USING RESTRICTED STUDIES FOR

MARC VIANELLO

DEFICIENCIES IN BOTH RESTRICTED STOCK AND PRE-IPO STUDIES UNDERMINE THEIR RELIABLE USE IN ESTIMATING DISCOUNTS FOR LACK OF MARKETABILITY.

STOCK AND PRE-IPO QUANTIFYING DLOM

TWO WAYS OF SAYING "I DON'T KNOW"?

CURRENT METHODS FOR DETERMINING A DISCOUNT FOR LACK OF MARKETABILITY (DLOM) HAVE THEIR SHORTCOMINGS.[1]

The discussion that follows focuses first on restricted stock studies, which have been used to quantify DLOMs since the early 1970s. Such studies make a good case for the need for a DLOM when valuing an investment that is not immediately marketable. The study results can be unreliable, however, when used for calculating the discount applicable to a particular valuation engagement. Furthermore, similar challenges arise from the use of studies conducted prior to initial public offerings.

Restricted Stock Studies

Restricted stocks are shares in public companies that are subject to limited public trading, pursuant to SEC Rule 144 or other restrictions on sale. Restricted stock studies attempt to quantify DLOMs, by comparing the sale price of publicly traded shares to the sale price of otherwise identical, marketability-restricted shares, of the same company.[2] There have been many restricted stock studies—those known to the author are shown at Exhibit 1.[3] Exhibit 1 presents the reported median and mean discounts of the studies, and, where available, the reported standard deviations.

The studies are grouped into four sections. In the first section, studies involving transactions wholly *prior to 1997*, reported an average median discount of 23% and an average mean discount of 23%. In 1997 the SEC reduced the two-year restriction period of Rule 144 to one year.[4] In the second grouping, for studies involving transactions wholly *after* 1997 through 2008, an average median discount of 14% and an average mean discount of 11% were reported.

MARC VIANELLO, CPA, ABV, CFF, is the founder and managing member of Vianello Forensic Consulting, LLC, in Overland Park, Kansas, and is the inventor of the VFC DLOM Calculator (www.dlomcalculator.com). He can be reached at vianello@vianello.biz.

In 2008, the SEC further reduced the Rule 144 restriction period to six months.[5] According to the IRS, no restricted stock studies have been published that reflect the reduced holding period requirement,[6] but the present author understands that the FMV Restricted Stock Study contains current, six-month holding period transactions. Considering the age of most of the restricted stock studies, the Rule 144 transitions, and changes in the market, it seems unavoidable to conclude that a DLOM derived from the above studies ignores current data and conditions. Note that the studies referenced in the remaining two sections of Exhibit 1 include either calendar year 1997 or 2008. For that reason, those studies can be considered less reliable measures than the ones in the two groupings discussed above.

Problem for Appraisers

Appraisers may face serious problems when relying on any of the restricted stock studies. The fact that the majority of studies do not report the standard deviation of their results alone makes such reliance risky. But the risk is compounded by the fact that the few studies that reported standard deviations have high coefficients of variation—ranging from .5 to .75—resulting from high standard deviations in relation to their means. This indicates a very broad range of underlying data points.[7] Relying solely on the means and medians of restricted stock studies is, therefore, likely to lead the appraiser to an erroneous DLOM conclusion.[8]

Study Analysis. Unfortunately, the problems with the restricted stock studies are not resolved by only using one or more of the seven studies that did disclose their standard deviation. First, all seven predate 1996. The standard deviations of the post-1997 and post-2008 studies are unreported. Second, Monte Carlo simulation modeling discloses other serious concerns. The graph in Exhibit 2 was prepared using Oracle's Crystal Ball software to model a 200,000-trial normal statistical distribution, based on the reported mean and standard deviation of the 146-observation Moroney study.[9] Using the study's 35% reported mean and 18% reported standard deviation as assumptions, Crystal Ball generated a distribution of predicted discounts ranging from negative 44.5% to positive 113.9%.

Applying the same normal distribution analysis to the Maher, Management Planning, Silber, and BVR (Johnson) studies, we find:

- The potential range of discounts comprising the 34-observation Maher study is from negative 41.0% to positive 110.6%.
- The potential range of discounts comprising the 49-observation Management Planning study is from negative 32.5% to positive 83.1%.
- The potential range of discounts comprising the 20-observation Management Planning study is from negative 29.9% to positive 83.7%.
- The potential range of discounts comprising the 69-observation Silber study average of 34.0% is from negative 75.8% to positive 138.0%.
- The potential range of discounts comprising the 72-observation BVR (Johnson) study is from negative 34.5% to positive 70.5% for companies with positive net income, and negative 49.4% to positive 97.0% for companies with negative net income.

Log-Normal Assumption. Common sense dictates that a DLOM cannot be negative and cannot be more than 100%. Therefore, normal statistical distribution cannot be the appropriate assumption regarding the distribution of the

EXHIBIT 1
Restricted Stock Studies

Summary of Restricted Stock Study Results						
	Period Covered		Number of	Reported	Reported	Reported Standard
Study	From	To	Observations	Median	Mean	Deviation
SEC overall average	1966	1969	398	24%	26%	na
Johnson and Racette	1967	1973	86	na	34%	na
Milton Gelman	1968	1970	89	33%	33%	na
Robert R. Trout	1968	1972	60	Na	34%	na
Robert E. Moroney	1969	1972	146	34%	35%	18%
J. Michael Maher	1969	1973	34	33%	35%	18%
Stryker / Pittock	1978	1982	28	45%	na	na
Wruck, Karen H.						
Registered	1979	1984	36	2%	-4%	na
Unregistered	1979	1984	37	12%	14%	na
FMV Opinions (Hall / Polacek)	1979	1992	100+	na	23%	na
Barclay, Holderness, and Sheehan	1979	1997	594	17%	19%	na
Hertzel and Smith	1980	1987	106	13%	20%	na
Management Planning, Inc.	1980	1995	49	29%	28%	14%
Management Planning, Inc.	1980	1995	20	29%	27%	13%
Hertzel, Lemmon, Linck, and Rees	1980	1996	404	13%	17%	na
Willamette Management Associates	1981	1984	33	31%	na	na
Silber (1981-1988)	1981	1988	69	na	34%	24%
Krishnamurthy, Spindt, Subramanium, and Woidtke						
All	1983	1992	391	na	19%	na
Restricted shares	1983	1992	75	na	34%	na
Shares with registration pending	1983	1992	23	na	23%	na
Shares not known to be restricted	1983	1992	293	na	15%	na
Shares with pending registration or not known	1983	1992	316	na	16%	na
Wu	1986	1997	301	20%	9%	na
Bajaj, Denis, Ferris, Sarin						
All	1990	1995	88	21%	22%	na
Registered	1990	1995	37	10%	14%	na
Unregistered	1990	1995	51	27%	28%	na
FMV Opinions	1991	1992	na	na	21%	na
BVR (Johnson)	1991	1995	72	na	20%	na
Positive net income			na	na	16%	12%
Negative net income			na	na	23%	17%
Columbia Financial Advisors (1996-April 1997)	1996	1997	23	14%	21%	na
Group 1: Studies through 1997				**23%**	**23%**	
Columbia Financial Advisors (May 1997-1998)	1997	1998	15	9%	13%	na
Verdasca	2000	2006	711	10%	10%	na
Glegg, Harris, Madura, and Ngo	2000	2008	601	8%	9%	na
Billett and Floros						
Placement Tracker and PrivateRaise	2001	2008	12004	27%	na	na
PrivateRaise only	2001	2008	1127	10%	na	na
Placement Tracker only	2001	2008	2650	24%	na	na
Group 2: Studies after 1997 and before 2008				**14%**	**11%**	

EXHIBIT 1 (CONTINUED)
Restricted Stock Studies

Summary of Restricted Stock Study Results						
Study	Period Covered		Number of Observations	Reported Median	Reported Mean	Reported Standard Deviation
	From	To				
Wruck and Wu	1980	1999	1854	11%	11%	na
Angrist, Curtis, and Kerrigan (MPI)	1980	2009	1863	13%	16%	na
Finnerty						
Pre-February 1997	1991	2007	41	20%	26%	na
Post-February 1997	1991	2007	167	16%	22%	na
Chaplinsky and Haushalter						
Purchase discount only	1995	2000	382	17%	19%	na
Purchase discount and warrant	1995	2000	235	14%	17%	na
Brophy, Ouimet, and Sialm						
Hedge funds - traditional PIPEs	1995	2002	586	na	14%	na
Other investors - traditional PIPEs	1995	2002	1559	na	9%	na
Floros and Sapp	1995	2008	14391	11%	na	na
Huson, Malatesta, and Parrino	1995	2009	1029	12%	12%	na
Meidan	1996	2006	1726	na	10%	na
Group 3: Studies spanning 1997				**14%**	**16%**	
Stumpf, Martinez, and Stallman (SRR)	2005	2010	98	9%	11%	na
Harris-Trugman Valuation Assoc.						
All	2007	2010	136	14%	17%	na
Pre-SEC rule change	2007	2010	47	15%	18%	na
Post-SEC rule change	2007	2010	89	14%	16%	na
Group 4: Studies spanning 2008				**15%**	**13%**	

population of restricted stocks. A log-normal distribution must instead be assumed for the population. Using Crystal Ball, with the log-normal assumption and 200,000 trials, resulted in the graph in Exhibit 3. It discloses that the log-normal range of discounts comprising the Moroney study is from 3.7% to 269.2% with a median discount of 31.1%. Approximately 60% of probable outcomes occur below the study mean.

Applying the same log-normal distribution analysis to the Maher, Management Planning, Silber, and BVR (Johnson) studies produces these conclusions:

- The log-normal range of discounts comprising the Maher study is from 4.0% to 276.6% with a median discount of 31.2%. Approximately 60% of probable outcomes occur below the study mean.
- The log-normal range of discounts comprising the 49-observation Management Planning study is from 2.7% to 233.1% with a median discount of 25.0%. Approximately 60% of probable outcomes occur below the study mean.
- The log-normal range of discounts comprising the 20-observation Management Planning study is from 3.2% to 162.6% with a median discount of 25.0%. Approximately 60% of probable outcomes occur below the study mean.
- The log-normal range of discounts comprising the Silber study is from 2.0% to 472.8% with a median discount of 27.8%. More than 60% of probable outcomes occur below the study mean.
- The log-normal range of discounts comprising the BVR (Johnson) study is from 0.7% to 268.3% for companies with positive net income, and 1.04% to 431.4% for companies with negative net income.

Remaining Problems. Even assuming a log-normal distribution, the appraiser is left with two problems. First, what should be done about the fact that some portion of the distribution continues to imply a DLOM greater than 100%? Can that simply be ignored? Is some form of adjustment required? Second, with 60% or more of the predicted outcomes occurring below the reported means of the studies, what is the basis for assuming a DLOM based on a study's mean (or an average of studies' means)? These issues, as well as the inability of the studies to reflect market dynamics (past or present), the inability to associate the studies with a specific valuation date, and the limited ability—even *inability*—to associate the study results to a valuation subject with any specificity, seriously call into question the reliability of basing DLOM conclusions on restricted stock studies.

Thus although the restricted stock studies demonstrate the appropriateness of a DLOM in determining fair market value, they reflect deficiencies that undermine their reliability for practical application when valuing privately held businesses. Practitioners must be mindful of the deficiencies

when basing valuation conclusions on restricted stock studies.

Sales Prior to Initial Public Offerings

Studies of sales of stocks later included in initial public offerings (pre-IPO studies) have been used to quantify DLOMs since at least the late 1990s. Despite their continued use by a segment of the valuation community, as with restricted stock studies, pre-IPO study results are unreliable for calculating the DLOM applicable to a particular valuation engagement.

Pre-IPO studies analyze otherwise identical stocks of a company by comparing prices before, and as of, the IPO date.[10] As with the restricted stock studies discussed above, the valuation utility of pre-IPO studies is seriously flawed. For example, the "before" dates of these studies use different measurement points ranging from several days to several months prior to the IPO.[11] Determining a "before" date that avoids market bias and changes in the IPO company can be a difficult task.[12] If the "before" date is too close to the IPO date, the price might be affected by the prospects of the company's IPO. And if the "before" date is too far from the IPO date, overall market conditions or company-specific conditions might have changed significantly. Such circumstances undermine the use of pre-IPO studies to estimate a specific DLOM.

PRACTITIONERS MUST BE MINDFUL OF THE DEFICIENCIES OF SUCH STUDIES.

IRS Job Aid

The IRS' Job Aid for IRS Valuation Professionals, "Discount for Lack of Marketability," (Job Aid) discusses three pre-IPO studies: the Willamette Management Associates studies; the Robert W. Baird & Company studies; and the Valuation Advisors' Lack of Marketability Discount Study.[13] Each of these studies suffers from deficiencies that undermine their usefulness for estimating the DLOM applicable to a specific business as of a specific date.

Limited Size. First, the Willamette and Baird & Company studies were of limited size, and not ongoing. The original Willamette study covered 1,007 transactions over the years 1975 through 1997 (an average of 44 transactions per year);[14] the subsequent Willamette study covered 173 transactions from 1980 through 1993 (an average of 12 transactions per year);[15] and the Baird & Company studies covered 346 transactions from 1981 through 2000 (an average of 17 transactions per year).[16]

The Valuation Advisors studies are ongoing and larger than the others, at this writing covering 10,716 transactions over the years 1985 to the present, but nonetheless represent a 30-year average of just 357 pre-IPO transactions per year.[17] Although larger than all but two of the restricted stock studies reviewed earlier,[18] the sample sizes of the *Valuation Advisors* pre-IPO studies remain small on an annual basis and subject to considerable data variation. This fact alone calls into question the reliability of conclusions based on the studies.

Broad Ranges. Second, the Willamette and Baird & Company studies report a broad range of averages, and very high standard deviations relative to their means (reflecting the broad range of underlying data points).[19] The original Willamette studies report standard mean discounts that averaged 39.1% and standard deviations that averaged 43.2%.[20] The subsequent Willamette studies report standard mean discounts that averaged 46.7%, but the standard deviations are not reported.[21] The Baird & Company studies report standard mean discounts that averaged 46% and standard deviations that averaged 45%.[22]

The graph in Exhibit 4 was prepared using Crystal Ball to model a 200,000-trial normal statistical distribution based on the reported means and standard deviations of the original Willamette studies. It discloses that the potential range of discounts comprising the average 39.1%

1 In a forthcoming article for this journal, the author will discuss a sophisticated new method that has been developed for reaching a supportable DLOM conclusion.

2 Job Aid for IRS Valuation Professionals, "Discount for Lack of Marketability," 9/25/2009.

3 The information presented in Exhibit 1 was gathered from "Restricted Stock Studies That Back Up the DLOM," 19 Business Valuation Update 11 (November 2013); Job Aid for IRS Valuation Professionals, *Id.*; and materials provided by Mercer Capital.

4 Securities and Exchange Commission, *Revisions to Rules 144 and 145*, Release No. 33-8869 (11/15/07), available at: http://www.gov/rules/final/2007/33-8869.pdf

5 *Id.*

6 Job Aid for IRS Valuation Professionals, note 2, *supra*, at p. 17.

7 The sample sizes and standard errors of the continuing FMV studies, unknown at this writing, may or may not resolve some of this criticism.

8 Job Aid for IRS Valuation Professionals, note 2, *supra*, at p. 17.

9 Crystal Ball is a widely accepted modeling software program that uses a Monte Carlo simulation to randomly generate values for uncertain variables based on defined assumptions.

10 Job Aid for IRS Valuation Professionals, note 2, *supra*, at p. 19.

11 *Id.*

12 *Id.* at p. 21.

mean discount and average 43.2% standard deviation of these studies is from negative 167.6% to positive 235.8%.

A 206-observation subset of the Baird & Company studies reports average mean discounts of 44% and average standard deviations of 21%.[23] Applying the same normal distribution analysis to this subset, the potential range of discounts is from negative 59.8% to positive 150.6%.

Log-Normal Assumption

As with the restricted stock studies, common sense tells one that a DLOM cannot be negative. Therefore, normal statistical distribution cannot be the appropriate assumption regarding the distribution of discounts within the populations, and a log-normal distribution must be assumed instead. Using Crystal Ball with the log-normal assumption and 200,000 trials resulted in the graph illustrated in Exhibit 5. It discloses that the log-normal range of discounts comprising the original Willamette study is from 0.5% to 1,151.2% with a median discount of 26.3%. Almost 70% of probable outcomes occur below the 39.1% mean discount of the study.

The potential range of discounts comprising the Baird & Company studies is from 5.7% to 327.3% with a median discount of 42.7%. Approximately 60% of probable outcomes occur below the reported mean discount of the study.

EXHIBIT 2
Model Using Crystal Ball Software

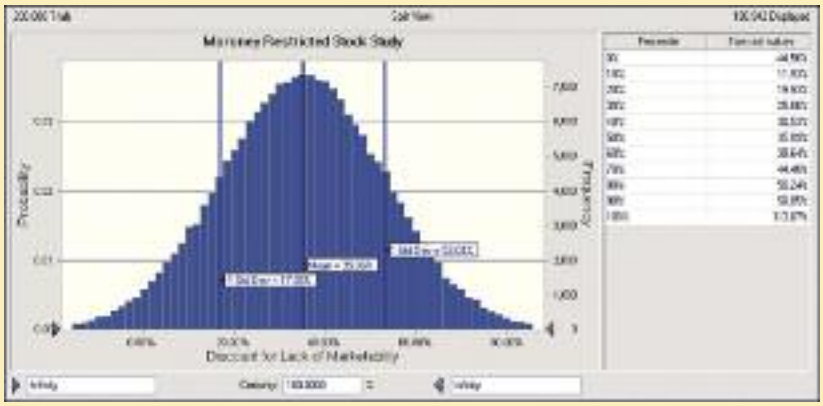
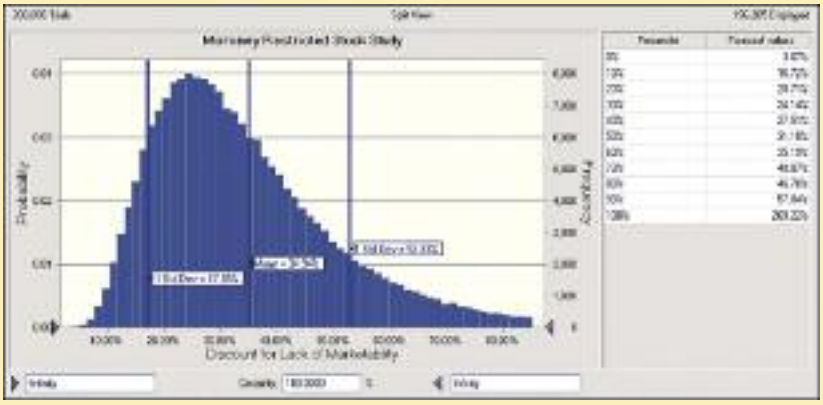


EXHIBIT 3
Crystal Ball and Log-Normal Distribution Assumption



These statistical problems with the pre-IPO studies and the limited ability—even *inability*—to align them with (1) past and present market dynamics; (2) a specific valuation date; and (3) a specific valuation subject, seriously call into question the reliability of basing DLOM conclusions on such studies. Although the Valuation Advisors database comprises a substantially greater population of pre-IPO transactions, the appraiser remains confronted with deciding whether the applicable measurement date is the pre-IPO transaction date or the IPO date; and establishing that economic conditions, IPO company conditions, and valuation subject company conditions have not changed

13 *Id.* at p. 19.
14 *Id.* at p. 95.
15 *Id.* at p. 96.
16 *Id.* at p. 97
17 See description of the Valuation Advisors Lack of Marketability Discount Study at: http://www.bvresources.com/bvstore/subscribeinfo.asp?pid=SUB17.
18 The Floros and Sapp restricted stock study involved 14,391 transactions from 1995 to 2008, averaging about 1,000 transactions per year. The Billett and Floros restricted stock study involved 12,004 transactions from 2001 to 2008, averaging about 1,500 transactions per year.
19 The standard deviation of the Valuation Advisors study is not available on its website.
20 Job Aid for IRS Valuation Professionals, note 2, *supra*, at p. 95.
21 *Id.* at p. 96. The table on page 96 of the IRS DLOM Job Aid presents two columns captioned "discount mean." The author has assumed that the second column is intended to report the "discount median" of the studies.
22 *Id.* at p. 97.
23 Mercer, *Quantifying Marketability Discounts* (Peabody Publishing, 2001), p. 80.
24 http://www.nasdaq.com/markets/ipos/activity.aspx?tab=filings.
25 120 TC 358 (2003).
26 TCM 2011-141.

EXHIBIT 4
Model Based on Original Williamette Studies

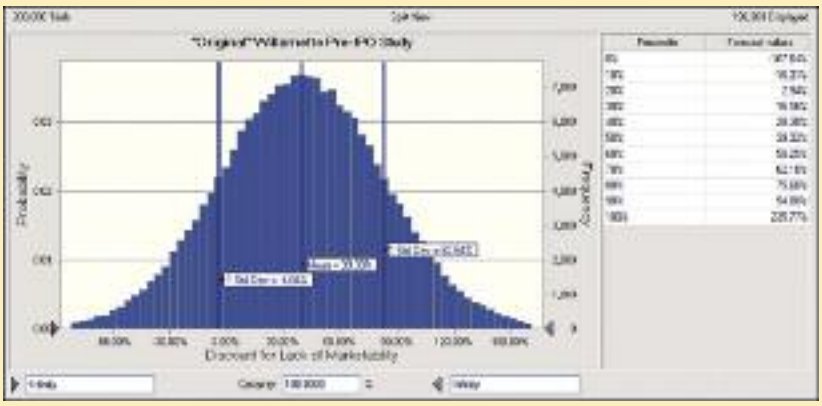


EXHIBIT 5
Model Using Log-Normal Assumption

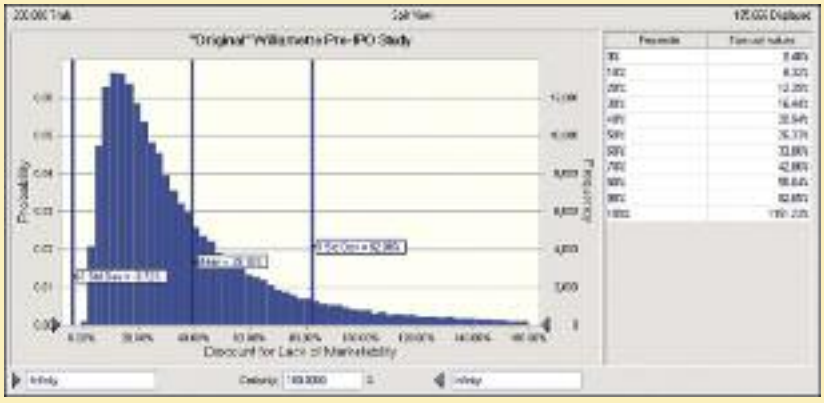
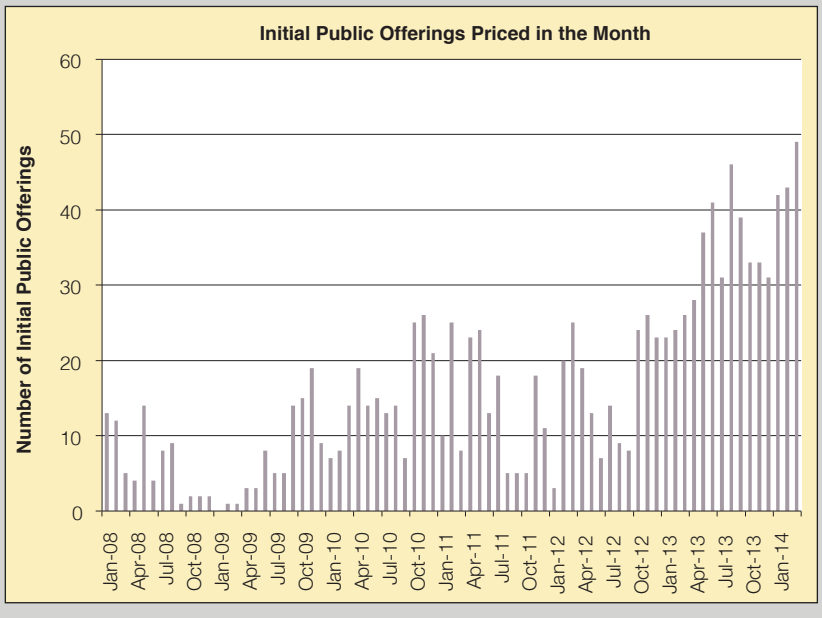


EXHIBIT 6
IPO Transaction Volume



in the interim. This, of course, assumes that it can be established that the IPO company is reasonably comparable to the valuation subject.

Transaction Volume. In addition, the volume of IPO transactions underlying the pre-IPO studies is shallow and erratic, comprising a very limited number of IPOs at any point in time, as shown in the graph in Exhibit 6.[24]

In the last six-plus years, the peak volume of offerings was 49 (March 2014) while in January 2009 there were no IPOs at all. From September 2008 through March 2009 the average number of IPOs filed was less than 1.3 per month. Significantly, not every IPO has associated pre-IPO stock sale transactions. It is therefore difficult to understand a rationale for estimating DLOM for a specific privately held company at a specific point in time, based on such limited data.

Tax Court Decisions

Further, the Tax Court has found DLOM conclusions based on the pre-IPO approach to be unreliable. In *McCord*, the court concluded that pre-IPO studies may reflect more than just the availability of a ready market. [25] Other criticisms expressed by the court were that the Baird & Company study is biased, because it does not sufficiently take into account the highest sales prices in pre-IPO transactions, and that the Willamette studies provide insufficient disclosure to be useful. And in *Estate of Giustina*, the Tax Court found that the pre-IPO studies overstate discounts for lack of marketability.[26]

Conclusion

It is questionable whether pre-IPO studies present an independent justification for DLOMs in the way the restricted stock studies do. Moreover, the available examples of both types of studies reflect deficiencies that undermine their reliability for practical application when valuing privately held businesses and other assets that are not immediately marketable, or when testing asset impairment for financial statement purposes. Practitioners must be mindful of the deficiencies of such studies and databases when reaching valuation conclusions on these sources. ●