales (net sales is stated in million). EBITDA/SALE is EBITDA over net sales. Positive income is an indicator variable takes a value of one if private firms have positive net income and zero otherwise. Public buyer is an indicator variable takes a value of one if the buyer of private firm is publicly traded company and zero otherwise. Asset purchase is an indicator variable takes a value of one if the transaction type is acquiring the assets instead of equity. Ccorp is also an indicator variables that takes on a value of one if private firm organizational type is C corporation and zero if organizational type is S corp, LLP, LLC, etc. Estimated slope coefficients for Year and Sector dummy variables are not reported to conserve space. ***, ** and * indicate statistical significant at 1%, 5% and 10%.

	DLOMSALE (%)	DLOMSALE (%)	DLOMEBITDA (%)	DLOMEBITDA (%)
LOGSALE	-0.605	-0.620	-4.970	-4.055
	(0.56)	(0.53)	(3.60)***	(2.43)**
EBITDA/SALE	-19.452	-20.465	-2.312	-2.065
	(2.56)**	(2.40)**	(2.10)**	(1.67)*
POSITIVE INCOME	0.839	-1.976	-13.832	-13.985
	(0.26)	(0.60)	(2.72)***	(2.56)**
PUBLIC BUYER	-13.488	-14.699	-38.277	-32.773
	(1.80)*	(1.81)*	(11.01)***	(5.34)***
ASSET PURCHASE	-0.005	-0.360	0.178	2.045
	(0.00)	(0.12)	(0.05)	(0.47)
CCORP	-1.423	-2.254	4.572	5.476
	(0.52)	(0.77)	(1.30)	(1.41)
INTERCEPT	76.899	58.702	88.266	96.967
	(8.76)***	(3.14)***	(14.98)***	(6.28)***
Year & Sector Dummies	No	Yes	No	Yes
Firms	431	431	283	283
R-squared	0.0257	0.1170	0.1372	0.2588

Table 4. Median regression for DLOM

This table presents median regression results for DLOM, measured by DLOMSALE and DLOMEBITDA. All variables are the same as Table 3. ***, ** and * indicate statistical significant at 1%, 5% and 10%.

	DLOMSALE (%)	DLOMSALE (%)	DLOMEBITDA (%)	DLOMEBITDA (%)
LOGSALE	-1.906	-1.705	-6.480	-5.759
	(0.90)	(1.09)	(2.38)**	(8.42)***
EBITDA/SALE	-24.490	-20.612	-2.131	-1.868
	(1.76)*	(2.12)**	(1.29)	(4.26)***
POSITIVE INCOME	1.489	0.669	-7.238	-11.269
	(0.24)	(0.16)	(0.80)	(5.35)***
PUBLIC BUYER	-16.966	-18.423	-41.621	-30.887
	(1.84)*	(1.87)*	(2.48)**	(7.31)***
ASSET PURCHASE	-0.432	-1.843	-3.151	0.203
	(0.08)	(0.48)	(0.43)	(0.12)
CCORP	-4.990	-1.992	2.061	7.195
	(0.95)	(0.55)	(0.31)	(4.78)**
INTERCEPT	92.213	88.224	85.128	90.860
	(5.21)***	(3.77)***	(5.79)***	(10.02)***
Year & Sector Dummies	No	Yes	No	Yes
Firms	431	431	283	283
Pseudo R-square	0.0232	0.1137	0.0878	0.1892