

The Private Company Discount Based on Empirical Data

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Valuation analysts attempt to improve the quality of valuation reports in order to provide a more transparent work product for the report audience. One challenge for many business valuation reports is to effectively communicate the value of a nonmarketable equity interest, particularly the rationale for the selected discount for lack of marketability (DLOM). One means to support the DLOM selection is reliance on transaction pricing studies. These studies show that private companies typically sell at a price discount compared to otherwise comparative public companies. This phenomenon may be because private companies are illiquid and, therefore, sell at transaction pricing multiples that reflect this illiquidity (i.e., DLOM). This discussion summarizes the empirical data that may be used to quantify the private company valuation discount.

INTRODUCTION

Analysts intend that their valuation reports reflect the most current generally accepted business valuation practices. Such valuation guidance is provided by books, articles, studies, white papers, court cases, and academic presentations.

New guidance related to the discount for the lack of marketability (DLOM) was recently published. This guidance provides evidence that the disadvantages of the inherent illiquidity faced by private companies can be quantified.

To estimate the DLOM for a nonmarketable equity ownership interest, valuation analysts typically consider studies related to restricted stock transactions and initial public offerings. Many of the restricted stock and initial public offering (IPO) studies that are commonly cited are over 30 years old. However, even today these studies are still considered relevant.

In fact, DLOM indications provided by the older studies may be more relevant than the DLOM indications provided by the newer studies. This conclusion is primarily due to changes in the Securities and Exchange Commission Rule 144a holding period restrictions.

Because restricted stock and IPO studies involve public (and not private) companies, some valuation analysts argue that a more direct DLOM method may be appropriate. Of course, there are other methods used to quantify the DLOM.

One DLOM method that is not as commonly discussed, but represents newer guidance, is the use of empirical data to estimate a private company discount (PCD). To date, there are several published PCD studies. Many authors of these studies suggest that PCD indications provide a more direct indication of the private company DLOM.

There are two types of PCD studies: (1) the pricing multiples studies and (2) the acquisition studies.

The pricing multiples studies are based on a comparison of (1) a publicly traded company's stock price and (2) a private company's business enterprise value derived from an acquisition transaction.

The acquisition studies are based on using an acquisition transaction of a public company compared to a private company acquisition transaction.

This discussions summarizes (1) the Koeplin study, (2) the Kooli study, (3) the Officer study, and (4) the Paglia study. The first three studies are

referred to as acquisition studies. These acquisition studies are discussed in the following sections.

This discussion also summarizes the Paglia study. The purpose of the Paglia study is to determine if a PCD can be quantified based on a pricing multiples analysis.

Other acquisition studies not extensively discussed herein include (1) Block¹ and (2) De Franco et al.² According to the Paglia study, the Block study is an extension of the Koeplin study using more current dates—that is, it was conducted over the 1999–2006 time period. The De Franco study is similar to the Officer study. That is, it uses similar 2-digit Standard Industrial Classification (SIC) code matching procedures.

KOEPLIN STUDY

Several papers were published on the PCD. One such paper titled “The Private Company Discount” was authored by John Koeplin, Atulya Sarin, and Alan C. Shapiro (the “Koeplin study”).³ The Koeplin study was conducted to determine if the transaction consideration paid for private companies was less than the transaction consideration paid in transactions involving matched publicly traded companies.

The study presented results from two analyses of (1) domestic transactions, and (2) foreign transactions. In order to conduct the analyses, the Koeplin study identified matched pairs (one private company transaction and one public company transaction) based on (1) four digit industry SIC classification, (2) date proximity of the transaction—within 12 months of one another, and (3) size—based on annual revenue.

The Koeplin study identified 84 domestic company matched pair transactions and 108 foreign company matched pair transactions using the SDC Merger and Acquisition Database

(SDC). The search was conducted to identify transactions that occurred between 1984 and 1998. The study arrived at these transactions by screening out (1) financial firm acquisitions, (2) regulated utilities business acquisitions, and (3) acquisitions involving less than a controlling interest.

After identifying matched pair transactions, Koeplin calculated four enterprise value transaction pricing multiples.⁴ The PCD calculation is based on the percentage difference between the mean and median pricing multiple indications. This calculation was performed for the four transaction pricing multiples of the (1) private company transaction pricing multiples, and (2) public company transaction pricing multiples.

The results of the Koeplin study for the 84 domestic company and the 108 foreign-company-based transaction matched pairs are presented in Exhibit 1.

The study used a regression analysis to test statistical significance. The study results indicated that earnings-based pricing multiples provided statistically significant guidance for estimating the PCD, but revenue-based pricing multiples did not provide the same level of statistical significance.

The Koeplin study concluded that private domestic companies sell at acquisition pricing multiples that are 20 percent to 30 percent less than acquisition pricing multiples of publicly traded domestic companies. The study also concluded that foreign based private companies sell at acquisition pricing multiples that are 40 percent to 50 percent less than acquisition pricing multiples of publicly traded foreign companies.

Exhibit 1
Koeplin Study
Private Company Price Discount Estimate

	Private Company Transaction Pricing Multiples		Public Company Transaction Pricing Multiples		Private Company Price Discount Estimate [a]	
	Mean	Median	Mean	Median	Mean	Median
Domestic Transaction Data						
Enterprise Value/EBIT [b]	11.76	8.58	16.39	12.37	28.26	30.62
Enterprise Value/EBITDA [c]	8.08	6.98	10.15	8.53	20.39	18.14
Enterprise Value/Book Value	2.35	1.85	2.86	1.73	17.81	-7.00
Enterprise Value/Sales	1.35	1.13	1.32	1.14	-2.28	0.79
Foreign Transaction Data						
Enterprise Value/EBIT	16.26	11.37	28.97	12.09	43.87	5.96
Enterprise Value/EBITDA	11.96	7.10	25.91	9.28	53.85	23.49
Enterprise Value/Book Value	2.41	1.35	3.70	1.68	34.86	19.64
Enterprise Value/Sales	2.63	1.35	4.59	1.63	42.70	17.18
[a] Private company discount = 1 - (private company transaction multiple ÷ public company transaction multiple).						
[b] EBIT = Earnings before interest and taxes.						
[c] EBITDA = Earnings before interest, taxes, depreciation, and amortization.						

KOOLI STUDY

The Kooli study, published in *The Journal of Private Equity*, provides further perspective on PCD evidence.⁵ Much like the Koeplin study, the Kooli study compares private company acquisition pricing multiples to public company acquisition pricing multiples. One of the primary differences between the Kooli study and the Koeplin study is the use of a portfolio of public company transactions as the public company comparison metric—and not just the use of a single transaction.

According to Kooli, picking one public company transaction for comparison as the Koeplin study did is a potentially noisy procedure for matching firm risk characteristics. Therefore, the Kooli study developed a portfolio of public companies to use for comparison. This portfolio methodology is credited to the work of Brav, Geczy, and Gompers.⁶

Kooli suggested that the Koeplin study had certain weaknesses, such as the fact that private companies in the sample were typically smaller and had different growth rates than the matched public companies. Also, the Koeplin study did not consider differences in employment contracts for key managers due to the acquisition. These differences may be a form of financial consideration provided to entice management to approve a transaction.

The Kooli study recognized the Koeplin study weaknesses and attempted to control for these

weaknesses. The Kooli study used the same general methodology as the Koeplin study with the exception of its matching procedures (i.e., using a portfolio approach for transaction matching).

The Kooli study identified 331 private company transactions using the DoneDeals database. The study focused on private and public company transactions between 1995 and 2002. These transactions were controlling interest transactions for U.S.-based companies.

The Kooli study concluded that transaction pricing multiples of public companies were typically greater than the transactions pricing multiples of private companies. More specifically, the transactions pricing multiples based on sales, earnings, and cash flow were greater by 17 percent, 34 percent, and 20 percent, respectively.

The study used regression analysis to identify contributing factors that may explain the variation of transaction price discount observations. It found that the PCD varied due to firm characteristics and by industry classification. For example, for companies classified as large and growing, the PCD is generally small.

The results of the Kooli study by industry sector, including the identification of statistical significance, are provided in Exhibit 2.

The Kooli study indicated that private companies that operated in the wholesale and retail trade sector transacted at a greater discount than businesses in most other industries.

Exhibit 2
Kooli Study
Median Discount for the Marketability Indications Across Industry Categories

Industry Sector	Price Discount Indication Based on Transaction Pricing Multiple Price/Sales (%)	Price Discount Indication Based on Transaction Pricing Multiple Price/Earnings (%)	Price Discount Indication Based on Transaction Pricing Multiple Price/Cash Flow (%)
Agriculture and Mining	-58.6	49.0	31.5
Construction	70.2	59.0	19.1
Manufacturing	36.7 [a]	30.5 [b]	21.6
Transportation and Communications	-30.3	18.1	21.6
Wholesale and Retail Trade	60.1 [a]	55.7 [a]	-10.4
Finance, Insurance, and Real Estate	-35.3 [b]	29.2 [a]	3.8
Services	15.4	33.6 [b]	34.1

Notes:
a. Statistically significant at the 1 percent level.
b. Statistically significant at the 5 percent level.

OFFICER STUDY

The Officer study, published in the *Journal of Financial Economics*, provides additional perspective on the PCD evidence.⁷ In addition to calculating the PCD, one of the primary purposes of this study was to determine if illiquidity of the

target company influenced the size of PCD discounts. To determine if illiquidity influenced the PCD, the Officer study analyzed two factors to compare the public company acquisition pricing multiples. Those two factors are as follows:

1. Private company acquisition pricing multiples
2. Unlisted subsidiary acquisition pricing multiples, to compare to public company acquisition pricing multiples

The Officer study initially identified 12,716 company acquisition bids (both successful and unsuccessful) using SDC. The search was conducted to find transactions that occurred between 1979 and 2003. The study then actively eliminated transactions in which SDC merger and acquisition transaction data were incomplete.

In order to measure the private company (and unlisted subsidiary) acquisition price discounts, the comparable industry transaction method was used. For this method, Officer formed portfolios of publicly traded acquisition targets to compare to each unlisted target, similar to procedures used in

the Kooli study. Portfolio selection was based on the following criteria:

1. Public targets in the same two-digit SIC code as the unlisted target
2. Deal value excluding assumed liabilities within 20 percent of the unlisted target deal value
3. Acquisitions that were announced within a three-calendar-year window centered on the announcement date of the unlisted acquisition

The results of the Officer study, including the number of observations per financial metric, are presented in Exhibit 3.

Based on the Officer study results, unlisted targets—private companies and unlisted subsidiaries—were acquired at approximately 15 percent to 30 percent price discounts relative to comparable publicly traded targets.

According to Officer and other evidence provided in the study, the study results support the hypothesis that acquisition prices are sensitive to the liquidity needs of the target company owners.

Exhibit 3 Officer Study Private Company Price Discount Estimate

Financial Transaction Metric		Private Company Target Price Discount/(Premium) to Target Public Company (%)	Unlisted Subsidiary Company Target Price Discount to Target Public Company (%)
Price to Book Value of Equity	Average	-15.61	27.47
Price to Book Value of Equity	Median	-15.22	35.18
Number of Transactions (in #)		106	145
Price to Earnings Per Share	Average	22.85	28.90
Price to Earnings Per Share	Median	27.82	38.03
Number of Transactions (in #)		148	136
Deal Value to EBITDA	Average	17.18	26.91
Deal Value to EBITDA	Median	20.14	35.07
Number of Transactions (in #)		111	107
Deal Value to Sales	Average	18.15	29.99
Deal Value to Sales	Median	18.72	40.91
Number of Transactions (in #)		308	590
Average Acquisition Price Discount		17.28	28.31
Median Acquisition Price Discount		19.51	35.95
Number of Transactions (in #)		364	643

As such, the study concluded that selling parties are willing to sell assets at a price discount because of liquidity needs. The greater the liquidity needs, the greater the price discount indications.

PAGLIA STUDY

According to the Paglia study,⁸ the above-mentioned acquisition pricing multiples studies have one major weakness: an inherent issue of establishing good matches between private company transactions and public company transactions. In certain studies, the sample sizes were less than 100 in total count.

In certain other studies, the matching criteria that was used cast a relatively wide net based on industry classification to establish matches—for example, relying on two-digit SIC code matching. Another weakness is that it is unknown whether any of the transactions used for comparison incorporate strategic value.

The Paglia study attempts to address the above-mentioned weaknesses by (1) identifying a larger group of comparable transactions and (2) identifying better private company and public company matches using a pricing multiples methodology instead of the acquisition methodology. This study compares the price multiples derived by (1) public market pricing of publicly traded stocks and (2) private company acquisition pricing.

The Paglia study's quantification of the PCD is subject to the presumption that publicly traded market prices approximate controlling interest values. This condition is based on the premise presented by Eric Nath.⁹ If true, then the merger and acquisition (M&A) transaction values of private companies represent the same level of value as publicly traded company values, since each value indication is based on control level pricing indications.

In order to quantify the PCD, or the DLOM as Paglia refers to it, the Paglia study relied on four analytical procedures.

First, screening criteria were developed to identify privately held company M&A transactions. The Paglia study used the following screening criteria.

1. Privately held company M&A transactions, as provided in the Pratt's Stats database, that occurred between 1993 to 2008
2. M&A company targets with annual net revenues of at least \$10 million
3. M&A company targets located in the United States
4. Exclusion of companies classified as utilities, financial services, and other service-related companies

Second, criteria were developed to identify publicly traded companies to match to the privately held companies involved in M&A transactions. The Paglia study focused on publicly traded companies listed on the AMEX, NYSE, and Nasdaq using the following matching criteria:

1. Industry classification based on six-digit North American Industrial Classification System (NAICS) codes
2. Revenue and earnings before interest, taxes, depreciation, and amortization (EBITDA) financial metrics

Based on the matching criteria, the Paglia study identified 674 matched pairs based on annual revenue and 635 matched pairs based on EBITDA.

Third, both market value of invested capital (MVIC) to revenue pricing multiples and MVIC to EBITDA pricing multiples were calculated for the matched pairs.

Fourth, the study compared the matched pairs based on MVIC-to-revenue and MVIC-to-EBITDA ratio indications. The differences between the matched pairs yielded DLOM estimates. In general, the Paglia study found that all measures of market multiples—including, MVIC/revenue, MVIC/gross profit, and so on, for private companies were significantly less than the same multiples for publicly traded companies. That finding is generally consistent with the above-mentioned studies.

In contrast, the study found that mean and median profitability measures—such as return on equity and net profit margins for private companies were generally equal to or greater than the same measures for matched publicly traded businesses.

The following two equations were used to calculate the private company DLOM estimates:¹⁰

1. $DLOMSALE (\%) = [1 - (MVIC/Sale \text{ for private firm}) / (MVIC/Sale \text{ for public firm})] \times 100$
2. $DLOMEBITDA (\%) = [1 - (MVIC/EBITDA \text{ for private firm}) / (MVIC/EBITDA \text{ for public firm})] \times 100$

Based on DLOMSALE calculations, private companies sold at an average price discount of 67 percent, and at a median price discount of 73 percent, with reference to the average and median price of similar publicly traded companies.

Based on DLOMEBITDA calculations, private companies sold at an average price discount of 66 percent, and at a median price discount of 72 percent, with reference to the average and median price of similar publicly traded companies.

Exhibit 4
Paglia Study
Discount for the Lack of Marketability Indications Across Industry Sectors

NAICS Code - Industry Sector	2 Digit NAICS Code (#)	Number of Businesses (#)	PCD DLOM Based on MVIC/Revenue Pricing Multiples (%)	Number of Businesses (#)	PCD DLOM Based on MVIC/EBITDA Pricing Multiples (%)
Mining	18	18	70.40	22	67.00
Construction	22	22	58.97	35	52.37
Manufacturing	31-33	257	71.79	245	76.46
Wholesale Trade	42	46	65.73	47	64.28
Retail Trade	44-45	58	66.65	44	57.43
Transportation	48-49	17	51.81	25	37.42
Information	51	92	88.91	65	83.65
Professional Services	54	84	81.20	51	88.70
Staff Support & Waste Management	56	34	74.10	19	71.43
Healthcare	62	26	43.79	35	80.22
Art & Entertainment	71	4	59.12	4	58.81
Accommodation & Food Service	72	<u>15</u>	62.82	<u>18</u>	76.01
Total Number of Companies		673		610	

The Paglia study results were also presented in two-digit NAICS industry category sectors. This information is presented in Exhibit 4.

As presented in Exhibit 4, companies in the information services and professional services sectors had the largest DLOM indications. In contrast, companies in the transportation sector had the lowest DLOM indications.

In addition to the matched pairs analysis, the Paglia study examined other factors that influence the DLOM. More specifically, the study investigated the influence of size, profitability, financial distress, purchase and purchaser characteristics, market liquidity, market volatility, time period, and industry affiliation on the observed DLOM. Based on these other influential factors, the Paglia study developed the following hypotheses:

1. Larger firms have lower discounts.
2. Private firms with positive profits have lower discounts.
3. Private firms that are acquired by strategic buyers have lower discounts compared to those that are acquired by financial buyers.
4. Firms that exhibit greater risk of financial distress have greater discounts than those with lower levels of financial risk.
5. Discounts are larger with decreased liquidity in the markets.
6. Discounts are larger when public markets are more volatile.

A multivariate regression analysis was used to test the Paglia study hypotheses. In general, the regression results support several of the Paglia hypotheses. The results indicated that private companies with (1) a larger book value of assets, (2) positive net income, and (3) lower probability of financial distress (i.e., companies with higher Altman's Z scores), have significantly lower PCD DLOM discounts.

In contrast, the regression results indicated that (1) the buyer type (publicly traded company buyer or private company buyer), (2) the transaction type (asset purchase or stock purchase), and (3) the organization type (C corporation or pass-through entity) do not influence PCD DLOM discounts.

Further, the regression results (1) did not support the hypothesis that greater discounts are observed when market volatility increases and (2) indicated only mild support for greater discounts when market liquidity decreases.

SUMMARY AND CONCLUSION

The acquisition studies discussed herein are based on analyses that were similar to the Paglia study. However, these studies used an acquisition methodology and not the pricing multiples methodology used by Paglia. Nonetheless, all studies quantified the PCD discount.

As published in 2000, the Koeplin study identified 84 domestic company matched transactions,

“ . . . these studies provide evidence that private companies are sold at pricing multiples that are lower than the pricing multiples of their public counterparts.”

and 108 foreign company matched transactions that occurred between 1984 and 1998. These transactions provided evidence of a PCD of 20 percent to 30 percent for domestic company transactions and 40 percent to 50 percent for foreign company transactions. The Koeplin study concluded that public companies generally sell at higher earnings-based

pricing multiples than private companies.

As published in 2003, the Kooli study identified 331 private company transactions that occurred between 1995 and 2002. These transactions provided evidence of PCDs of 17 percent based on revenue-based transaction multiple comparisons, 34 percent based on earnings-based multiple comparisons, and 20 percent based on cash-flow-based pricing multiple comparisons.

The Kooli study and the Officer study used a portfolio matching methodology to match private companies to a portfolio of public companies. This approach was performed to correct for the potential noise created from relying on one public company that may be dissimilar to the private company other than by its industry classification.

As published in 2007, the Officer study identified various private company transactions that occurred between 1979 and 2003. These transactions provided evidence of PCDs of 15 percent to 30 percent. The Officer study also presented evidence suggesting that the PCD is sensitive to the liquidity needs of the target private company owners. That is, the greater the need for liquidity the larger the PCD.

Two PCD studies that are not discussed here are the Block study and the De Franco study. The Block study, as published in 2007, reported PCD discount indications of 14 percent based on enterprise value to book value pricing multiple analyses and 24 percent based on enterprise value to revenue pricing multiple analyses. The De Franco study, as published in 2007, reported PCD indications of between 21 percent and 37 percent.

As published in 2010, the Paglia study identified 674 matched pairs based on revenue, and 635 matched pairs based on EBITDA between 1993 and 2008. These transactions provided evidence of PCDs of 66 percent to 73 percent.

The Paglia study used multivariate regression analysis to test certain hypotheses related to the level of PCD. The study found that larger private

companies that were profitable generally had lower PCD indications.

Collectively, these studies provide evidence that private companies are sold at pricing multiples that are lower than the pricing multiples of their public counterparts. This PCD may be due to a lack of liquidity/marketability of private company ownership as compared to public company ownership. The size and profitability of the subject business apparently influence the magnitude of the PCD.

Notes:

1. Stanley Block, “The Liquidity Discount in Valuing Privately Owned Companies.” *Journal of Applied Finance* (Fall/Winter 2007).
2. Gus De Franco, Ilanit Gavious, Justin Jin, and Gordon D. Richardson, “Do Private Company Targets That Hire Big 4 Auditors Receive Higher Proceeds?” University of Toronto Working Paper (December 19, 2008).
3. John Koeplin, Atulya Sarin, and Alan C. Shapiro, “The Private Company Discount,” *Journal of Applied Corporate Finance* 12, no. 4 (Winter 2000).
4. Enterprise value was calculated as the number of targeted shares multiplied by offering price plus the book values of (1) short-term debt, (2) straight debt, (3) convertible debt, and (4) preferred stock less marketable securities.
5. Maher Kooli, Mohamed Kortas, and Jean-Francois L’Her, “A New Examination of the Private Company Discount: The Acquisition Approach,” *The Journal of Private Equity* (Summer 2003).
6. A. Brav, C. Geczy, and P. Gompers. “Is the Abnormal Return Following Equity Issuance Anomalous?” *Journal of Financial Economics* 56 (2000): 209–249.
7. Micah S. Officer, “The Price of Corporate Liquidity: Acquisition Discounts for Unlisted Targets,” *Journal of Financial Economics* 83, (2007): 571–598.
8. John K. Paglia and Maretno Harjoto, “The Discount for Lack of Marketability in Privately Owned Companies: A Multiples Approach,” *Journal of Business Valuation and Economic Loss Analysis* 5, no. 1 (2010).
9. Eric W. Nath, “Control Premiums and Minority Interest Discounts in Private Companies.” *Business Valuation Review* (June 1990): 39–46.
10. The Paglia study excluded outlier DLOM indications that fell between 0 percent and 100 percent.

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