

Business Valuation Review[®]



**Trugman Valuation Associates, Inc. (TVA)
Restricted Stock Study**

William Harris

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This article discusses our research and analysis for a restricted stock study performed for the periods 2007 and 2008. With Wall Street being extremely volatile during this period, we expected to see substantial discounts. The results will surprise you.

Introduction

A discount for lack of marketability (DLOM) is used to compensate for the difficulty of selling shares of stock that are not traded on a stock exchange compared with those that can be traded publicly. If an investor owns shares in a public company, he or she can pick up the telephone, call a broker, and generally convert the investment into cash within three days. This is not the case with an investment in a closely held business. Therefore, publicly traded stocks frequently have an element of liquidity that closely held shares do not. This is the reason that a DLOM may be applied. It is intended to reflect the market's perceived reduction in value for not providing liquidity to the shareholder.

The most commonly used sources of data for determining an appropriate level of a DLOM are studies involving restricted stock purchases or initial public offerings. Revenue Ruling 77-287 references the Institutional Investor Study,¹ which addresses restricted stock issues. Many studies have updated this one.

Restricted stock (or letter stock, as it is sometimes called) is stock issued by a corporation that is not registered with the Securities and Exchange Commission (SEC) and cannot be readily sold into the public market. The stock is usually issued when a corporation is first going public, making an acquisition, or raising capital.

¹From "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, 92d Cong., 1st Sess. 1971: 2444-2456.

William Harris is a financial analyst with Trugman Valuation Associates, Inc. He has a BS, business administration, from Belk College of Business at the University of North Carolina at Charlotte (2006) and an MS, finance, from Chapman Graduate School of Business at Florida International University (2007). He is a CFA candidate.

The main reasons that corporations issue restricted stock, rather than tradable stock, are to avoid dilution of their stock price with an excessive number of shares available for sale at any one time and to avoid the costs associated with registering with the SEC.

The registration exemption on restricted stocks is granted under Section 4(2) of the 1933 Securities Act. The intent of Section 4(2) is to allow "small" corporations the ability to raise capital without incurring the costs of a public offering. Regulation D, a safe harbor regulation, which became effective in 1982, falls under section 4(2) of the code and provides uniformity in federal and state securities laws regarding private placements of securities. Securities bought under Regulation D are subject to restrictions, the most important being that the securities cannot be resold without either registration under the act, or an exemption.² The exemptions for these securities are granted under Rule 144:³

Rule 144 allows the limited resale of unregistered securities after a minimum holding period of two years. Resale is limited to the higher of 1% of outstanding stock or average weekly volume over a 4 week period prior to the sale, during any three month period. There is no quantity limitation after a four year holding period.

Therefore, in order to sell their stock on the public market, a holder of restricted stock must either register his or her securities with the SEC or qualify for a 144 exemption. A holder of restricted stock can, however, trade the stock in a private transaction. Historically, when traded privately, the restricted stock transaction was usually required to be registered with the SEC. However, in 1990, the SEC adopted Rule 144a, which relaxed the SEC filing restrictions on private transactions. The rule allows qualified institutional investors to trade unregistered securities

²Alli, Kasim L., and Donald J. Thompson. 1991. "The Value of the Resale Limitation on Restricted Stock: An Option Theory Approach." *Valuation* (March):22-23.

³Ibid.

among themselves without filing registration statements.⁴ Effective April 1997, the two-year holding period was reduced to one year. This holding period was later reduced to six months in December 2007 and became effective on February 15, 2008.

In 1977, in Revenue Ruling 77-287, the Internal Revenue Service specifically recognized the relevance of the data on discounts for restricted stocks. The purpose of the ruling was “to provide information and guidance to taxpayers, Internal Revenue Service personnel and others concerned with the valuation, for Federal tax purposes, of securities that cannot be immediately resold because they are restricted from resale pursuant to Federal security laws.”⁵ The ruling specifically acknowledges the conclusions of the SEC Institutional Investor Study and the values of restricted securities purchased by investment companies as part of the “relevant facts and circumstances that bear upon the worth of restricted stock.”

The studies concerning restricted stock deal with minority blocks of stock in public companies. Therefore, the restricted stock studies may be a useful guide in assessing a discount for lack of marketability to a minority interest. The average DLOM ranges between 20% and 45% based on past studies.

The TVA Restricted Stock Study is a time-focused study that analyzes implied restricted stock discounts from January 2007 through December 2008. This time period can be described as a time of high financial market volatility and extreme uncertainty in the minds of the investing public. This higher level of financial market volatility could potentially lead to higher implied marketability discounts due to the increased risk of an investment losing value during the required Rule 144 holding period. In this study, we analyzed eighty transactions that took place during this time period to determine whether or not the economic recession actually caused higher implied marketability discounts. In addition, we take our analysis further as we utilize statistical methods to determine what company-specific variables drive the magnitude of the implied marketability discounts.

Methodology

The transactions analyzed in the TVA Restricted Stock Study were discovered by searching through 8-K filings of public companies from the 10K Wizard database and the full text search database provided on the SEC website. Sales of such transactions are disclosed in section 3.02

of the company’s 8-K filing titled “Unregistered Sales of Equity Securities.” We reviewed over 6,900 8-K filings. Transactions were eliminated based on the following criteria:

1. A significant number of the unregistered stock issuances analyzed were either issuances involving preferred stock, warrants, stock options, convertible notes, or any combination thereof. In this study, we are analyzing the implied discounts for lack of marketability for common stock issuances. These other securities have risk protection benefits that are not present in shares of common stock. Therefore, all transactions involving preferred stock, warrants, convertible notes, or any combination thereof were eliminated.
2. During our search, we eliminated transactions that raised doubt about whether the transaction price was a fair market value price. Therefore, the issuance could not involve any special contractual arrangements between the buyer and the seller; could not be issued as part of a merger or an acquisition; or could not be issued to insiders, employees, and/or other related parties.
3. Pertinent information such as the date of the transaction and the price per share must have been available.
4. The average of the intraday highest closing price for the month and the intraday lowest closing price for the month for each stock had to be greater than \$1. This price parameter was established because of the speculative nature and the large percentage changes from small price movements associated with such low-priced stocks.
5. Transactions that occurred as part of the U.S. government’s Troubled Asset Relief Program (TARP) were eliminated, as these transactions do not constitute fair market value transactions.
6. The transaction had to be a cash purchase. Therefore, share-for-share exchanges and share-for-services exchanges were eliminated, as the prices for these transactions cannot be quantified.
7. The stock had to be traded on a domestic exchange for at least six months prior to the date of the transaction. In analyzing historical price and volume data, it became apparent that many stocks incurred abnormal price movements shortly after an initial public offering. Based on our analysis, we believe that six months of trading activity is sufficient to derive accurate indications about the stock’s true secondary market price and historical daily trading volatility.

⁴Brealey, Richard A., and Steward C. Myers. 1996. “How Corporations Issue Securities.” Chap. 14 of *Principles of Corporate Finance*, 5th ed. New York, New York: McGraw-Hill.

⁵Revenue Ruling 77-287 (1977-2 C.B. 319), Section I.

Table 1
Unregistered Stock Sales

Company	Ticker	Date of Transaction	Exchange	Price per Share (\$)	Shares Placed	Offering Amount (\$)	Discount Announced in Filing	Discount	Avg. Stock Price Transaction Month (\$)	Discount
Atlas Mining Co	ALMI	1/10/2007	OTC BB	1.35	1,481,482	2,000,001	N	N/A	1.62	16.7%
Singing Machine Co	SMD	1/16/2007	AMEX	0.83	1,800,024	1,500,000	N	N/A	1.15	27.5%
Avalon Pharmaceuticals	AVRX	1/19/2007	NASDAQ	3.34	3,000,000	10,020,000	N	N/A	3.58	6.7%
Ricks Cabaret International	RICK	2/1/2007	NASDAQ	7.00	425,000	2,975,000	N	N/A	9.72	27.9%
VCG Holding Corp	VCGH	2/2/2007	NASDAQ	7.10	3,000,000	21,300,000	N	N/A	10.08	29.5%
Black Hills Corp	BKH	2/14/2007	NYSE	36.00	4,170,891	150,152,076	N	N/A	37.59	4.2%
Triangle Petroleum Corp	TPLM	2/26/2007	OTC BB	2.00	10,412,000	20,824,000	N	N/A	2.77	27.8%
Granite City Food and Brewery	GCFB	3/8/2007	NASDAQ	5.35	2,617,334	14,002,737	N	N/A	5.99	10.7%
Euronet Worldwide	EEFT	3/8/2007	NASDAQ	25.00	6,374,528	159,363,200	N	N/A	26.59	6.0%
Ethos Environmental	EDEV	3/9/2007	OTC BB	1.00	50,000	50,000	N	N/A	3.78	73.5%
Colombia Goldfields	CGDF	3/21/2007	OTC BB	1.00	9,020,000	9,020,000	N	N/A	1.21	17.0%
Transmeridian Exploration	TMYEQ	4/1/2007	OTC BB	2.70	1,655,000	4,468,500	N	N/A	2.93	7.7%
Ricks Cabaret International	RICK	4/2/2007	NASDAQ	9.40	425,000	3,995,000	N	N/A	9.27	-1.5%
AFP Imaging Corp	AFPC	4/13/2007	OTC BB	1.48	5,500,000	8,140,000	N	N/A	1.90	21.9%
Oilsands Quest	BQI	5/3/2007	AMEX	2.75	13,900,000	38,225,000	N	N/A	3.11	11.6%
BPZ Resources	BPZ	5/8/2007	AMEX	5.25	6,700,000	35,175,000	N	N/A	6.30	16.6%
AtrCure Inc.	ATRC	5/24/2007	NASDAQ	9.15	1,683,060	15,399,999	N	N/A	10.63	13.9%
Synutra International	SYUT	5/29/2007	NASDAQ	16.50	4,000,000	66,000,000	N	N/A	18.75	12.0%
Neogenomics Inc.	NGNM	6/1/2007	OTC BB	1.50	2,670,000	4,005,000	N	N/A	1.68	10.7%
3D Systems Corp	TDSC	6/19/2007	NASDAQ	17.50	1,250,000	21,875,000	N	N/A	22.68	22.8%
Metalico Inc.	MEA	6/21/2007	AMEX	7.00	5,246,000	36,722,000	N	N/A	7.48	6.4%
VIA Pharmaceuticals	VIAP	6/29/2007	NASDAQ	2.43	10,288,065	24,999,998	Y	38.50%		38.5%
Mandalay Media Inc.	MNDL	7/24/2007	OTC BB	0.50	5,000,000	2,500,000	N	N/A	1.09	54.1%
Enova Systems	ENA	7/25/2007	AMEX	5.35	2,218,000	11,866,300	N	N/A	6.25	14.3%
Sport Supply Group	RBI	7/26/2007	NASDAQ	10.00	1,830,000	18,300,000	N	N/A	10.04	0.4%
Progressive Gaming Corp	PGIC	8/13/2007	NASDAQ	4.50	6,943,333	31,244,999	N	N/A	5.50	18.2%
Transworld Corp	TWOC	8/22/2007	OTC BB	3.50	1,000,000	3,500,000	N	N/A	4.25	17.6%
Profile Technologies	PRTK	8/24/2007	OTC BB	0.90	436,111	392,500	N	N/A	1.50	40.0%
Meade Instruments	MEAD	8/24/2007	NASDAQ	1.90	3,157,895	6,000,001	N	N/A	2.11	9.7%
Manitex Corporation	MNTX	8/30/2007	NASDAQ	6.00	1,500,000	9,000,000	N	N/A	7.23	17.0%
Asian Dragon Group	AADG	8/31/2007	OTC BB	2.16	600,000	1,294,860	N	N/A	3.85	43.9%
Live Current Media	LIVC	9/25/2007	OTC BB	2.00	2,550,000	5,100,000	N	N/A	2.24	10.5%
Big Cat Energy Corp	BCTE	10/2/2007	OTC BB	1.00	500,000	500,000	N	N/A	1.42	29.3%
Zhongpin	HOGS	10/9/2007	NASDAQ	8.00	6,250,000	50,000,000	N	N/A	12.05	33.6%
Viper Powersports	VPWS	10/12/2007	OTC BB	0.75	1,338,667	1,004,000	N	N/A	1.00	25.0%
USA Technologies Inc.	USAT	10/17/2007	NASDAQ	7.00	2,142,871	15,000,097	N	N/A	7.80	10.3%
Ivivi Technologies	IVVI	10/18/2007	NASDAQ	5.00	1,000,000	5,000,000	N	N/A	5.14	2.6%
Optimer Pharmaceuticals	OPTR	10/23/2007	NASDAQ	7.80	4,600,000	35,880,000	N	N/A	8.11	3.8%
Elixir Gaming Technologies	EGT	10/25/2007	AMEX	3.50	15,000,000	52,500,000	N	N/A	4.55	23.0%
Fushi Copperweld	FSIN	10/26/2007	NASDAQ	14.00	2,786,000	39,004,000	N	N/A	15.85	11.7%

Table 1
Continued

Company	Ticker	Date of Transaction	Exchange	Price per Share (\$)	Shares Placed	Offering Amount (\$)	Discount Announced in Filing	Discount	Avg. Stock Price Transaction Month (\$)	Discount
Sequenom Inc.	SQNM	10/26/2007	NASDAQ	9.00	3,383,335	30,450,015	N	N/A	9.32	3.4%
Sten Corp	STEN	10/30/2007	NASDAQ	2.50	310,000	525,000	N	N/A	2.81	10.9%
Cano Petroleum	CFW	11/2/2007	AMEX	7.15	3,500,000	25,025,000	N	N/A	7.48	4.3%
Kona Grill	KONA	11/6/2007	NASDAQ	16.25	650,000	10,562,500	N	N/A	16.72	2.8%
China Bak Battery	CBAK	11/6/2007	NASDAQ	3.90	3,500,000	13,650,000	N	N/A	4.65	16.0%
EPIX Pharmaceuticals	EPIX	11/9/2007	NASDAQ	3.10	5,245,468	16,260,951	Y	15%		15.0%
Green Plains Renewable Energy	GPRED	11/14/2007	NASDAQ	8.10	1,200,000	9,720,000	N	N/A	9.51	14.8%
Ricks Cabaret International	RICK	11/19/2007	NASDAQ	14.00	1,165,000	16,310,000	N	N/A	16.05	12.7%
General Moly Inc.	GMO	11/20/2007	AMEX	8.50	8,256,699	70,181,942	N	N/A	9.54	10.9%
Pressure Biosciences	PBIO	11/21/2007	OTC BB	5.00	126,750	633,750	N	N/A	6.59	24.1%
Gold Resource Corp	GORO	12/5/2007	OTC BB	4.00	5,413,500	21,654,000	N	N/A	4.25	5.9%
Wonder Auto Technology	WATG	12/10/2007	NASDAQ	8.65	3,000,000	25,950,000	N	N/A	10.09	14.3%
Legend International	LGDI	12/12/2007	OTC BB	0.80	18,750,000	15,000,000	N	N/A	1.05	23.8%
Cougar Biotechnology	CGRB	12/14/2007	NASDAQ	29.00	3,000,000	87,000,000	N	N/A	31.25	7.2%
AspenBio	APPY	12/20/2007	NASDAQ	7.25	2,516,310	18,243,250	N	N/A	9.97	27.2%
National Coal Corp	NCOC	12/27/2007	NASDAQ	3.91	1,000,000	3,910,000	Y	15.0%		15.0%
National Coal Corp	NCOC	12/27/2007	NASDAQ	4.10	1,000,000	4,100,000	Y	15.0%		15.0%
Tri-Valley Corporation	TIV	Jan-08	AMEX	5.00	210,000	1,050,000	N	N/A	6.30	20.6%
Biospecifics Technology	BSTC	1/14/2008	OTC BB	10.50	200,000	2,100,000	N	N/A	12.25	14.3%
En2go International	ENGO	1/22/2008	OTC BB	1.00	1,350,000	1,350,000	N	N/A	2.10	52.4%
Delta Petroleum Corp	DPTR	2/20/2008	NASDAQ	19.00	36,000,000	684,000,000	N	N/A	20.83	8.8%
Hoku Scientific	HOKU	2/29/2008	NASDAQ	8.64	2,893,519	25,000,000	N	N/A	9.70	10.9%
RCM Technologies	RCMT	3/19/2008	NASDAQ	4.29	700,000	3,000,000	N	N/A	4.72	9.2%
Enova Systems Inc.	ENA	3/26/2008	AMEX	3.91	2,131,274	8,333,281	N	N/A	3.95	1.0%
Secured Digital Storage Corp	SDGS	4/22/2008	OTC BB	0.80	2,681,375	2,145,100	N	N/A	2.73	70.6%
Widepoint Corporation	WYY	5/2/2008	AMEX	1.02	2,500,000	2,550,000	N	N/A	1.23	16.7%
National Coal Corp	NCOC	5/12/2008	NASDAQ	4.65	2,332,000	10,843,800	Y	7.4%		7.4%
Asia Premium Television Group	ATVG	5/22/2008	OTC BB	2.00	385,000	770,000	N	N/A	2.88	30.4%
Oilsands Quest	BQI	5/23/2008	AMEX	4.20	11,904,761	49,999,996	N	N/A	4.47	6.0%
Oilsands Quest	BQI	5/23/2008	AMEX	4.20	12,976,761	54,502,396	N	N/A	4.47	6.0%
Graymark Healthcare	GRMH	6/3/2008	NASDAQ	4.50	3,344,447	15,050,012	N	N/A	7.90	43.0%
ICO Global Communications	ICOG	6/6/2008	NASDAQ	3.61	6,515,697	23,500,000	Y	5%		5.0%
Ricks Cabaret International	RICK	6/12/2008	NASDAQ	20.00	672,000	13,440,000	N	N/A	20.45	2.2%
Harbin Electric	HRBN	6/24/2008	NASDAQ	14.13	3,500,000	49,455,000	N	N/A	16.52	14.4%
Document Security Systems Inc.	DMC	6/25/2008	AMEX	4.00	500,000	2,000,000	N	N/A	5.30	24.5%
Argan, Inc.	AGX	7/2/2008	AMEX	12.00	2,200,000	26,400,000	N	N/A	15.97	24.9%
Tercica Inc.	TRCA	7/11/2008	NASDAQ	6.77	590,580	3,999,998	N	N/A	8.89	23.8%
L-1 Identity Solutions	ID	8/5/2008	NYSE	14.85	8,083,472	120,000,000	N	N/A	14.93	0.5%

Table 1
Continued

Company	Ticker	Date of Transaction	Exchange	Price per Share (\$)	Shares Placed	Offering Amount (\$)	Discount Announced in Filing	Avg. Stock Price Transaction Month (\$)	Discount
Profile Technologies Inc.	PRTK	8/15/2008	OTC BB	0.90	2,550,440	2,295,404	N	2.40	62.5%
Odyssey Marine Exploration	OMEX	8/19/2008	NASDAQ	4.90	1,970,000	9,653,000	N	4.85	-1.0%
Average									18.1%
1st Quartile									7.4%
Median									14.4%
3rd Quartile									24.2%
High									73.5%
Low									-1.5%
Standard Deviation									15.6%
Transactions									80

Table 2
Restricted Stock Study Comparisons

	TVA	MPI	FMV	FMV	FMV	FMV	Finnerty	Bajaj	MPI
Discounts									
Dates Covered	2007-2008	2000-2007	2002-2005	1997-2005	1980-2005	1991-1997	1990-1995	1980-1995	
Transactions	80	200	91	237	475	101	88	49	
Average	18.1%	18.7%	14.6%	21.6%	22.0%	20.1%	22.2%	27.7%	
Standard Deviation	15.6%	N/A	19.9%	22.4%	19.4%	17.9%	N/A	14.1%	
1st Quartile	7.35%	N/A	6.8%	9.0%	9.9%	N/A	N/A	16.7%	
Median	14.4%	N/A	12.6%	17.8%	19.4%	20.7%	20.7%	28.8%	
3rd Quartile	24.2%	N/A	22.7%	33.3%	33.3%	N/A	N/A	37.8%	
Volatility									
Dates Covered	2007-2008	2000-2007	2002-2005	1997-2005	1980-2005	1991-1997	1990-1995	1980-1995	
Transactions	80	N/A	90	236	467	N/A	88	49	
Average	70.4%	N/A	76.5%	110.0%	93.5%	N/A	74.6%	24.8%	
Standard Deviation	41.9%	N/A	32.0%	144.7%	111.4%	N/A	N/A	16.5%	
1st Quartile	46.2%	N/A	54.8%	68.0%	58.1%	N/A	N/A	13.6%	
Median	56.2%	N/A	72.8%	88.4%	77.2%	N/A	N/A	22.1%	
3rd Quartile	77.6%	N/A	92.2%	120.2%	105.5%	N/A	N/A	28.6%	
Average Market Cap	251.0	N/A	149.3	188.5	162.6	153.7	117.7	80.0	
Average Block Size	12.7%	N/A	17.7%	15.3%	13.1%	9.4%	13.0%	19.2%	

Source: Pluris Valuation Advisors, LLC, *Discounts for Illiquid Shares and Warrants*, January 22, 2007.

After our search process was completed, we determined that 80 transactions met our criteria. Details of these transactions appear in Table 1. For the majority of these transactions, we needed to determine an appropriate market price for the stock in order to calculate the implied DLOM. This was accomplished by taking the average of the highest intraday stock price during the month of the transaction and the lowest intraday stock price during the month of the transaction. Our reasons for using this average as the market price of the stock was to account for any price contamination that may have resulted from the transaction announcement or any leakage of information that may have occurred in the days leading up to the transaction. However, we are aware that some degree of error still exists under this method, as it will under any method in determining the appropriate unaffected market price. In some instances, the discount was announced in the company's 8-K filing. In these cases, we did not recalculate the discount using our methodology and instead used the discount announced in the filing.

The eighty transactions included in our study had an average implied discount of 18.1%, a median of 14.4%, and a standard deviation of 15.6%. The implied discounts in our sample ranged from a premium of 1.5% to a discount of 73.5%. Table 2 presents comparisons between the results of our study and the results of select other restricted stock studies that have been performed in the past. Since 1980, based on the studies presented in Table 2, average restricted stock discounts have ranged from a low of 14.6% to a high of 27.7%. Our average of 18.1% falls within the range of these past studies, which is an indication that the economic environment has had no noticeable effect on the magnitude of the illiquidity discounts of the transactions in our sample. It should be noted that different selection criteria between our study and the studies performed in the past could explain some of the changes in the discounts over time. The transactions used for our analysis had a variety of distinguishable characteristics that could potentially cause either a higher or a lower implied discount. Therefore, we used a variety of statistical tools to further analyze the data and determine the main drivers of illiquidity discounts.

Correlation Analysis

In our analysis of the discounts, we initially hypothesized that the magnitude of the implied illiquidity discount is primarily attributed to risk, liquidity, size, earning capacity, and contractual rights relating to the specific transaction. We performed a correlation analysis on a variety of variables relating to each of these categories to determine what, if any, statistical relationships

existed between the magnitude of the discount and the particular variable. In particular, we performed two statistical calculations for each variable, the correlation coefficient and the coefficient of determination (or R^2). The correlation coefficient tests the strength and the direction of the linear relationship between two variables. A correlation coefficient of 1 indicates a perfect positive linear relationship between two variables, a correlation coefficient of -1 indicates a perfect negative linear relationship between two variables, and a correlation coefficient of 0 indicates that no linear relationship exists between the two variables; R^2 is simply the correlation coefficient squared. It is a goodness-of-fit measure used to predict future outcomes of certain variables. In this case, we used R^2 to determine how well the implied discounts can be predicted by each particular variable. The results of our analysis are summarized in Table 3.

Risk

- *One year annualized, historical daily price volatility*—We calculated price volatility by calculating the standard deviation of daily stock price returns for the 12 months prior to the month of the transaction. If the stock was traded for less than a year, we calculated the historical daily price volatility from the company's inception to the month prior to the transaction. We expected that stocks with higher volatility should have substantially higher discounts as the potential risk of the investment losing value increases.
- *Debt ratio*—Companies with significant amounts of debt are viewed as being more risky, as a larger portion of their cash flows are used for debt service

Table 3
Correlation Analysis

	Correlation	R^2
Volatility	0.78	0.60
Debt Ratio	0.22	0.05
Exchange	0.51	0.26
Volume	(0.25)	0.06
Shares Placed per Average Volume	0.54	0.29
Share Turnover	(0.32)	0.10
Market Cap	(0.30)	0.09
Revenues	(0.23)	0.05
Total Assets	(0.28)	0.08
Book Value	(0.27)	0.07
Positive Net Income	(0.13)	0.02
Positive EBITDA	(0.20)	0.04
Positive Operating Cash Flow	(0.26)	0.07
Days until Registration	0.38	0.15

payments. In the case of marketability discounts, we expected that companies with higher debt ratios would have higher discounts, as they would have less money available for distributions to investors resulting in a longer payback period, the time it takes for the investor to recover his or her initial investment.

Liquidity

- *Exchange listing*—We expected that companies listed on the Over the Counter Bulletin Board Exchange would have larger discounts than companies traded on the NASDAQ, AMEX, or New York Stock exchanges. The reason is that companies on the Over the Counter Bulletin Board are typically smaller, with lighter trading volume. In quantifying this impact, we used a statistical tool known as a dummy variable, which is used in regression analysis to analyze qualitative variables. A dummy variable assumes two possible outcomes, a positive outcome or a negative outcome. A positive outcome is assigned a value of 1 and a negative outcome is assigned a value of 0. In this case, if the stock was traded on the Over the Counter Bulletin Board, we assigned it a value of 1, and if it was not traded on the Over the Counter Bulletin Board, we assigned it a value of 0.
- *Trading volume*—For our analysis of trading volume, we analyzed the average daily volume during the month of the transaction as reported by Yahoo! Finance. Our expectation was that companies that are thinly traded would have higher discounts, as it would take investors holding these investments a longer amount of time to liquidate their holdings.
- *Shares placed per average volume*—We divided the number of shares placed for each transaction by the average daily volume calculated above to determine how long it would take an investor to liquidate his or her holdings. We expected that a higher number of shares placed per average volume would warrant a higher discount, as it would take a longer amount of time for an investor to turn his or her investment into cash.
- *Share turnover*—We also tested for liquidity by calculating the share turnover for each company. The share turnover was calculated by dividing the average volume by the total shares outstanding. The higher the share turnover, the more liquid were the shares of the company. We performed this analysis in anticipation that companies with high share turnover would trade at lower discounts due to increased liquidity.

Size

- *Market capitalization*—We calculated the market capitalization for each company by multiplying our derived market price per share by the number of shares outstanding as of the company's most recent filing. We expected that larger companies would trade at lower discounts, as these companies typically have higher trading activity, longer history, and financial stability.
- *Latest twelve-month revenues*—Another indication of a company's size is its sales volume. Companies with large revenues typically have established products in high demand, and as a result, should warrant a lower discount.
- *Total assets*—Companies with larger asset bases typically have advantages in raising capital to promote internal growth over the long run. Therefore, we expected that companies with a larger amount of total assets would have lower discounts.
- *Book value*—The book value of a company is an indication of its value in the event of liquidation. We expected that companies with higher book values would have lower discounts.

Earning capacity

- In our analysis of each company's earning capacity, we analyzed latest twelve months net income; earnings before interest, taxes, depreciation, and amortization (EBITDA); and cash flow from operations. We discovered that a large majority of the companies were not profitable. Only twenty-two of the companies had positive net income, while twenty-five had positive EBITDA, and twenty-six had positive cash flow from operations. This could be attributed to a variety of factors, most notably the economic environment in which our analysis was performed, as well as the fact that many of these companies were in their early stages of operation and issued unregistered stock as a way to raise capital to pursue profitable ventures and grow their businesses. To account for these factors in our analysis, we adjusted our individual regressions on our profitability measures by using dummy variables. We believed that it was unreasonable to expect that the magnitude of a company's loss would warrant a higher discount. Therefore, in our regression analysis, we assigned companies with positive earnings streams a value of 1 and companies with negative earnings streams a value of 0. It was our expectation that profitable companies would have lower discounts than unprofitable companies.

Contractual rights

- Often, investors require that unregistered stock sales come with some form of registration rights attached that would allow the stock to be available for public sale prior to the required holding period under Rule 144. In our analysis, we performed some additional research on the stocks with registration rights by using 10K Wizard's database to locate the registration statement that confirmed that the securities issued in the private placement were subsequently registered prior to the end of the required holding period. We then calculated the number of days between the date the private placement occurred and the date in which the securities were subsequently registered. If no registration statement was filed (to our knowledge), we assumed that the securities remained unregistered for the entire holding period (365 days before February 15, 2008, and 182 days after February 15, 2008). Our expectation was that transactions that remained unregistered for longer periods of time would have higher discounts due to the decreased amount of liquidity associated with them.

In analyzing these five categories, we found that the main driver in the magnitude of the implied discounts was the historical stock price volatility, as this variable had a correlation coefficient of 0.78 and R^2 of 0.60. Other slight, yet notable, statistical relationships included the exchange variable (correlation = 0.51, $R^2 = 0.26$) and the shares placed per monthly volume variable (correlation = 0.54, $R^2 = 0.29$). Although the explanatory power (as measured by R^2) between the other variables was weak, the signs of the correlation coefficients, whether positive or negative, were consistent with our expectations. This indicates that slight tendencies exist between the magnitude of the implied illiquidity discount and the different variables tested.

Quartile Analysis

We further analyzed the tendencies for each variable as the result of the numerous limitations associated with correlation analysis. A major weakness of correlation analysis is that it assumes all relationships are linear. Just because a relationship between two variables is not linear does not mean that a relationship between the two variables does not exist. Another major issue with regression analysis in particular is that linear relationships change over time. While an R^2 measure can be high during one period, the measure can be entirely different during another. Finally, correlation analysis is extremely sensitive to outliers in the data. At times, removing outliers can have a significant impact on an individual's interpretation

of the regression results. To further analyze the tendencies of the reaction of implied restricted stock discounts to each of our hypothesized variables, we divided the data into four quartiles based on each variable. The data were organized from lowest to highest in each case. This resulted in an analysis of nine variables, since dummy variables, which only assume two outcomes, cannot be broken down into quartiles. The results of this portion of our analysis are presented in Table 4.

In reviewing Table 4, the impact of outliers becomes apparent. The average and median implied discounts in the 2nd and 3rd quartiles of each variable show small deviations from each other in most cases. However, significantly large differences exist between the magnitude of the implied discounts in the 1st quartiles and the magnitude of the implied discounts in the 4th quartiles. In each case, the change of the implied discount from the 1st quartile to the 4th quartile confirmed our expectations. However, there were exceptions in the movement of the averages or in the movement of the medians, when moving from the 2nd quartile to the 3rd quartile. This comes as no surprise for two reasons: first, that the standard deviations of the data in each quartile are large, indicating a wide level of dispersion in each quartile, and second, that an illiquidity discount cannot be explained by one particular variable and there will be a few exceptions in each case as a result.

We further analyzed the data by breaking it down into four quartiles consisting of twenty transactions each, but this time based on the size of the implied discount. The data analyzed from these four quartiles appear in Table 5.

In analyzing the quartiles, a variety of trends become apparent. The first trend is the size of the implied discount itself. The average implied discount for the 1st quartile is only 3.6%. The companies in this quartile appear to be large in comparison to the other quartiles, with average revenues of \$138 million, average total assets of \$436 million, average book value of \$209 million, and average market cap of \$448 million. The standard deviations of these variables in this quartile are quite large, however. The companies in this quartile are the least volatile, are the most actively traded, and use the least amount of debt. In addition, only one Over the Counter Bulletin Board stock is included in this quartile.

The companies in the 2nd quartile had an average implied discount of 11.1%. The companies in this quartile were smaller compared to those in the 1st quartile but were still respectably sizeable with an average market cap of \$270 million. Similar to the 1st quartile, the standard deviations of the size measures were large. Notable trends

Table 4
Analysis of Quartiles

	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
	Discounts			
Volatility	(46% and under)	(47%–56%)	(57%–78%)	(79%+)
Average	10.55%	13.48%	14.95%	33.57%
Median	8.47%	14.16%	11.62%	28.43%
Standard Deviation	9.44%	7.48%	9.94%	20.58%
Debt Ratio	(24% and under)	(25%–49%)	(50%–69%)	(70%+)
Average	19.56%	11.60%	16.30%	25.10%
Median	11.22%	12.21%	15.16%	19.97%
Standard Deviation	18.34%	8.27%	13.18%	18.22%
Volume	(16K and under)	(17K–61K)	(62K–215K)	(216K+)
Average	32.71%	13.84%	14.86%	11.14%
Median	27.72%	11.19%	15.00%	7.55%
Standard Deviation	21.69%	8.68%	9.24%	8.67%
Shares Placed per Average Volume	(11 and under)	(12–28)	(26–126)	(127+)
Average	14.89%	14.36%	13.36%	29.94%
Median	15.00%	9.73%	12.78%	26.40%
Standard Deviation	9.67%	16.25%	7.70%	19.97%
Share Turnover	(0.11% and under)	(0.12%–0.30%)	(0.31%–0.82%)	(0.83%+)
Average	33.33%	12.00%	14.14%	13.08%
Median	29.12%	11.18%	15.00%	10.56%
Standard Deviation	21.35%	7.71%	8.38%	10.01%
Market Cap (000s)	(57,894 and under)	(57,895–118,655)	(118,656–284,142)	(284,143+)
Average	24.50%	15.24%	21.82%	10.99%
Median	23.01%	14.91%	18.34%	9.81%
Standard Deviation	19.63%	11.11%	18.36%	6.88%
Revenues (000s)	(497 and under)	(498–11,989)	(11,990–74,654)	(74,655+)
Average	27.71%	16.36%	16.21%	12.28%
Median	24.40%	12.61%	15.78%	11.18%
Standard Deviation	20.58%	16.02%	11.22%	8.12%
Total Assets (000s)	(14,468 and under)	(14,468–45,608)	(45,609–142,652)	(142,653+)
Average	32.68%	14.53%	13.86%	11.50%
Median	27.16%	14.11%	13.59%	8.23%
Standard Deviation	21.20%	14.11%	9.37%	8.90%
Book Value (000s)	(4,945 and under)	(4,946–18,515)	(18,516–52,331)	(52,331+)
Average	26.68%	22.76%	10.71%	12.40%
Median	20.24%	22.45%	10.89%	10.39%
Standard Deviation	19.32%	17.87%	7.31%	8.61%

include an increased amount of debt utilization, less trading volume, and larger price volatility. The 2nd quartile contained four Over the Counter Bulletin Board stocks in comparison to only one for the 1st quartile.

As we moved to the 3rd quartile, similar trends exist, with a few exceptions. The average implied discount of the companies in this quartile was 18.5%. The average size of the companies in this quartile decreases, and the average trading volume also decreases. However, the

medians do not display the same trends, which are an indication that there are significant outliers in the data. Other apparent trends in this quartile include a decrease in the average total debt ratio and a slight decrease in the price volatility. The 3rd quartile contained six Over the Counter Bulletin Board stocks.

In analyzing the 4th quartile, the statistics change drastically. The average implied discount increases to 39.3%, and the companies have very little trading volume. These

Table 5
Breakdown of Quartiles by Discount

	Discount	Sales (000s)	Total Assets (000s)	Book Value (000s)	Volatility	Average Trading Volume (000s)	Debt Ratio	Market Cap (000s)	Number of OTC Stocks
1st Quartile									
Average	3.6%	138,474	436,304	208,663	48.00%	482.87	0.42	447,853	1
Median	4.0%	17,457	79,044	41,242	46.60%	160.00	0.36	215,042	
High	7.2%	917,574	2,472,866	1,127,228	79.57%	2,832.30	1.26	1,420,763	
Low	-1.5%	—	2,958	(159,997)	19.37%	8.80	0.08	36,290	
Standard Deviation	2.6%	260,682	708,490	358,861	15.13%	836.97	0.26	464,487	
2nd Quartile									
Average	11.1%	61,355	148,022	70,546	61.65%	323.18	0.78	269,992	4
Median	10.9%	28,343	50,336	25,999	56.85%	41.85	0.49	114,288	
High	14.3%	219,404	1,105,195	508,405	127.31%	2,074.10	6.34	1,383,384	
Low	7.4%	—	1,261	(6,736)	30.96%	7.20	0.01	5,585	
Standard Deviation	2.1%	72,019	250,467	133,575	22.92%	553.96	1.34	347,931	
3rd Quartile									
Average	18.5%	43,180	85,461	30,705	56.64%	177.28	0.59	182,798	6
Median	17.0%	25,682	78,797	15,833	51.61%	88.70	0.51	110,794	
High	24.1%	145,861	307,229	126,732	85.82%	1,096.40	1.94	608,652	
Low	14.4%	—	3,168	(78,435)	36.83%	4.50	0.10	13,611	
Standard Deviation	3.5%	46,046	75,506	46,505	14.75%	253.61	0.42	159,183	
4th Quartile									
Average	39.3%	31,877	30,950	13,170	115.44%	70.42	1.09	103,272	11
Median	32.0%	793	9,505	5,158	116.91%	6.20	0.58	88,405	
High	73.5%	238,495	176,843	86,620	216.37%	491.00	7.62	279,538	
Low	24.5%	—	262	(8,772)	32.84%	0.10	0.01	9,879	
Standard Deviation	15.6%	67,618	49,967	23,051	58.11%	126	1.73	81,207	

companies are considerably smaller, with an average market capitalization of \$103 million. In addition, the companies in this quartile are significantly more volatile and carry extremely higher amounts of debt on average. Eleven of the twenty companies in this quartile were Over the Counter Bulletin Board stocks.

The next step in our analysis involved a holding period analysis. A large majority of the eighty transactions we analyzed had registration rights and, as a result, were registered before the required Rule 144 holding period. This part of our analysis involved dividing the data into four quartiles, but this time based on the number of days the stock remained unmarketable before it was registered. The results of this analysis appear in Table 6.

In analyzing the data in Table 6, it becomes apparent that the holding period does have an influence on the implied illiquidity discount. The 1st quartile, consisting of transactions that were registered between zero and thirty-one days, had an average discount of 11.6%. The average discount increased to 14.3%, 20.4%, and 26.9% in the 2nd, 3rd, and 4th quartiles, respectively. An apparent trend in our holding period analysis was the standard deviation of each quartile. The standard deviation of the discount increases in each quartile. This was expected because longer holding periods involve additional risk and higher uncertainty.

Conclusion

In performing this empirical analysis, we had two primary objectives: determine the impact of the recent financial crisis on implied marketability discounts, and determine the impact of particular company-specific variables on implied marketability discounts. Based on the average discount calculated from our sample and the average discounts calculated in historical restricted stock studies, the recent financial crisis has had no significant effect on overall average implied marketability discounts. This comes as a surprise due to the strong linear relationship between stock price volatility and the implied

discount. In a time in which financial market volatility was high, one would expect a higher implied marketability discount on average. This could be attributed to a variety of factors, most notably varying contractual arrangements between the transactions and differing company-specific characteristics. As indicated in our quartile analysis, implied discounts are still quite high for transactions with longer holding periods, transactions involving financially distressed companies, and transactions involving illiquid offerings. What this tells us is that discounts are transaction specific and that, depending on the particular company and the particular contractual arrangements, the discount can be significantly higher or lower than the 18.1% average. This can be seen in the 4th quartile statistics in Table 4, in which the average discount was 39.3%.

Another major factor to consider was the fact that transaction volume was nonexistent during the latter months of 2008. The most recent transaction located based on our search criteria took place during August 2008. No transactions took place between September and December 2008 that met our search criteria. During this period, financial market turmoil was at its peak with the collapse of Lehman Brothers and the sale of Merrill Lynch. The fact that no transactions took place during this time period is also a potential reason for the insignificant change in the implied discounts during this recessionary period.

We can also draw conclusions about the many factors that do in fact cause higher implied marketability discounts. We performed a correlation analysis and found that certain variables, such as price volatility and liquidity, have stronger linear relationships with implied discounts. In addition, we sorted the data into various quartiles and analyzed the tendencies of the implied discounts. We found that some variables have positive relationships with implied discounts while others have negative relationships.

A factor not taken into account as part of our analysis was dividend paying history. Companies that pay distributions on a predictable and quantifiable basis should warrant smaller discounts as the investment income received from the dividends somewhat mitigates the risk of holding the investment during the time it takes to find a buyer. A significant majority of the companies we analyzed were nondividend paying. An analysis of dividends would prove to be meaningless due to the extremely small number of companies in our sample that actually paid dividends. However, this factor must be considered when quantifying a discount based on the data analyzed in our study.

Table 6
Analysis of Registration Rights

Quartile	Days before Registration	Discount		
		Average	Median	Standard Deviation
1	0–31 days	11.6%	10.0%	8.0%
2	32–63 days	14.3%	12.9%	11.3%
3	64–185 days	20.4%	15.9%	18.4%
4	185+ days	26.9%	18.8%	18.6%

We believe that the TVA Restricted Stock Study can be used as a basis to apply marketability discounts to minority interests in private companies. The study provides recent empirical data on implied marketability discounts and presents a variety of variables that can cause higher or lower discounts. The time-specific nature of the TVA

study also uncovered information about how implied marketability discounts react to times of economic turmoil. The overall average implied discount does not change significantly, as there are many transaction-specific characteristics that have larger impacts on implied discounts.