COMPETING MARKETABILITY DISCOUNT METHODOLOGIES

A Review of the FMV Restricted Stock Study™

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Valuing Shareholder Cash Flows: Quantifying Marketability Discounts (2005 E-Book)

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Chapter 5
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THE FMV OPINIONS RESTRICTED STOCK STUDY™

The FMV Opinions Restricted Stock Study™ ("FMV Study") was introduced in 2001 in an article written by employees of FMV Opinions, Inc. appearing in Valuation Strategies.[100] The introduction provided little substantive information about the contents of the study. To the best of our knowledge, other than articles written by employees of Mercer Capital, there has been no other review of the FMV Study by appraisers. Since then, there have been a number of articles by employees of FMV Opinions, Inc. yet these articles have also provided a very low level of insight into the nature of the FMV Study.

Historical Development of Marketability Discount Analysis

There have been several stages in the historical development of marketability discount analysis. These stages were outlined in a recent article in the *Business Valuation Review* (and summarized below):[101]

1. *The 35% Stage.* In the 1970s and 1980s, appraisers tended to consider marketability discounts in the range of 35%, based primarily on the averages of restricted stock studies summarized in the first two editions of Pratt's *Valuing a Business*.

2. *The 35% to 45%, Plus or Minus, Stage.* By the late 1980s, the combination of restricted stock studies and the pre-IPO studies (offered by John Emory, then at Robert W. Baird & Co., and by Willamette Management Associates), yielded average indications in the general range of 35% to 45%. Appraisers tended to believe that marketability discounts should be in that general range, and the venturesome occasionally extended the range, plus or minus, a little bit.

100 Robak, Espen and Hall, Lance S., "Bring Sanity to Marketability Discounts: A New Data Source," *Valuation Strategies*, July/August 2001.

101 Mercer, Z. Christopher, and Harms, Travis W., "Marketability Discount Analysis at a Fork in the Road," *Business Valuation Review*, December 2001 (Volume 20, No. 4), pp. 21-38.

3. *Mandelbaum Benchmark Analysis Stage.* Benchmark analysis came into its own in 1995 when Judge Laro correlated much of what appraisers had been doing into a nine factor analysis in *Mandelbaum*.[102] Some appraisers added factors and many used a form of the analysis advanced in *Mandelbaum*. However, like with the previous stages, the problem remained in that it was difficult to differentiate the facts and circumstances of a private investment relative to the information contained in the various averages.

4. *The "More Data" Stage.* By the early 1990s, a few appraisers acknowledged the issues with standard benchmark analysis, and began to conduct additional restricted stock studies with more detailed comparative information regarding transactions. The first of these studies, a study prepared by Management Planning, Inc. ("the MPI Study"), was published in *Quantifying Marketability Discounts* in 1997. Detailed transactional information for 49 transactions dating from 1980 to 1995 was provided in the MPI Study.

   In 2001, FMV Opinions, Inc. announced their study. As mentioned previously, few details of the study were provided in the *Valuation Strategies* article, but the study was offered for sale in an advertisement in the same issue. In that article, the authors suggested that the QMDM was a "black box" method and that it was flawed by "circular reasoning." It would add little to this article to rehash the ensuing debate, but readers are referred to the resulting follow-up in *Valuation Strategies*.[103] Suffice it to say, as shown above, the QMDM is no more a "black box" than is any other discounted cash flow model and the reasoning behind the QMDM is no more circular than that of any discounted cash flow method.

   At the present time, the FMV Study, which is available for licensing through Pratt's Business Valuation Resources, contains two pieces. The first piece is the two year holding period study, containing data on 248 transactions which occurred between 1980 and 1997, when the Securities and Exchange Commission changed Rule 144 to lower the holding period in relevant restricted stock transactions from two years to one year. The second piece contains data on 182 restricted stock transactions occurring between 1997 and 2001. The FMV Study will be reviewed in considerable detail below.

5. *The Quantitative (Rate of Return) Analysis Stage is Emerging.* The use of quantitative analysis to develop marketability discounts has been growing since the mid-1990s (from only isolated usage prior) and accelerated following the publication of *Quantifying Marketability Discounts* in 1997.

With this brief introduction to historical marketability discount analysis, we proceed to review the FMV Study.

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102 *Mandelbaum v. Commissioner,* T.C. Memo 1995-254, 69 T.C.M. (CCH) 2852 (1995), aff'd., 91 F 3d (24(3d Cir. 1996)).

103 See Mercer, Z. Christopher and Heinz, Nicholas J., "Marketability Discounts: Back to Reality," *Valuation Strategies*, November/December 2001, p. 34, in which we refuted these suggestions in detail. See also the Counterpoint debate in the July August 2002 issue of *Valuation Strategies*: Hall, Ekstein and Robak, "The Case of the Black-Box Model vs. Empirical Data," and Mercer, "QMDM: QED."

Review of the FMV Study

As noted above, the FMV Study was introduced for sale by FMV Opinions, Inc. in 2001. Since that time, the study has been licensed exclusively through Shannon Pratt's Business Valuation Resources.[104] To our knowledge, the study has not been independently reviewed and analyzed until now.[105]

In an article, Lance S. Hall, ASA of FMV Opinions, Inc. discussed the need for better analysis in order to support and to defend marketability discounts in Tax Court.[106] The article reviewed four recent cases in the Tax Court in which "a new approach developed by Dr. Mukesh Bajaj to determine discounts for lack of marketability has been given weight by the Tax Court." After pointing out several flaws with what he termed "the Bajaj approach," Mr. Hall suggested that "more data" is the answer.

> The Bajaj approach uses only 40 private placements of restricted stock. Obviously the more data that is available, the better the analyst is able to perform a comparative analysis. Moreover, the Bajaj approach examines only four company characteristics. One study, the FMV Opinions Restricted Stock Study™, has more than 240 private placement transactions for the period 1980 to 1996 and more than 190 private placement transactions for the period 1997 to 2000. In addition, the FMV Study looks at more than 30 company or transaction characteristics. Moreover, the Tax Court in both *McCormick* and *Lappo* indicated a strong preference for studies that have been performed by the testifying expert. With such data as supplied in the FMV Study, the appraiser can choose which characteristics to examine and which companies to include in the discount analysis; the FMV Study just supplies him or her with the necessary back-up data.
>
> …Moreover, a significantly larger restricted stock data base – with much greater company and transactional characteristics than the Bajaj approach's database – is available to appraisers to make a comparative analysis and assessment of the appropriate discount for lack of marketability applicable to a specific privately held company.

104 As of this writing, the price for a one year license is $499 and for a two year license $918 (with no indication of any marketability discounts). www.bvresources.com.

105 In order to review the FMV Study, we purchased it.

106 Hall, Lance S., "Counteracting the New and Winning IRS Approach to Determine Discounts for Lack of Marketability," *Valuation Strategies*, March/April 2004, p. 14.

Guideline Company Analysis

It is clear that Mr. Hall is suggesting that the FMV Study can be used by appraisers when employing the guideline company method to value illiquid minority interests in private companies. The *Business Valuation Standards* of the American Society of Appraisers provide "Statements on Business Valuation Standards" (SBVS). The SBVS develop specific guidance for certain topics. The first such statement addresses the Guideline Company Valuation Method.[107]

SBVS-1, Paragraph II.C. states:

> Guideline companies are companies that provide a reasonable basis for comparison to the investment characteristics of the company being valued. Ideal guideline companies are in the same industry as the subject company; however, if there is insufficient transaction evidence available in that industry, it may be necessary to select other companies having an underlying similarity to the subject company in terms of such relevant investment characteristics as markets, products, growth, cyclical variability, and other salient factors.

SBVS-1, Paragraph V. states:

> A comparative analysis of the qualitative and quantitative similarities and differences between the guideline companies and the subject company must be made to assess the investment attributes of the guideline companies relative to the subject company.

Interestingly, SBVS-1 does not address the issue of the proximity in time between guideline transactions used for valuation inferences and the valuation date for the appraisal. However, the "Definitions of Business Valuation Terms" in the ASA's Business Valuation Standards define the valuation date as:[108]

> Valuation Date – the specific point in time as of which the valuator's opinion of value applies (also referred to as "Effective Date" or Appraisal Date").

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107 American Society of Appraisers, *Business Valuation Standards,* "SBVS-1 The Guideline Company Valuation Method," p. 31 (downloaded from the American Society of Appraisers website May 2004).

108 *Ibid*, p. 21.

Groups of guideline public companies are routinely developed by appraisers when valuing private companies. Revenue Ruling 59-60, in fact, mandates the consideration of similar public companies when valuing private companies. A common characteristic of guideline public company analysis is that the pricing of public transactions is considered as of the valuation date, or certainly as close to the valuation date as is practicable given data limitations. However, for most public companies, daily trading information is available, and guideline groups are typically priced *as of the valuation date*.[109]

The FMV Study and Time

The FMV Study, as noted above, is divided into a two year study period, during which the SEC Rule 144 period of restriction was two years (until April 29, 1997), and a one year study period containing transactions occurring after the change in Rule 144 to a one year period of restriction. Transactions in the two studies occur as follows in Figure 5-1:[110]

The FMV Study

Two Year Portion		One Year Portion	
Year	**Total**	**Year**	**Total**
1980	3	1997	7
1981	2	1998	23
1982	7	1999	71
1983	6	2000	79
1984	5	2001	2
1985	12	**Total**	**182**
1986	12		
1987	12		
1988	9		
1989	3		
1990	9		
1991	15		
1992	24		
1993	32		
1994	20		
1995	39		
1996	31		
1997	7		
Total	**248**		

Figure 5-1

109 Some appraisers do, however, examine the pricing patterns in the periods leading up to the valuation date for perspective and to spot unusual trading patterns that might disqualify a particular guideline company from consideration.

110 The entire analysis of the FMV Study is based on the data base as it existed in May 2004.

The majority of the transactions in the two year portion of the FMV Study occurred in the 1990s. The majority of the transactions in the one year portion of the study occurred before the meltdown in the market following the tech boom period. No transactions have been reported on since 2001.

It would seem that the use of transactions from the FMV Study as direct guideline company observations would not meet the customary standard of proximity to the valuation date for appraisals as of a current date.

The FMV Study and Industry

The two portions of the FMV Study can also be stratified by industry classification. One data point in the study is the four-digit SIC Code for each transaction. For purposes of this review, we have sorted the transactions by two digit codes for a broader look (see Figure 5-2). Nine industry classifications account for 185 (75%) of the 248 total transactions in the two year portion of the study. The remaining 63 transactions are spread over 25 other industry categories. Interestingly, of the 28 transactions in SIC Classification #28, 18 represented companies in SIC Code #2834 (pharmaceutical preparations). Of the 24 transactions in SIC Classification #87, 15 are in SIC Code #8731 (services, commercial, physical and biological research).

The FMV Study
Two Year Portion

Two Digit SIC Codes	No.	Two Digit SIC Classification Description
38	35	Measuring, Analyzing & Controlling Instruments
28	28	Chemicals & Allied Products
36	27	Electronic & Other Electrical Equip & Components, except computers
87	24	Engineering, Accounting, Research, Management & Related Svcs.
73	21	Business Services
67	16	Holding & Other Investment Ofices
35	12	Industrial & Commercial Machinery & Computer Equipment
13	11	Oil & Gas Extraction
48	11	Communications
25 Others	63	Various
Total	**248**	

Figure 5-2

The one year portion of the FMV Study can be similarly sorted (see Figure 5-3). Five industry classifications account for 139 (76%) of the 182 transactions, with the 43 remaining transactions being spread over 17 other industry classifications. Of the 54 transactions in SIC Classification # 73, 29 are in SIC Code #7372 (services, prepackaged software), and 20 are in SIC Code #7375 (services, computer-related). Further, of the 26 transactions in SIC Classification #28, 14 are in SIC Code #2834 (pharmaceutical preparations). Of the 22 transactions in SIC Classification #87, 20 are in SIC Code #8731 (services, commercial, physical and biological research).

The FMV Study One Year Portion		
Two Digit SIC Codes	No.	Two Digit SIC Classification Description
73	54	Business Services
38	27	Measuring, Analyzing & Controlling Instruments
28	26	Chemicals & Allied Products
87	22	Engineering, Accounting, Research, Management & Related Svcs.
36	10	Electronic & Other Electrical Equip & Components, except computers
17 Others	43	Various
Total	**182**	

Figure 5-3

It should be clear from this brief classification analysis that the transactions in both the two year and one year portions of the FMV Study are concentrated in a relatively small group of industries. And this small group of industries is not generally representative of privately owned corporate America.[111]

Given the thousands of publicly traded companies in the public securities markets where prices are determined every day in active or relatively active trading, it is quite often impossible to find a group of sufficiently comparable companies (to a given private valuation subject) with which to employ the guideline company method. With a total of only 430 transactions occurring across a span of 22 years, and concentrated in a relatively few industry classifications, the FMV Study provides a limited source for guideline company analysis.

Quintile Analysis of the Two Year Portion of the FMV Study

With a broad overview of the FMV Study's transactional database in mind, it is now appropriate to examine the transactions in more detail to understand the operating nature of the companies involved and any relationships that may be discernible with respect to operating characteristics and restricted stock discounts.

111 Companies whose transactions are in the FMV Study often engaged in multiple restricted stock transactions. In the two year portion, 34 companies engaged in a total of 86 of the 248 transactions. In the one year portion, 32 companies engaged in 76 of the total of 182 transactions. And the restricted stock discounts sometimes varied considerably when the same company engaged in multiple issues. For example, AT&E Corporation, engaged in the wristwatch message paging business, issued restricted stock in March and April of 1987, with one discount being 24% and the other being 50%.

Limited analysis of the FMV Study was provided in a recent article.[112] The data base was divided into quintiles (such that there are five groups of equal size). We performed a similar analysis for this chapter, except that we created a sixth category including all transactions occurring at *restricted stock premiums*, or at prices above the freely traded prices of the respective companies. We made this adjustment because there are apparently different forces or factors at work with those transactions and we found it helpful to examine them separately.

Before proceeding, we should note that the FMV data base includes pricing as of three dates. Prices for each company are recorded in the data base based on the average of the high and low prices for a) the month preceding the transaction, b) the month in which the transaction occurred, and c) the month subsequent to the transaction. The analyses used by FMV Opinions, Inc. in various publications appears to focus on discounts based on subsequent month pricing. However, Figure 5-4 indicates there is a difference in median discounts based on the three different pricing dates.

	Discounts for Two Year Portion		
	PriorMonth	TransMonth	SubMonth
Median	16.7%	20.0%	22.0%
Average	18.2%	21.9%	22.5%
Std Dev	16.7%	16.0%	21.5%
	Discounts for One Year Portion		
	PriorMonth	TransMonth	SubMonth
Median	11.7%	21.8%	23.0%
Average	11.2%	24.1%	20.7%
Std Dev	29.4%	22.4%	35.2%
	Differences in Discounts		
	PriorMonth	TransMonth	SubMonth
Median	-5.0%	1.8%	1.0%
Average	-7.0%	2.2%	-1.8%

Figure 5-4

The median discounts based on subsequent month pricing are 22.0% for the two year portion of the study and 23.0% for the one year portion. This observation would suggest that discounts *increased* with a *decrease* in required holding periods, which is counter to theoretical expectations, assuming other things remain equal. This apparent anomaly was attributed to an increase in volatility between the two periods.[113] Note that the differences are as expected when prior month pricing (or even average discounts for the subsequent month). Perhaps, other things were not equal (other than volatility), or there were other reasons for higher volatility, as will be seen below.

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112 Hall, Lance S., "The Search for the Holy Grail: Getting Away from the 15-Minute Discount Determination," *The Value Examiner*, July/August 2004.

113 Hall, Lance, S., "Why Are Restricted Stock Discounts Actually Larger for One-Year Holding Periods?" *Business Valuation Update,* September 2003.

For the two year portion of the FMV Study, the median and average discounts rise based on the selection of pricing based on the high/low average of the prior month (which would presumably reflect no market reaction to the yet unannounced transaction), to the transaction month (which could be based on a price before or after the announcement), to the subsequent month pricing (which would incorporate the markets' reaction to the deal). A similar trend is seen in the one year portion of the data base; however, the jump between prior month and transaction month discounts is much more pronounced in the one year portion. Users of the FMV Study should be aware of the sensitivity of median discounts to the selection of the pricing date for transactions.

The following analysis was conducted using 14 of the more than 50 fields in the FMV Study's database. Figure 5-5 summarizes the quintile analysis and provides overall median observations for the two year portion of the study, as well.

OVERVIEW ANALYSIS OF THE FMV OPINIONS RESTRICTED STOCK STUDY™ (248 Restricted Stock Transactions Occurring 1980-1997)

TWO YEAR ANALYSIS

	Transactions at Premiums	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile	Overall Medians
Median Restricted Stock Discounts	**-5.4%**	**4.9%**	**15.9%**	**25.0%**	**34.7%**	**51.0%**	**22.2%**
Number of Transactions	*23*	*45*	*45*	*45*	*45*	*45*	*248*
Transaction Pricing	*Median Statistics for each Characteristic*						
Per Share Price	$11.53	$9.56	$6.00	$6.20	$4.00	$3.04	$6.00
Offer Amount ($mm)	$9.6	$8.0	$5.9	$4.5	$2.6	$2.8	$4.7
% of Company Placed	10.3%	7.9%	12.5%	10.1%	8.7%	14.7%	10.8%
Pre-Transaction Co. Stats ($mm)							
Market Capitalization	$100.4	$115.4	$72.9	$46.8	$31.4	$25.4	$51.6
Book Value	$8.0	$20.2	$5.60	$10.4	$4.5	$3.5	$7.0
Price/Book Multiple	6.56	5.7	4.99	4.58	6.83	7.5	5.76
Total Assets	$19.4	$38.7	$14.6	$23.5	$10.1	$6.9	$15.6
Revenues	$15.0	$29.8	$11.9	$25.4	$9.8	$5.6	$12.8
EBITDA	$0.8	$1.3	$0.3	$0.8	($0.5)	($0.4)	($0.4)
Net Income	($1.2)	($1.0)	($0.8)	($0.7)	($1.3)	($0.9)	($0.9)
Operating Margin	-0.4%	1.7%	-4.5%	0.1%	-8.0%	-8.1%	-2.8%
Volatility	0.57	0.6	0.66	0.6	0.75	0.85	0.69
Z-Score	11.49	9.2	7.08	6.18	7.67	10.2	7.89
Dividend Yield	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Implied Market Cap/Revenues	**6.7**	**3.9**	**6.1**	**1.8**	**3.2**	**4.5**	**4.0**

Figure 5-5

The overall median restricted stock discount for the pre-1997 transactions is 22.2%, as seen at the upper right portion of the table above.[114] As with all previous studies of restricted stock transactions, looking only at median discounts (the far right column in Figure 5-5) masks the broad range of discounts in the study. The actual discounts range from a high discount of 81% (for a transaction involving LXR Biotechnology, Inc. in December 1996) to a low discount, actually a 92% premium (for a transaction involving ACS Enterprises, Inc., a company in the analog and wireless television subscription businesses in October 1993).

Some 23 transactions occurred at a premium discount with a median premium of 5.4% (a restricted stock discount of *minus* 5.4%), as seen in the far left column of Figure 6. Premium transactions can occur because the purchase price was actually set at a premium to the market price, or because of a decrease in the stock price between the date of the announcement and the subsequent month pricing in the FMV Study, or both. We do not really know the reasons for premium transactions, so they are treated separately.

The remaining 225 transactions were divided into five quintiles of 45 transactions each. As indicated at the top-middle of the table above, there is a steady rise in restricted stock discounts across quintiles, with the first quintile having a 4.9% median discount and the fifth quintile having a median observation of 51.0%. We can observe the following from the quintile analysis:

- The median market capitalization declines steadily from $115 million (Q1) to $25.4 million (Q5). The obvious inference is that restricted stock discounts tend to increase as size, as measured by market capitalization, increases.[115]

- There is no similar correlation with size, as measured by revenues. The median company in every quintile is losing money. Only 98 companies of the 248 observations in the pre-1987 study were profitable, meaning that some 60% of the transactions involved companies that were losing money.

- Volatility (as measured by the annualized standard deviation of the continuously compounded rate of return on each company's common stock – with the standard deviation determined by examining the week-over-week difference in the weekly closing price analyzed over the one year period prior to the transaction date) generally rises over the quintiles from 0.60 (Q1) to 0.85 (Q5).

- The median dividend yields are all 0%, and only 24 of the 248 transactions involved companies paying dividends.

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114 The slight discrepancy in the quintile calculation and the overall median calculation presented above (22.2% versus 22.0%) results from the fact that in the quintile analysis, if there was no price in the database for the subsequent month, we attributed the transaction month discount for that observation (so that our quintiles would have even numbers of observations).

115 Despite this observed trend in the quintiles, there is no statistically significant correlation between observed discounts and either market capitalization or revenues (or of the log of each).

The surprising characteristic of the median revenue analysis is that, overall, the companies in the two year portion are quite small by public standards (median revenues of $12.8 million). The implied multiples of market capitalization to revenues (based on median pricing) are surprising, with an overall median of 4.0x revenues.[116] The bottom line of this analysis is that the two year study is comprised of fairly small companies selling at quite rich market valuations. The median price/book multiple implied by market pricing was 5.8x, again indicating relatively rich market pricing in comparison to most closely held companies valued by appraisers.

Quintile Analysis of the One Year Portion of the FMV Study

We prepared a similar analysis of the one year portion of the FMV Study, as shown in Figure 5-6.

OVERVIEW ANALYSIS OF THE FMV OPINIONS RESTRICTED STOCK STUDY™ (182 Restricted Stock Transactions Occurring 1997-2001)

ONE YEAR ANALYSIS

	Transactions at Premiums	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile	Overall Medians
Median Restricted Stock Discounts	**-20.0%**	**8.1%**	**20.3%**	**32.9%**	**45.8%**	**67.8%**	**23.0%**
Number of Transactions	*43*	*28*	*28*	*28*	*28*	*27*	*182*
Transaction Pricing	*Median Statistics for each Characteristic*						
Per Share Price	$11.08	$8.43	$6.87	$7.50	$5.00	$3.38	$7.45
Offer Amount ($mm)	$11.6	$11.3	$4.6	$5.0	$5.0	$3.3	$5.1
% of Company Placed	6.7%	8.7%	4.8%	6.4%	7.2%	12.1%	7.2%
Pre-Transaction Co. Stats ($mm)							
Market Capitalization	$181.0	$137.9	$95.2	$89.2	$88.7	$36.1	$104.3
Book Value	$15.8	$30.1	$4.20	$8.40	$6.50	$5.6	$9.1
Price/Book Multiple	11.4	4.7	16.1	4.9	9.3	6.3	7.6
Total Assets	$28.2	$62.1	$7.8	$14.0	$10.4	$7.5	$18.5
Revenues	$12.1	$20.5	$3.4	$4.4	$2.4	$1.8	$4.4
EBITDA	na	na	na	na	na	na	na
Net Income	($9.3)	($5.2)	($5.9)	($4.9)	($4.9)	($7.1)	($6.8)
Operating Margin	-69.2%	-39.5%	-142.9%	-40.4%	-177.5%	-424.4%	-97.3%
Volatility	0.99	0.83	1.01	0.98	1.04	1.44	1.02
Z-Score	52.7	5.4	44.4	80.9	61.8	87	47.8
Dividend Yield	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Implied Market Cap/Revenues	**15.0**	**6.7**	**28.0**	**20.3**	**37.0**	**20.1**	**23.7**

Figure 5-6

The overall median restricted stock discount for the one year portion of the FMV Study is 23.0% (based on subsequent month discounts), or slightly higher than the median for the two year portion of the study. As with the two year analysis, we can make a number of observations:

116 We calculated the preferred market value of total capital to revenue multiples for the two year study. The overall median multiple was 3.6x, or fairly close to the 4.0x multiple shown in the table.

- The discounts rise consistently across quintiles, with the fifth quintile median, at 67.8%, being considerably higher than the fifth quintile median of the two year portion (51.0%). This result occurred (with similar overall medians) at least in part because of the higher proportion of observations exhibiting negative discounts (restricted stock premiums). 43 (24%) of the 182 transactions reflected restricted stock premiums.

- Median discounts for the quintiles are again negatively (visually) correlated with size as measured by market capitalization. The median company measured by revenues has only $4.4 million in revenues. By way of perspective, 12 companies had no revenues, another 12 companies had revenues less than $100 thousand, and a total of 43 companies (inclusive) had revenues less than $1.0 million.

- The median observations for all quintiles indicate substantially negative profitability. Only 26 of the 182 observations involved companies with profitable operations (defined as pre-tax greater than zero).

- Volatility generally rose across the quintiles, with an overall median volatility of 1.02.

- The median dividend yield was 0%. None of the companies in the one year portion of the FMV Study paid dividends.

The surprising characteristic of the median revenue analysis for the more recent, one year study is that, overall, like the two year study, the companies in the one year portion are quite small by public standards (median revenues of only $4.4 million). The implied multiples of market capitalization to revenues (based on median pricing) are astonishing, with an overall median of 23.7x revenues. The bottom line of this analysis is that the one year study is comprised of quite small companies selling at very dear market valuations. The median price/book multiple implied by market pricing was 7.6x, again indicating rich market pricing in comparison to most closely held companies valued by appraisers.

Comparing the Medians – Two Years vs. One Year

To compare the results of the two year portion with the one year portion, we provide a summary table in Figure 5-7 highlighting the differences in median observations. Recall that the Hall article attributed the increase in the one year median restricted stock discount to an increase in the volatility of the earnings of the companies in the two portions of the study.

COMPARISON OF MEDIAN OBSERVATIONS
FMV OPINIONS RESTRICTED STOCK STUDY™
TWO YEAR PORTION VS. ONE YEAR PORTION

	Two Year Overall Medians	One Year Overall Medians	Differences	Observations
Restricted Stock Discounts	**22.2%**	**23.0%**	0.8%	*"Significant" implies*
Number of Transactions	*248*	*182*		*change > 20%*
Transaction Pricing				
Per Share Price	$6.00	$7.45	$1.45	Significant increase
Offer Amount ($mm)	$4.7	$5.1	$0.4	Increase
% of Company Placed	10.8%	7.2%	-3.6%	Significant decrease
Pre-Transaction Co. Stats ($mm)				
Market Capitalization	$51.6	$104.3	$52.7	Significant increase
Book Value	$7.0	$9.1	$2.1	Significant increase
Price/Book Multiple	5.76	7.6	1.84	Significant increase
Total Assets	$15.6	$18.5	$2.9	Increase
Revenues	$12.8	$4.4	-$8.4	Significant decrease
EBITDA	($0.4)	na	nm	
Net Income	($0.9)	($6.8)	($5.9)	Significant decrease
Operating Margin	-2.8%	-97.3%	-94.5%	Significant decrease
Volatility	0.69	1.02	0.33	Significant increase
Z-Score	7.89	47.8	39.91	Significant increase
Dividend Yield	0.0%	0.0%	0.0%	
Implied Market Cap/Revenues	**4.0**	**23.7**	**19.7**	**Significant increase**

Figure 5-7

Our analysis suggests that there are numerous reasons for any differences in the two median restricted stock discounts. Other things did not remain the same. There were significant changes (defined as 20% or more, plus or minus), in several important operating statistics and market pricing.

- Fueled by robust markets prior to the tech meltdown, the median market capitalization more than doubled between the two portions of the study.
- The portion of the company being sold was considerably smaller in the latter analysis.
- Relative pricing as measured by price/earnings multiples or price/book multiples increased significantly in the latter study.
- Profit dynamics also deteriorated considerably as measured by margins or by earnings.

In short, the one year study (after April 1997) contains transactions involving companies even less similar to private corporate America than the pre-1997 transactions.

Comparing Conclusions

In a 2004 article, regarding a quintile analysis of the two year data, Mr. Hall writes:

> In assessing the relevance of these data, it is important to understand that private placements of restricted stock do not reflect the normal cross section of all publicly traded companies. Rather, pure play restricted stock transactions are heavily weighted towards the small, micro-cap segment of the public marketplace. Many of the attributes of the companies in the FMV Study are similar with many of the small privately held companies that appraisers typically value.[117]

It should be clear that this analysis is incomplete and does not focus on the salient operating characteristics of the companies in the FMV Study. For example, the quintile analysis tables in the Hall article include only median data for restricted stock discounts, market value (capitalization), volatility, total assets, revenues, and price per share. The more complete analysis in this chapter does not suggest general comparability with private corporate America.

Block Size vs. the Discount

Mr. Hall states the following in reference to a graph in his article entitled "Block Size vs. The Discount: A Closer Look At The Top Quintile":[118]

> The table above demonstrates that the marketplace recognizes the differences in liquidity between large percentage blocks of restricted stock and small percentage blocks of restricted stock. Percentage blocks less than 20% had a median discount of only 18%, whereas the median discount for blocks over 35% had a median discount of 58 percent.
>
> By recognizing the differences in liquidity between large- and small-blocks, the FMV Study data become meaningful in the valuation of privately held companies. Unlike the restricted stock of a public company, the illiquidity of a one-percent block in a private company is similar to the illiquidity of a 30-percent block in the same company. Moreover, the illiquidity of a large block restricted stock transaction is more similar to the illiquidity of any minority interest of a privately held company.

Before addressing the statistics in the first quoted paragraph above, the second quoted paragraph should be discussed. Mr. Hall asserts: a) small blocks of *public companies* are more liquid than larger blocks of public companies; and, b) the illiquidity of a small block in a *private company* is similar to that of a larger block in the same company. Note first that assertion a) is supported only by the referenced graph. Note second that assertion b) is not supported at all.

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117 Hall, Lance S., "Block Size vs. The Discount: A Closer Look at the Top Quintile," *The Value Examiner*, May/June 2004.

118 *Ibid*.

We stratified the two year portion of the database by block size. Figure 5-8 provides the results of that stratification, which was sorted by subsequent month pricing discounts. As before, if there was no discount for a transaction in the subsequent month field, we substituted the transaction month discount as a proxy in order to have a complete data set. This could cause some differences between Mr. Hall's calculations and ours.

		TWO YEAR ANALYSIS		
		Median Restricted Stock Discounts for the Indicated Ranges of Block Sizes		
Post-Transaction Block Size Ranges	No. Trans.	Prior Month Pricing	Trans. Mo Pricing	Subsequent Mo. Pricing
Less than 20%	206			
Median		16.2%	19.3%	19.0%
Average		17.2%	20.2%	20.3%
20% up to 25%	18			
Median		19.5%	21.3%	25.4%
Average		21.0%	25.8%	32.6%
25% up to 30%	11			
Median		23.8%	20.0%	26.6%
Average		19.2%	24.8%	28.6%
30% up to 35%	7			
Median		36.0%	40.9%	40.3%
Average		23.2%	38.1%	41.8%
35% and Over	6			
Median		37.7%	48.2%	30.6%
Average		35.5%	44.6%	35.8%
Total Transactions	248			
Median		16.7%	20.0%	22.2%
Average		18.2%	21.9%	22.7%

Figure 5-8

In the first paragraph quoted in this section, Mr. Hall stated that small percentage blocks (less than 20%) had median discounts of only 18%, whereas the largest blocks (over 35%) had a median discount of 58%. Our analysis essentially affirms the statement regarding small percentage blocks. Our calculations differ somewhat from Mr. Hall's analysis, at least based on subsequent month pricing. Median discounts rise from 25.4% (20% to 25% block sizes) to 26.6% (25% to 30% block sizes), to 40.3% (30% to 35% block sizes), and then fall to 30.6% for block sizes over 35%.

What the Hall analysis did not state is that the under 20% segment of the database represents 206 transactions, or more than 80% of all observations. The two segments where Mr. Hall's graph indicates the largest discounts are comprised of a total of only 13 observations, or 5% of the observations.

The FMV Discount for Lack of Marketability Method

Mr. Hall advances the FMV Approach, which is really a valuation method (within the guideline company method, which is within the market approach to valuation). We summarize the method here in order to illustrate the comparative foundations upon which it is built.

- Conduct a comparative analysis between the subject interest and the small block portion of the database. Presumably, this would involve comparisons with the 206 transactions having discounts under 20%.

- Make comparisons on characteristics like revenue, total assets, volatility, book value, market value, profit, profit martins, volatility, market-to-book ratios and dividends. Mr. Hall provides only the first three, plus price per share, in his published analysis.

- Based on these comparisons, develop an "as if" restricted stock of a public company discount ("restricted stock equivalent discount" or RED)

- Make another analysis comparing the subject company with the companies exhibiting large discounts. Presumably, such comparisons would be made with the 13 transactions having discounts greater than 30% and develop a "large block discount increment, "or LBI. *Note that the total discount from which the LBI would be calculated (TD) would have to be the result of the analysis of the 13 large block transactions, (although TD is not mentioned specifically in the article).*

- Obtain the appropriate "private company discount," (PCD), by summing the RED and the LBI. According to Mr. Hall's article: PCD = RED + LBI

We can now see that there is more than a bit of round-about reasoning in the FMV method. It calls for analyzing the small block portion of the database in order to develop RED. It then says to analyze the large block portion to develop LBI, which is the result of a total discount (TD) less the just-derived RED. However, we see that the objective of the analysis, the PCD, is determined once TD is determined.

PCD = RED + LBI (per Mr. Hall's definition)

TD = RED + LBI (the two add up to the same total)

Therefore: TD = PCD

Once TD is known, the PCD is also known. And TD is determined by analyzing only a small handful of transactions, as should be clear from Figure 5-8 above.

All of this follows from Mr. Hall's unsupported assertion that illiquid interests of private companies, whether large or small, are more like large blocks of restricted shares of public companies (in terms of relative illiquidity) than smaller blocks of restricted shares of public companies. If TD = PCD, and TD is determined from only 13 or so transactions in the data base, why do we need the rest of the database when valuing illiquid interests of private companies? Would it not be better to perform the most in-depth analysis of those 13 transactions possible to obtain the "right" discount, and then to apply that discount to all situations? In seeking to specify a methodology, the FMV method breaks down.

IMPLIED REQUIRED RETURNS, THE QMDM AND THE FMV STUDY

The purpose of marketability discount analysis is to determine, to the best of an appraiser's ability, the appropriate discount applicable to each particular valuation situation. The analysis thus far suggests that the FMV Study is of limited use as a basis for guideline company analysis, where the standard is comparability in terms of business characteristics and the proximity of the pricing of guideline transactions with the valuation date. As described in the analysis above, the FMV Study, including both the two year and one year portions, does not provide substantial comparative information that relates to most of private corporate America, at least as observed in our experience.

We have suggested that restricted stock studies can be used as evidence of the existence of and general magnitude of restricted stock discounts. We have also suggested that the studies (whether using averages or individual transactions) can be used to infer the implied required rates of return imbedded within the various transactions.[119]

Using the quintile analysis of the two year portion of the FMV Study, we can see how this type of analysis works. In the top portion of Figure 5-9 below, the quintile discounts are repeated from Figure 5-5 above. In the middle portion, implied returns for the median transaction in each quintile are shown. In order to estimate a required return, basic present value analysis suggests that three factors are needed:

- *A present value (PV).* In this case the discounted price for each median transaction is used (on the basis of remaining percentage of $1.00).

- *A future value (FV).* For purposes of this analysis, we have assumed that the expected growth in value (i.e., the discount rate for the public companies assuming no dividends) is 15% per year, compounded, from the base (indexed) price of $1.00 per share. This assumption would not, of course be appropriate for all companies; however, varying the base equity discount rate over a fairly wide range does not change the general conclusions of this analysis.

[119] The analysis of this section addresses Mr. Abrams' question (noted in Chapter 1) regarding the magnitude of expected holding period premiums implied by the restricted stock studies.

- *An expected holding period (HP).* We have estimated the number of quarters needed to dribble out each block under Rule 144 at the greater of 1% of shares outstanding or weekly average trading volume as provided for each transaction in the FMV Study (assuming a constant dribble rate). The implied holding period is then determined by adding the two year period of Rule 144 restriction to the half-life of the years to dribble (quarters / 4 / 2). For clarity, the first quintile holding period of 2.66 years (highlighted below) is calculated as follows: 2 years + (5.25/4)/2 = 2.66 years.

	Two Year Portion of the FMV Study						
	Transactions at Premiums	**First Quintile**	**Second Quintile**	**Third Quintile**	**Fourth Quintile**	**Fifth Quintile**	**Overall Medians**
Restricted Stock Discounts	**-5.4%**	**4.9%**	**15.9%**	**25.0%**	**34.7%**	**51.0%**	**22.2%**
Number of Transactions	*23*	*45*	*45*	*45*	*45*	*45*	*248*
Returns Based on Discounts	*Implied Returns for Expected Holding Periods Based on Rule 144 Dribble-Out Provisions Assuming a Base Equity Discount Rate of 15.0% for all Companies*						
Prior Month Hi-Lo Avg Pricing	18.4%	18.2%	18.6%	20.5%	26.8%	29.3%	22.4%
Transaction Mo. H--Lo Avg	16.2%	19.4%	22.1%	25.2%	32.3%	34.9%	23.9%
Subsequent Mo. Hi-Lo Avg	12.3%	17.5%	22.0%	26.9%	34.2%	44.3%	24.4%
Quarters to Dribble (Rule 144)	*3.58*	*5.25*	*5.4*	*7.32*	*7.86*	*10.9*	*5.53*
Implied Holding Period (Years)	*2.45*	*2.66*	*2.68*	*2.91*	*2.98*	*3.36*	*2.69*
Returns Based on Discounts	*Implied Holding Period Premiums (HPP) Relative to Assumed Base Equity Discount Rate*						
Prior Month Hi-Lo Avg Pricing	3.4%	3.2%	3.6%	5.5%	11.8%	14.3%	7.4%
Transaction Mo. H--Lo Avg	1.2%	4.4%	7.1%	10.2%	17.3%	19.9%	8.9%
Subsequent Mo. Hi-Lo Avg	-2.7%	2.5%	7.0%	11.9%	19.2%	29.3%	9.4%

Figure 5-9

The middle portion of the figure displays the median of calculated required returns implied by each quintile's assumptions. For example, the first quintile's subsequent month pricing return of 17.5% is the median of the individual transactions in the quartile calculated as follows:

$$[(1 + 15\%)^{\wedge HP} / (1 - RSD)]^{\wedge (1/HP)} - 1$$

Note that the implied required returns for the first through the third quintiles are in the range of the high teens to the mid-twenties in percentage points. The implied holding period premiums (relative to the assumed equity discount rate of 15%) are in the range of 3% to 12% or so. The median implied holding period return is 24.4% for the overall two year portion of the study (based on subsequent month pricing), and the median holding period premium is 7.4%. The implied expected returns are lower for the premium transactions and higher for the higher level discounts in the fourth and fifth quintiles.

These median expected required returns and expected holding period premiums (R_{hp} and HPP from the QMDM discussion in Chapter 1) appear reasonable in light of the nature of the restricted stock transactions and the general nature of the issuing companies. And the general level of returns can be used as a basis for estimating holding period premiums in the valuation of illiquid interests of private companies.

Why might it be a superior methodology to look at restricted stock transactions in terms of their implied required returns rather than in the absolute level of their discounts?

- First, market participants, particularly actual buyers of illiquid interests in public companies, do not make decisions based on the absolute levels of discounts in other transactions. While the price negotiated will always reflect a discount (positive, zero, or negative), pricing decisions, in our experience, are based on expected return requirements over expected investment horizons.

- Second, the standard deviation of expected required returns is much smaller than the standard deviation of population restricted stock discounts. The discounts are a single number and reflect only the relationship between current market prices and restricted stock transaction prices. The implied returns, while still a single number, reflect the influence of an estimate of expected return for the public securities, the expected holding period until liquidity, and the transaction price. If the assumptions made are reasonable, the variability of implied required returns should be less than that of raw discounts – they take into account more information about the investment decision-making process of investors. The relative variability of restricted stock discounts and implied required returns can be seen in Figure 5-10.

	Two Year Portion of the FMV Study					
	Restricted Stock Discounts			Implied Required Returns*		
	Prior Mo.	Trans Mo.	Subs. Mo.	Prior Mo.	Trans Mo.	Subs. Mo.
Medians	16.7%	20.0%	22.0%	22.4%	23.9%	25.0%
Averages	18.2%	21.9%	22.5%	24.7%	26.5%	27.6%
Std Deviations	16.8%	16.0%	21.5%	10.4%	10.6%	13.7%

** Assuming base equity discount rate for all companies is 15.0%*

Figure 5-10

- And third, the use of implied required returns in the context of models like the QMDM enables appraisers to simulate the thinking of hypothetical and real life investors when determining marketability discounts.

The fact that appraisers must still make estimates of holding period premiums to enterprise equity discount rates when employing the QMDM to value shareholder level interests does not negate the benefit of discounted cash flow analysis. In fact, as indicated in the discussion of the QMDM, appraisers must often estimate specific company and/or specific shareholder-level risks when employing discounted cash flow analysis. And they do so in light of market evidence as outlined in the discussion of the FMV Study.

Guideline Analysis Applied to the QMDM Examples

We used the QMDM to estimate marketability discounts in three example cases in Chapter 1. The first two examples involved minority interests in partnerships, with one holding non-income producing land, and the other holding an attractive apartment building and providing substantial cash flows to limited partners.

The transactions in the FMV Study do not involve any companies holding primarily land, apartments, or securities, so there are no directly comparable observations in the data base. The Business Valuation Resources website contains a list of questions and answers regarding the FMV Study. [120] The question regarding the use of the study in valuing partnerships is addressed there:

> **Q. Is the FMV marketability discount as applicable for a family limited partnership with real estate interest as it is for corporations?**
>
> **R.** 1. Since the FMV Restricted Stock Study™ includes data on the differences in value between fully-marketable and less-marketable securities, it could be applied to ANY situation where the marketability discount is an issue, but the data is clearly more applicable in some situations than in others.
>
> 2. The data is most applicable to the following marketability discount determinations, in descending order: (a) the restricted (subject to Rule 144) stock of publicly traded companies; (b) the stock of privately held operating entities; (c) everything else.
>
> 3. When valuing non-controlling illiquid interest in FLPs holding real estate, analysts often use transactions from the secondary market for partnership interests (Partnership Spectrum). This data, since it pertains directly to real estate holding partnerships, are most directly applicable to RE holding FLPs. However, the lack of marketability discount may not be fully reflected in the secondary market discount data, since these interests do have a market, albeit not a very active or liquid one. Thus, the FMV study could be used to determines a marketability discount for FLPs holding real estate either (a) directly, through determining a discount for entities that are relatively similar to the subject entity and adding this discount to the discount from the secondary market transactions or (b) as a smaller increment for the incremental lack of marketability of an interest in an FLP vs. an interest in a partnership trading in the secondary market. This last discount could be based on the difference between large block and small block transactions in the FMV study (since large blocks are less liquid than small blocks).

[120] See www.bvmarketdata.com/defaulttextonly.asp?f=FMV%20Faqs.

This question and response suggest that the FMV Study is most applicable to the valuation of restricted shares of public companies, then to illiquid interests in private companies, then to everything else. The stretch gets further and further as one moves to FLPs that are non-income producing, and then to FLPs that are income producing, and to the general category of asset holding entities.

In the third part of the response above, we fail to see how dated transactions in non-comparable entities can shed much light on the question of appropriate marketability discounts for asset holding entities, particularly using direct, guideline company analysis. There are no comparables. Once again, the existence of discounts can be used to develop implied required holding period rates of return, which can be used as one data set in determining the required holding period rates of return using the QMDM, but the direct approach seems destined to failure.

The suggestions regarding incremental discounts to the net asset value of real estate partnerships is even further afield. We do not see the relevance of the suggested methodology. And finally, the suggestion regarding large block transactions is also unworkable in the partnership or asset holding entity structure. First, there are only a handful of the large block, large discount transactions (13 by our count), and it can be seen immediately that these companies bear no resemblance whatsoever to real estate holding entities.

Example #3 in the QMDM discussion in Chapter 1 was an attractive, $50 million revenue company. We estimated that the expected growth in value was 15% and there was no expectation of dividends. The expected holding period was estimated to be eight to ten years, and the required holding period return was selected as 20.0%. Based on these assumptions, a marketability discount of 27% was developed using the QMDM.

We have used a guideline company analysis using the FMV Study to illustrate how one might attempt to develop a marketability discount for Example #3, and also to relate the analysis to quantitative, rate of return analysis and the QMDM. We used the two year portion of the FMV Study. Our selection criteria were:

- Begin with the entire data base of 248 transactions

- Sort on companies having revenues in the range of $25 million to $100 million. This sort eliminated 194 companies from further consideration.

- Sort the remaining 54 transactions based on net margins in the range of 5% to 12% (relative to our subject company's 10% net margin). This sort eliminated another 36 companies.

- Sort the remaining 18 transactions to eliminate those companies paying dividends. This sort eliminated another 5 companies.

- The remaining 13 transactions constitute our guideline group for Example #3.

The resulting guideline company group is presented in Figure 5-11.

Example #3
Guideline Company Analysis

Screens to FMV Study Two Year Portion of Data Base	
All Companies in Two year Data Base	**248**
Revenues $25-$100 Million	**-194**
Net Margins 5% to 12%	**-36**
Dividend Paying Stocks Eliminated	**-5**
Remaining in Guideline Group	**13**

Company	SICCode General	TransMonth	Years Before Val. Date	Total Revenues ($ 000's)	Net ProfitMargin	Effective Holding Period (Yrs)*
Pharmakinetics Laboratories, Inc.	87	4/1/1990	14.2	$26,758	10.4%	**2.5**
Presstek, Inc.	35	2/1/1996	8.3	$27,611	10.4%	**2.0**
Ryan's Family Steak Houses, Inc.	58	3/1/1985	19.3	$32,874	10.2%	**2.8**
Ryan's Family Steak Houses, Inc.	58	11/1/1985	18.6	$32,874	10.2%	**2.2**
Mechanical Technology Incorporated	38	6/1/1996	8.0	$29,748	9.8%	**6.7**
Telepictures Corporation	78	8/1/1984	19.8	$74,186	8.2%	**2.9**
GENDEX Corporation	38	3/1/1991	13.3	$29,385	8.1%	**3.4**
North American Holding Corporation	62	5/1/1987	17.1	$36,677	8.0%	**2.7**
ICN Pharmaceuticals Inc.	28	8/1/1983	20.8	$38,744	7.7%	**2.8**
Genus, Inc.	35	2/1/1995	9.3	$63,616	6.6%	**2.4**
Concord Camera Corp.	38	1/1/1992	12.4	$48,459	5.9%	**2.2**
Carrington Laboratories, Inc.	38	4/1/1995	9.2	$25,430	5.6%	**2.5**
Electro-Nucleonics, Inc.	38	10/1/1981	22.7	$34,959	5.0%	**2.2**
Medians			**14.2**	**$32,874**	**8.1%**	**2.5**
Averages			**14.8**	**$38,563**	**8.1%**	**2.9**
Lows			**8.0**	**$25,430**	**5.0%**	**2.0**
Highs			**22.7**	**$74,186**	**10.4%**	**6.7**
		Valuation Date				
Subject Company Example #3	**73**	**5/31/2004**	**0.0**	**$50,000**	**10.0%**	**9.0**

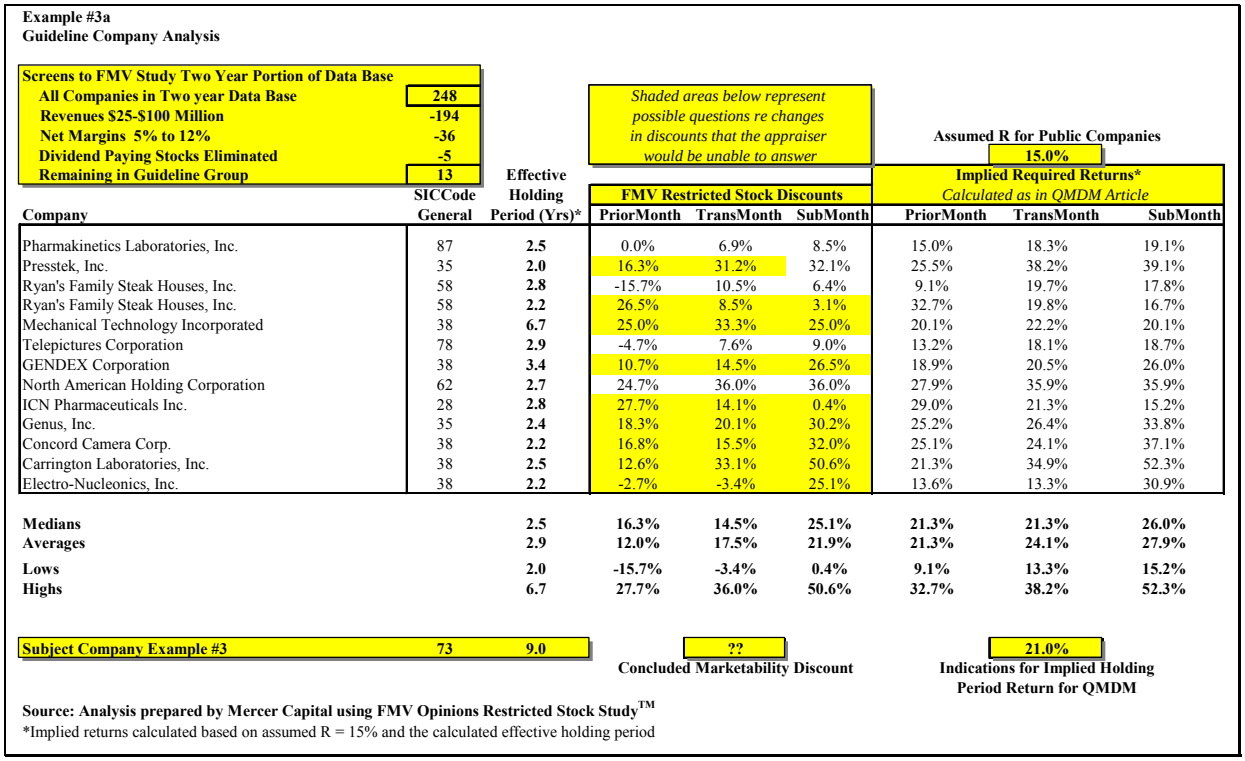
Source: Analysis prepared by Mercer Capital using FMV Opinions Restricted Stock Study™
* Effective holding period estimated based on estimated period required to dribble shares under Rule 144 after a two year period of restriction on sales

Figure 5-11

Our $50 million company compares reasonably in terms of size with the median revenues ($32.9 million) and average ($38.6 million) for the selected guideline group, although it is larger. In addition, the profit margin comparisons appear to be reasonable.

Comparability stops at this point. There are no close matches in terms of SIC Code General Classifications. The average transaction in the guideline group took place about 15 years prior to the valuation date. And the effective holding periods for the guideline group are much shorter than for the investment represented by Example #3.

We can now look at the analysis of restricted stock discounts for the selected guideline group in Figure 5-12.



Example #3a
Guideline Company Analysis

Screens to FMV Study Two Year Portion of Data Base	
All Companies in Two year Data Base	**248**
Revenues $25-$100 Million	**-194**
Net Margins 5% to 12%	**-36**
Dividend Paying Stocks Eliminated	**-5**
Remaining in Guideline Group	**13**

Shaded areas below represent possible questions re changes in discounts that the appraiser would be unable to answer

Assumed R for Public Companies **15.0%**

Company	SIC Code General	Effective Holding Period (Yrs)*	FMV Restricted Stock Discounts PriorMonth	FMV Restricted Stock Discounts TransMonth	FMV Restricted Stock Discounts SubMonth	Implied Required Returns* (Calculated as in QMDM Article) PriorMonth	Implied Required Returns* TransMonth	Implied Required Returns* SubMonth
Pharmakinetics Laboratories, Inc.	87	**2.5**	0.0%	6.9%	8.5%	15.0%	18.3%	19.1%
Presstek, Inc.	35	**2.0**	16.3%	31.2%	32.1%	25.5%	38.2%	39.1%
Ryan's Family Steak Houses, Inc.	58	**2.8**	-15.7%	10.5%	6.4%	9.1%	19.7%	17.8%
Ryan's Family Steak Houses, Inc.	58	**2.2**	26.5%	8.5%	3.1%	32.7%	19.8%	16.7%
Mechanical Technology Incorporated	38	**6.7**	25.0%	33.3%	25.0%	20.1%	22.2%	20.1%
Telepictures Corporation	78	**2.9**	-4.7%	7.6%	9.0%	13.2%	18.1%	18.7%
GENDEX Corporation	38	**3.4**	10.7%	14.5%	26.5%	18.9%	20.5%	26.0%
North American Holding Corporation	62	**2.7**	24.7%	36.0%	36.0%	27.9%	35.9%	35.9%
ICN Pharmaceuticals Inc.	28	**2.8**	27.7%	14.1%	0.4%	29.0%	21.3%	15.2%
Genus, Inc.	35	**2.4**	18.3%	20.1%	30.2%	25.2%	26.4%	33.8%
Concord Camera Corp.	38	**2.2**	16.8%	15.5%	32.0%	25.1%	24.1%	37.1%
Carrington Laboratories, Inc.	38	**2.5**	12.6%	33.1%	50.6%	21.3%	34.9%	52.3%
Electro-Nucleonics, Inc.	38	**2.2**	-2.7%	-3.4%	25.1%	13.6%	13.3%	30.9%
Medians		**2.5**	**16.3%**	**14.5%**	**25.1%**	**21.3%**	**21.3%**	**26.0%**
Averages		**2.9**	**12.0%**	**17.5%**	**21.9%**	**21.3%**	**24.1%**	**27.9%**
Lows		**2.0**	**-15.7%**	**-3.4%**	**0.4%**	**9.1%**	**13.3%**	**15.2%**
Highs		**6.7**	**27.7%**	**36.0%**	**50.6%**	**32.7%**	**38.2%**	**52.3%**
Subject Company Example #3	**73**	**9.0**		**??**			**21.0%**	

Concluded Marketability Discount

Indications for Implied Holding Period Return for QMDM

Source: Analysis prepared by Mercer Capital using FMV Opinions Restricted Stock Study™
*Implied returns calculated based on assumed R = 15% and the calculated effective holding period

Figure 5-12

Restricted stock discounts for all three pricing dates are shown in Figure 5-12. As can be seen by the shaded portion in the middle, there are significant and unexplained swings in restricted stock discounts between dates for most of the companies. Such issues in a data base can be problematic for an appraiser attempting to defend his or her assumptions.

There are quite wide swings between the high and low discounts for even this group of "comparable" companies. Importantly, there is a substantial difference in the median restricted stock discounts between the prior month and transaction month, and then the subsequent month. With such differences, an appraiser had better be certain that his or her selection of one or the other is the most appropriate choice.

The question is: using this data, how does the appraiser decide on a single marketability discount? That choice must reconcile all the differences noted above as well as the six year difference in expected holding period for the subject company. These are difficult reconciliations on a subjective basis. And the choice must be a net choice, which means that there is no way to distinguish between issues related to the holding period or to the restricted stock observations, or to any other factors.[121]

121 The issue in this choice would be compounded if the subject company paid dividends.

To tie the guideline company analysis for Example #3 into the discussion of the QMDM, we prepared the rate of return analysis at the right side of Figure 5-12. The implied rates of return are clearly less variable than are the raw discounts (confirmed by calculation of standard deviations). Note that we have made the simplifying assumption that the base discount rate for each of the public companies is 15%. On this basis, the median implied required returns for the investors in the restricted shares are in the range of 21% to 26%. Based solely on this analysis, an appraiser could take some comfort in the selection of a 20% required holding period return (as was the choice in Example #3). However, the appraiser could relate this analysis together with generalized required return analysis (like found in Figures 5-9 and 5-10). He could further relate it to other data regarding venture capital returns, hedge fund returns, or other examples of required returns where more current information is available. In the final analysis, he would have reasonable support for the required return assumption.

WHERE DO WE GO FROM HERE?

In early 2004, both benchmark analysis (based primarily on restricted stock studies and related analyses) and quantitative rate of return analysis continue to be used by appraisers to develop and support marketability discounts. We have commented on numerous occasions about the courts' growing unease in accepting marketability discounts supported solely by reference to restricted stock studies. This trend gives us confidence that quantitative rate of return analysis grounded in careful analysis of the specific facts and circumstances of subject illiquid business interests will ultimately become the standard for developing marketability discounts.

But when that day arrives, the profession will still have work to do. The seeming reluctance of courts to fully embrace quantitative methods thus far can generally be traced back to discomfort with the support presented for the underlying assumptions. Appraisers (including those at Mercer Capital) need to continue to improve their development, presentation, and support of the critical assumptions supporting development of the marketability discount.

Another Quantitative, Rate of Return Model

There is a growing focus on quantitative, rate of return analysis. For example, an article was recently published by Dr. David Tabak of NERA which set forth a proposed method for quantifying the incremental holding period risks faced by investors in illiquid business interests.[122] The Tabak article comments favorably on the QMDM, calling it "a sound theoretical means for explaining the current value of an asset or business." Dr. Tabak noted that the analyst must estimate the inputs of the QMDM. The Tabak Model combines the expected growth rate of value and the investor's discount rate into an excess required return.

122 Tabak, David, PhD., "A CAPM-Based Approach to Calculating Illiquidity Discounts," *NERA Economic Consulting Whitepaper*, November 11, 2002 (www.nera.com).

The Tabak Model then provides "a method of quantifying the excess required return in an objective manner." In so doing, the Tabak model substitutes another important assumption, the volatility (standard deviation) of some series of returns. However, the volatility of investments in closely held assets is also an unknown. Like with the QMDM, the expected holding period must still be estimated when using the Tabak Model. In the final analysis, the underlying mathematics of the Tabak model and the QMDM reconcile to each other, as indicated in a review article by Travis Harms.[123]

Figure 5-13, reproduced from the Harms article, shows a comparison of the assumptions of the Tabak Model and the QMDM. Expected dividend growth in the Tabak model would be discretely forecasted, and the QMDM provides for a similar assumption regarding dividend growth.

Tabak Model	QMDM
Growth in Value Always equal to the marketable rate of return (less any dividend yield).	May be equal to the marketable rate of return, however the analyst has the opportunity to account for real-world factors such as leakage of cash flows to owner/managers, and suboptimal corporate investment policies by increasing or decreasing this rate.
Holding Period Premium Quantifiable, assuming β, σi, and σM can be reasonably estimated. However, analyst judgment required to estimate these factors. No sources of data exist regarding returns and associated variances on illiquid securities. Range of implied holding period premiums under Tabak model shown in Exhibit 2 on page 3 of this article.	Product of analyst judgment, based on specific facts and circumstances. Inferences can be made by reference to published restricted stock studies.
Expected Holding Period Product of analyst judgment, based on specific facts and circumstances.	Product of analyst judgment, based on specific facts and circumstances.
Dividend Yield Estimated based on expectations for future distributions.	Estimated based on expectations for future distributions.

Figure 5-13

123 Harms, Travis, W., "Another Nail in the Coffin of Benchmark Analysis," *E-Law Business Valuation Perspective*, Issue 2002-10, December 19, 2002.

Figure 5-14, also reproduced from the Harms article, demonstrates that the Tabak Model and the QMDM provide identical marketability discounts under the same set of assumptions.

Comparison of Tabak Model for Cost of Illiquidity with QMDM

Assumptions	
r_{RF}	4.00%
β	1.00
θ	7.70%
φ	2
T	2.0

	Tabak Model		QMDM	
Required Return (Marketable Minority)	$RMM = r_{RF} + \beta\theta$	11.70%	*See note (1) below*	12.41%
Required Return (Nonmarketable Minority	$RNM = r_{RF} + (\beta + \varphi)\theta$	23.56%		26.56%
Holding Period Premium	$HPP = \varphi\theta$	11.86%		14.15%
Expected Future Value of $1 at time T	$EFV = e^{RMM(T)}$	1.26364	$(1 + RMM)^T$	1.26364
Present Value of Expected Future Value	$PV = EFV[e^{-(RMM + HPP)T}]$	0.78887	$EFV/(1 + RMM + HPP)^T$	0.78887
Implied Marketability Discount	MD = 1 - PV, or $1 - e^{-HPP(T)}$	**21.11%**	1 - PV	**21.11%**

Note (1): The Tabak model assumes continuously compounding rates of return, whereas the mathematics underlying the QMDM are based on the simpler assumption of periodic compounding. Therefore, for a valid comparison, the rates of return under the Tabak model are converted for use in the QMDM as follows: QMDM rates = EXP(Tabak Rates) - 1.

Figure 5-14

The Harms article concluded as follows:

> The Tabak Model is based on the same fundamental economic theory of the QMDM: shareholders demand higher rates of return as compensation for illiquidity. The Tabak Model reaches into modern portfolio theory as a means of quantifying this return premium. Application of the Tabak Model does require the analyst to specify the subject company's overall variance of returns and covariance with the returns of the market, which is likely a daunting task in the case of illiquid securities. Nonetheless, we welcome all efforts to offer greater precision in the arena of quantitative analysis of marketability discounts.
>
> The Tabak paper provides further confirmation of the importance of quantitative, rate of return analysis for determining appropriate and supportable marketability discounts. We believe that reliance on benchmark analysis among the business appraisal community will continue to wane and the logic of quantitative, rate of return analysis will win the day.

CONCLUSION

Estimating appropriate marketability discounts has been a mystery for too long. Courts and other appraisal users are begging to be demystified. In our opinion, continued reliance on benchmark studies (even with additional data points), and arcane statistical analyses does nothing to reduce the fog of mystery shrouding this topic. Business appraisers can cut through the fog and enhance the credibility of their conclusions by developing well-supported conclusions of value at the nonmarketable minority interest through use of quantitative methods, such as the QMDM. In so doing, we can apply real-world investment concerns to the specific facts and circumstances of each subject interest.