

CHAPTER 6

Why You Should D.O.W.T. (Doubt) Venture Capital Returns—Option Pool Reserve

Differences in how venture capitalists, valuation professionals, underwriters, and auditors treat stock options when valuing a company's securities has a huge impact on the differences in conclusions reached by these parties.

In this chapter, we take a look real VC-backed cases to illustrate how the varying perspectives (VC, valuation professional, underwriter, and auditor) result in value conclusions that can be internally inconsistent in many cases or simply wrong in some cases. We take the various assumptions, such as considering that the ungranted (reserved) option pool is totally vested on the valuation date, that the reserved pool is ignored, and other variations, apply those to the cases presented and see how big the differences in value conclusions are in different circumstances. Being aware of these differences should allow you to D.O.W.T. (doubt) venture returns, to carefully consider the impact of assumptions concerning how dividends, options, warrants, and time impact investment cash flow. See Exhibit 6.1.

UNISSUED OPTION POOLS

In the simplest sense, there are three alternatives for how to treat the unissued option pool for purposes of venture-capital valuation:

1. Ignore the unissued pool and don't include it in any of the analysis.
2. Assume that the entire option pool is both granted and vested in its entirety at each step of the analysis.
3. Specifically estimate changes in the unissued option pool to match changes in time incorporated in the analysis.

D	Dividends (Cumulative)	Do They Convert (PIK)?
O	Options	Actual Payouts on Valuation Date?
W	Warrants	Underlying Preferences and Rights?
T	Time	As of Exit or as of Valuation Date?

EXHIBIT 6.1 Payout Error Mnemonic D.O.W.T. VC Returns
Source: Liquid Scenarios, Inc.

Why is this so important? We can take another home ownership analogy to get some insights. Imagine you and a partner invest in a home together. A clear opportunity to sell the home for \$500,000 to \$600,000 within one year seems apparent, so long as you can do \$50,000 to \$100,000 in improvements. You don't know exactly how long the improvements will take and, as a result, don't know exactly how much they will cost. You do, however, know that the total cost will be at least \$50,000 prior to getting a buyer to pay \$500,000 to \$600,000 for the home.

Your partner agrees to bear the cost of the first \$50,000 in improvements for you, and split any amount above that with you based on your pro-rata ownership share. Also, since your partner will be bearing most of the costs, and the first costs of the project, it's safe to assume he or she will get multiple detailed estimates before starting work. This is important, because in some cases an argument for not modeling detailed costs is that meaningful estimates are not easily obtainable or accessible.

Assuming you want to have an idea of the net present value of the improvements to your investment interest, should you ignore the costs of the improvements entirely, since they occur in the future and you know your partner will bear most of the cost (dilution)? Should you assume that the whole \$100,000 in improvements takes place immediately and base your NPV calculations on that? Obviously, neither of those are reasonable courses of action if you really want to understand the change in the value of the investment you've already made and very well may have to add more cash to.

It's clear that with a single investment of a few hundred thousand, max, most people would like to have a reasonably arrived at estimate of the potential cost of realizing their investment return. That being the case, should funds with millions in multiple companies want to do the same? Of course,

and they all do desire to manage their funds responsibly. However, truths and myths about how to properly model one of the biggest potential costs that will reduce, or enhance, their investment returns (options), are many times treated across the board with simplifying assumptions that result in erroneous conclusions.

VALUE CONCLUSION ELEMENTS IMPACTED BY OPTION POOL RESERVE ASSUMPTIONS

Each of the seven valuation elements in Exhibit 6.2 are clearly impacted by how one decides to treat the option pool reserve of a venture-capital-backed company when reaching a value conclusion. We will briefly cover how each of these areas are impacted using the examples referred to previously starting with some basic sanity tests that should be applied when reaching a value conclusion.

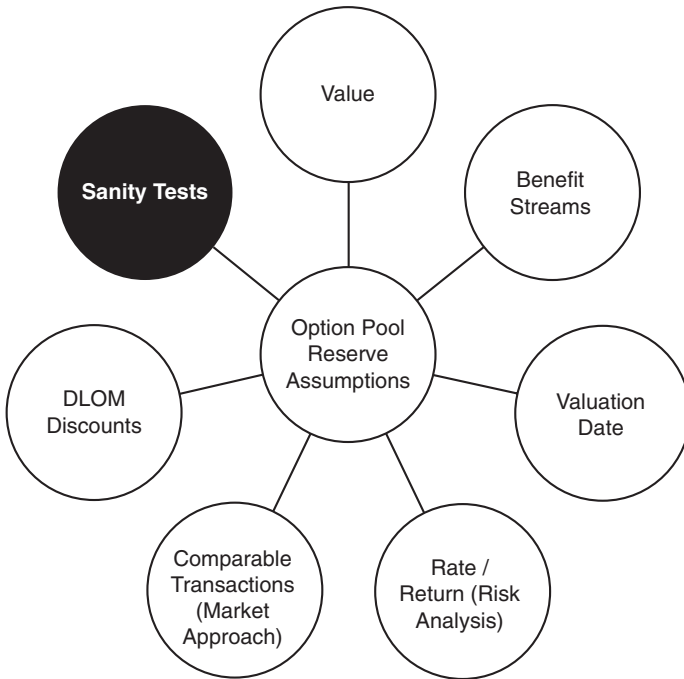


EXHIBIT 6.2 Bad Option Assumptions Cause Sanity Tests to Fail
Source: Liquid Scenarios, Inc.

Sanity Tests

We start our simple sanity tests using the Microsoft case initially, since it is one of the few venture-backed companies, other than Zynga, that has substantial earnings so early in its life. Because of those earnings, we are able to get a better sense of the impact of various option pool reserve assumptions on traditional discounted cash flow analysis as well as the current, OPM, and PWERM models. Also, since the company completed only one venture-capital financing round prior to realizing liquidity, that gives us room to include hypothetical rounds in between that would be more common for venture-backed companies. After the Microsoft case, you can easily perform a similar analysis on Excite and Google, since those companies had a lot more rounds of financing.

The Simple Version

Microsoft Corporation June 30, 1981, Hypothetical Valuation Date

Estimated Waterfall 1

Assumptions:

- Single average grant price (\$0.475 per share)

- Assume the entire unissued option pool is vested

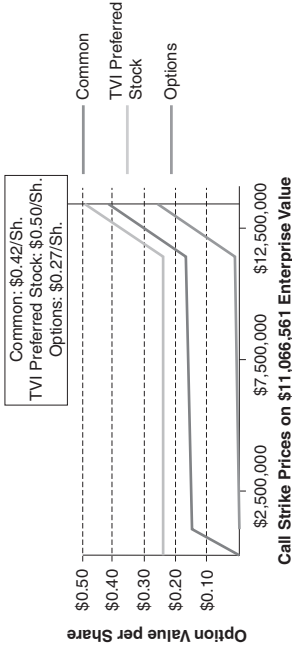
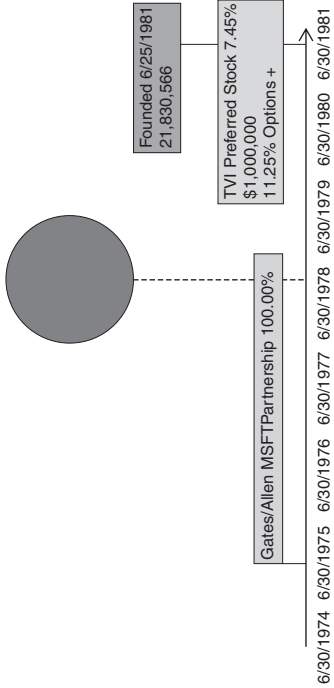
- Assume that all existing grants are fully vested

Summary benefit conclusion diagrams (OPM and current)

As illustrated in Exhibit 6.3, the backsolve method generates \$0.42/share before marketability discounts for common, \$0.50/share for the preferred (which is the preferred purchase price around that date), and payouts that match the estimated fully diluted percentage ownership of Microsoft Corporation as of June 30, 1981. As mentioned previously, most venture-fund analysts, and also many venture-capital fund CFOs and finance staff, would assume that since the fully diluted percentage ownership equals the percentage payoff chart in the lower-right-hand corner of Exhibit 6.3, the model is valid. But as you learned earlier in this book, the complete opposite of that assumption is true, especially just following a new round of venture financing, as is the case in the Microsoft example here above.

The way that the target percentage ownership of the preferred stock investors matches fully diluted ownership and payout calculations using this simplifying assumption with respect to the unissued option pool may explain why this method has been popular with VCs for so long. However, if we were to assume that Microsoft sold the very next day for \$100 million, none of the percentage payouts in our waterfall would be realized. Particularly, the sole venture capitalist in the deal, Technology Venture Investors, or

iCap Table



Founders

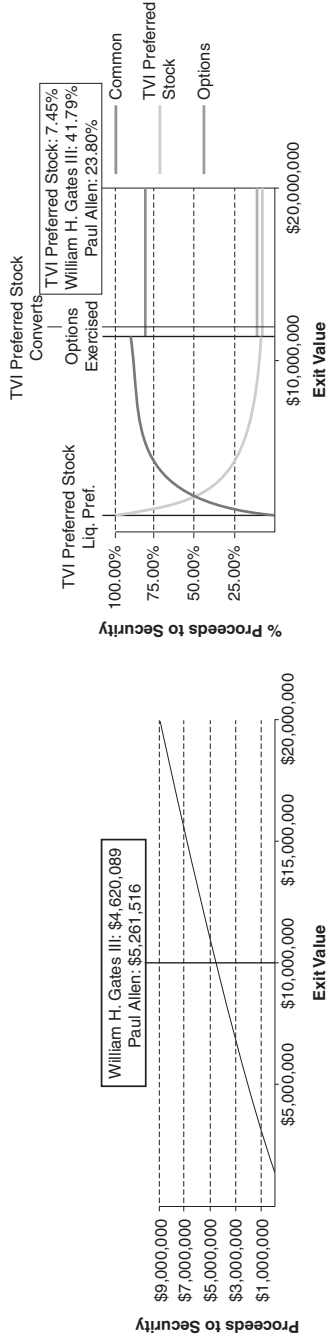


EXHIBIT 6.3 Summary Benefit Conclusion Diagrams—Microsoft First VC Round

Source: Liquid Scenarios, Inc.

TVI, would get something greater than 7.5%, and it's highly unlikely that it would be willing to give some of that excess to future employees of the acquiring company. We can easily illustrate this by changing the date to July 1, 1981, and comparing the proceeds that parties would receive based on the assumption that all options (granted and reserved) were vested (top diagrams) opposed to the actual payouts that would occur based on actual company sale the very next day (the lower charts). See Exhibit 6.4.

PERCEIVED ADVANTAGE—UNISSUED OPTION POOL SIMPLIFYING ASSUMPTION: VERY EASY TO CALCULATE

IF 100% of option pool is assumed granted and vested, AND 100% of granted options are assumed vested, THEN payout percentages in waterfalls and payout diagrams will equal fully diluted ownership percentages for each preferred class and the fully diluted target ownership percentage of the most recent round closed (assuming no warrants and no debt are outstanding as of the valuation date).

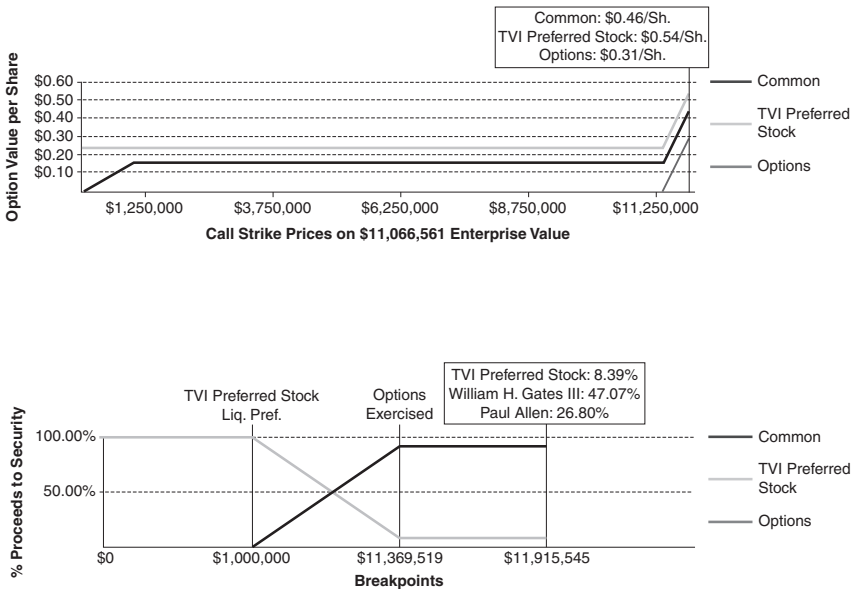


EXHIBIT 6.4 Impact of Common Simplifying Option Assumption on Bill Gates
 Source: Liquid Scenarios, Inc.

Different parties explain the rationale behind this assumption, especially with respect to financial reporting of venture-capital funds to the insurance companies, pension funds, and other institutional limited partners that have to rely upon these assumptions, indirectly, for their reporting to plan holders, states, universities, public servant retirement funds, and so forth. These are the most common explanations I've heard. . .

“Assuming that the entire option pool is vested, even if it hasn't been issued yet, is conservative, since it will likely take 100% of the option pool being used in order to get the company to the point where it would be attractive to an acquirer.” Obviously there's some merit to this argument. However, as you look at it closer you realize that it fails on several fronts.

First, what is the exercise price that's being assumed for the options that are fully vested? In the previous iteration of our sample case, we used an average exercise price of \$0.475 under both scenarios for consistency (the simplifying assumption that the entire unissued pool vested the next day, and the more realistic assumption that only those options that were granted would dilute other holders from proceeds).

The second problem is that if we are assuming that the entire option pool will be needed to get the company to the point of an exit, where's our assumption concerning the additional financing required to get the company to that exit? Is leaving that out also conservative?

Another major problem with this logic is suggesting that it is in fact conservative. In some cases, it results in more value being allocated to common stock, which is unrealistic, and in other cases it results in more of a company's value being allocated to preferred stock or options. There are more variables at play to determine if it's conservative (results in a relatively lower value conclusion for the security you are valuing) or aggressive (results in a relatively higher value conclusion for the security you are valuing).

“That's just the way it's done in the industry. It's been that way since the beginning and it's not going to change.” There's no way to prove that this has, in fact, or hasn't been done, since the concept of reserve a pool for employee options doesn't pre-date the modern venture-capital industry. That being said, there's no doubt that it's a popular approach at venture funds. In a world where the methods of reporting IRRs and residual fund values to fund investors simply involve reporting the amount invested (the cost method), not an estimate of the upward change in value, you could also argue that the option pool doesn't matter with respect to what the limited partners are relying on. Again, however, the industry hasn't lived in such an environment for several decades, since many firms routinely wrote up investments based on new up rounds and wrote down investments based on

down rounds or other significant events clearly indicating an impairment of some kind. In both of these cases changes to the option pool are routine and have been for some time. As a result, failure to properly consider such a potentially dilutive, or anti-dilutive, security can come at a very high cost in terms of understanding the value of the security a fund actually holds.

“The option pool isn’t significant (material) to the calculations.” Ironically, I’ve heard this from almost every group, to varying degrees. Primarily from VCs investing partners, VC analysts, and, surprisingly, even some valuation professionals. As we’ve illustrated in the first of many examples, this is simply not true. If a 20% difference in rights to proceeds is not significant, in a business where IRR is a measuring stick for the limited partners making the investments, it’s hard to argue that even 5% or 10% is not material when you can account for it simply by making a more realistic assumption.

Most importantly, the significance of the option pool can’t be substantively opined upon until one has done at least a few sanity tests similar to the one we did on the previous page.

So, as you can see from the preceding example, assuming that the entire reserve option pool has been vested as of a date when it’s definitively known not to be vested can cost millions of dollars in fees due to incorrectly achieved, or not met, hurdle rates. More importantly, the inherent value of an investment and the urgency of a sale offer at a given price are substantially reduced by this popular practice. If that’s not enough, the impact on audited fund values, and therefore the information limited parties receive from the fund and rely on to make additional investments in new funds, become distorted due to this process. Next, we’ll take a look at the other extreme: ignoring the option pool reserve in its entirety.

Ignoring the Unissued Option Pool

Microsoft Corporation June 30, 1981, Hypothetical Valuation Date

Estimated Waterfall 2

Assumptions:

Single average grant price (\$0.475 per share)

Ignore the entire unissued option pool (remove from model)

Assume that all existing grants are fully vested

Summary benefit conclusion diagrams (OPM and current)

In this example, we started by using the same backsolved enterprise equity value, \$11,066,561, as illustrated in the prior sample, which assumed 100% of the unissued option pool was issued and vested immediately. As illustrated in Exhibit 6.5, using that same total equity value we end up with a substantially higher value allocated to our common stock, \$0.46 per

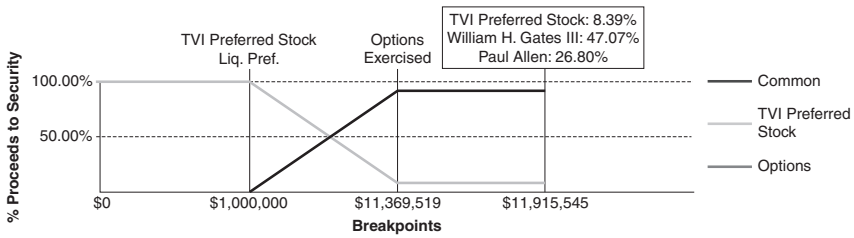
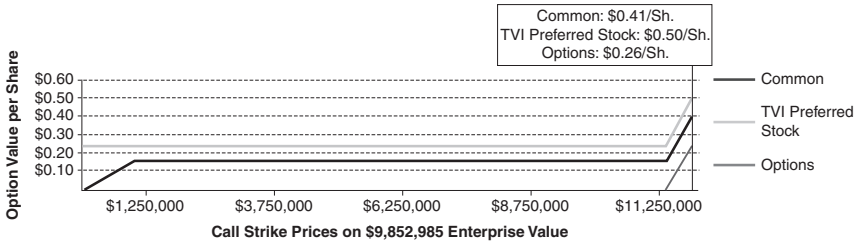


EXHIBIT 6.5 Impact of Ignoring Unissued Option Pool on Bill Gates, Paul Allen, and TVI

Source: Liquid Scenarios, Inc.

share before marketability discounts for common assuming 0% of the unissued pool is outstanding versus \$0.42/share assuming that 100% of the unissued pool was vested.

Without further information, it’s clear that ignoring the unissued option pool effectively increases the hypothetical proceeds available for common stock. This means that the value of the common stock we conclude, regardless of what valuation methodology or approach we use, will be higher with this assumption than it is if we assume that some of the unissued option pool reducing our return at certain points in time.

If the goal is to minimize the intrinsic value of the common stock for tax purposes, as some valuation professionals believe, then ignoring the unissued option pool might be at odds with that objective. If the goal is to provide a reasonable, conservative, and defensible position of the common stock value, then it appears that assuming 100% of the unissued pool has been issued would work against that goal, since the value conclusion for common stock would be understated on most dates. Using either of these prevalent simplifying assumptions results in conclusions that yield unanticipated variations in value conclusion, depending on the date of the valuation and its proximity to the latest option pool reserve being authorized.

So why are these simplifying assumptions so popular? In both cases valuation practitioners, venture capitalists, and even auditors using these methods argue that they are less subjective than having to estimate changes in the option pool at a more detailed level. The real-world cost of the simplifying assumption can be illustrated by simply applying the backsolve method to determine an enterprise value for Microsoft on June 1, 1981, with the sometimes popular valuation assumption that none of the unissued option pool will impact the benefit flows to common stock, preferred stock, or other issued securities of Microsoft.

PERCEIVED ADVANTAGE—UNISSUED OPTION POOL SIMPLIFYING ASSUMPTION: NO ESTIMATE NEEDED

IF 0% of the option pool is assumed granted and vested, AND 100% of granted options are assumed vested, THEN payout percentages in waterfalls and payout diagrams will be higher than the fully diluted ownership percentages for each preferred class and the fully diluted target ownership percentage of the most recent round closed under every scenario.

As you can see in Exhibit 6.6, ignoring Microsoft's unissued option pool entirely on July 1, 1981, results in a backsolve enterprise value, based on

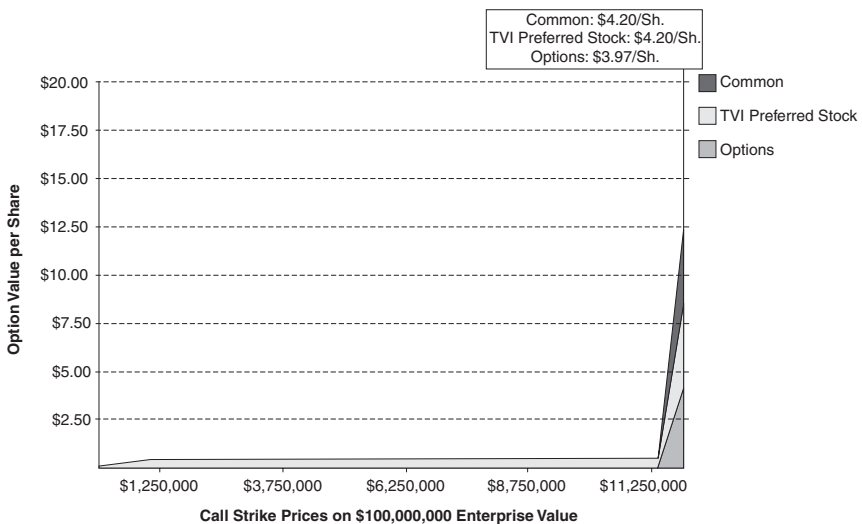


EXHIBIT 6.6 Bad Option Pool Assumptions Cause Backsolve to Fail
Source: Liquid Scenarios, Inc.

the preferred stock market value on June 30, of around \$9.9 million. This is a full 10% lower than the approximately \$11.1 million backsolved value we generated assuming that 100% of the unissued option pool had actually been issued and vested. See Exhibit 6.7.

Sanity Test—Increasing the Enterprise Value Estimate

Another quick sanity test of these popular assumptions is to have an equally large exit value—perhaps 100X the last-round proceeds—and see what OPM value we end up with for common stock under both assumptions. So, for instance, Exhibit 6.8 ignores the option pool and assumes a company equity value of \$100 million on July 1, 1981.

As you can see in Exhibit 6.8, these assumptions result in an estimated OPM value of \$4.20 per share for common stock.

In Exhibit 6.9, we kept the assumed company equity value at \$100 million and assumed the same date, but assumed that 100% of the unissued option pool was both issued and vested on that date. The result of changing that simple assumption is a value conclusion of just \$3.75 per share for the common stock before discounts, or roughly a value of \$81 million for Microsoft's outstanding common shares, \$7.5 million for outstanding preferred shares, and the remaining \$10MM allocated largely to options that were not yet granted. This implies that the ungranted options were worth more than the preferred stock actually outstanding. As you can see, these assumptions result in an estimated OPM value of \$4.20 per share for common stock.

Is the difference of more than \$10 million in common value material? Exhibit 6.10 assumes 100% of the unissued pool is vested, while Exhibit 6.11 assumes 0% of the unissued pool has a claim on equity.

If for some reason you have to choose between one of these two simplifying assumptions, which method is better? The answer depends on timing. As Exhibit 6.12 illustrates, you can still generate a perfect waterfall and current date OPM without even knowing the size of the unissued option pool. However, if you want to create a lattice, or compound OPM, take into account future financing rounds, model claims on future expected cash flows or terminal values, or otherwise look to the future capital structure of the company, you can't do so accurately without modeling the unissued option pool.

As a result, if you believe that a sale or liquidation of the company is imminent, then ignoring the unissued option pool is the better simplifying assumption of the two. If you don't believe a sale or liquidation of the company is imminent, and the unissued option pool is relatively small as a percentage of fully diluted shares (perhaps 1% to 2%), then assuming that 100% of the unissued pool is actually granted and vested might be a better simplifying assumption in some cases.

EXHIBIT 6.7 Microsoft OPM Backsolve with Typical Option Pool Assumption

	Total	TVI Preferred Stock Liq. Pref.	Common Participants	Options Exercised	TVI Preferred Stock Converts
Breakpoints		Breakpoint 1	Breakpoint 2	Breakpoint 3	Breakpoint 4
Strike Price (K)		\$0	\$1,000,000	\$11,369,519	\$11,915,545
BEV Estimate (\$)	\$9,852,985	\$9,852,985	\$9,852,985	\$9,852,985	\$9,852,985
Breakpoint Call Value	\$9,852,985	\$486,554	\$3,139,452	\$106,438	\$6,120,541
Call Value at Floor		\$9,852,985	\$9,366,430	\$6,226,979	\$6,120,541
Term in Years (t)		5.00	5.00	5.00	5.00
Risk-Free Rate (r)		13.95%	13.95%	13.95%	13.95%
Volatility		60.00%	60.00%	60.00%	60.00%
d1		20.06	2.90	1.08	1.05
d2		18.72	1.55	-0.26	-0.29
N(d1)		1.00	1.00	0.86	0.85
N(d2)		1.00	0.94	0.40	0.38
S * N(d1)		\$9,852,985	\$9,834,359	\$8,481,622	\$8,403,802
K * e ^{-rt}		\$0	\$497,828	\$5,660,069	\$5,931,896
Times N(d2)		\$0	\$467,929	\$2,254,643	\$2,283,261
C Value at Ceiling		\$9,366,430	\$6,226,979	\$6,120,541	\$0
Common	\$8,850,242	\$0	\$3,139,452	\$106,387	\$5,604,403
TVI Preferred Stock	\$1,000,000	\$486,554	\$0	\$0	\$513,446
Options	\$2,743	\$0	\$0	\$51	\$2,692

Source: Liquid Scenarios, Inc.

Name	Test	
Chart	Default Breakpoints	
Term	5.00	Years
Risk Free Rate	13.95%	
Volatility	60.00%	
BEV Estimate	\$100,000,000	

Back Solve Last Round	
Last Round	Common
Adjusted Issued Price	\$0.1700000
OPM Value Per Share	\$4.1955816
Marketability Discount (DLOM)	16.19%
Control Discount (DLOC)	0.00%
OPM Value Net Of Discounts	\$3.5163483
Implied Enterprise Value	
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EXHIBIT 6.8 Using Extremely High Exit Value as Sanity Test for OPM

Source: Liquid Scenarios, Inc.

Name	Test	
Chart	Default Breakpoints	
Term	5.00	Years
Risk Free Rate	13.95%	
Volatility	60.00%	
BEV Estimate	\$100,000,000	

Back Solve Last Round		
Last Round	Common	
Adjusted Issued Price	\$0.1700000	
OPM Value Per Share	\$3.7495274	
Marketability Discount (DLOM)	16.19%	
Control Discount (DLOC)	0.00%	
OPM Value Net Of Discounts	\$3.1425069	
Implied Enterprise Value		
Back Solve		

EXHIBIT 6.9 Using Extremely High Exit Value as Sanity Test for OPM

Source: Liquid Scenarios, Inc.

EXHIBIT 6.10 OPM Payouts and Backsolved Microsoft Value

	Total	TVI Preferred Stock Liq. Pref.	Common Participates	Options Exercised	TVI Preferred Stock Converts
Breakpoints		Breakpoint 1	Breakpoint 2	Breakpoint 3	Breakpoint 4
Strike Price (K)		\$0	\$1,000,000	\$11,369,519	\$11,990,783
BEV Estimate (\$)	\$100,000,000	\$100,000,000	\$100,000,000	\$100,000,000	\$100,000,000
Breakpoint Call Value	\$100,000,000	\$497,760	\$5,008,137	\$286,522	\$94,207,581
Common	\$81,854,307	\$0	\$5,008,137	\$251,702	\$76,594,468
TVI Preferred Stock	\$7,514,937	\$497,760	\$0	\$0	\$7,017,176
Options	\$10,630,756	\$0	\$0	\$34,820	\$10,595,936

Source: Liquid Scenarios, Inc.

EXHIBIT 6.11 OPM Payouts and Backsolved Microsoft Value

	Total	TVI Preferred Stock Liq. Pref.	Common Participates	Options Exercised	TVI Preferred Stock Converts
Breakpoints		Breakpoint 1	Breakpoint 2	Breakpoint 3	Breakpoint 4
Strike Price (K)		\$0	\$1,000,000	\$11,369,519	\$11,915,290
BEV Estimate (\$)	\$100,000,000	\$100,000,000	\$100,000,000	\$100,000,000	\$100,000,000
Breakpoint Call Value	\$100,000,000	\$497,760	\$5,008,137	\$251,796	\$94,242,307
Common	\$91,591,923	\$0	\$5,008,137	\$251,793	\$86,331,993
TVI Preferred Stock	\$8,407,037	\$497,760	\$0	\$0	\$7,909,277
Options	\$1,040	\$0	\$0	\$3	\$1,037

Source: Liquid Scenarios, Inc.

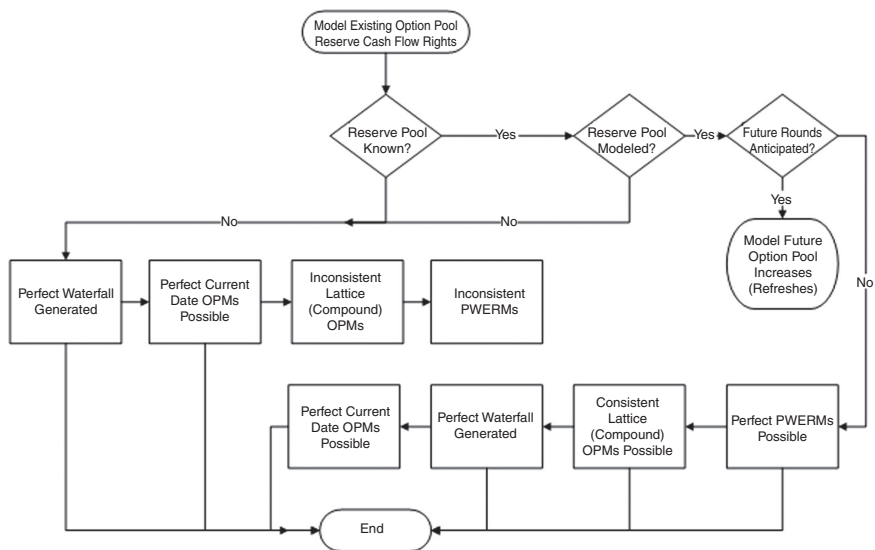


EXHIBIT 6.12 Value Indication Impact Flow Chart for Option Assumptions
Source: Liquid Scenarios, Inc.

Time Invalidates Both Simplifying Assumptions

As we move the date from the day immediately after a financing round to some other future date, the distorting impact of these popular simplifying assumptions regarding the option pool become even more pronounced. As you saw previously, unless a sale and liquidation of the company is imminent, a forward-looking calculation is required to properly arrive at a value conclusion. As you look into the future of a venture-funded company, there are few things you can project with a great deal of accuracy. However, one of the things you can project reasonably and rather simply is granting and vesting of shares that are in the unissued option pool.

In the sanity tests, we were able to demonstrate rather easily that our value conclusions under the simplest conditions were extremely sensitive to the two most popular assumptions concerning the option pool. If we move the date out under both examples by just one year, the results continue to vary significantly for each of the valuation and allocation approaches we’ve illustrated thus far in the Microsoft case. Before showing the impact of these assumptions on other valuation approaches, we will take a quick look at how these popular shortcuts can cost millions of dollars to limited partners (pension funds and endowments), employees, venture-fund general partners, responsible reporting parties (auditors, tax accountants, company officers), and founders.

IMPACT ON PARTIES RELYING ON ASSUMPTIONS OF VC INVESTMENTS

Microsoft Corporation June 30, 1982, versus June 30, 1981 Hypothetical Valuation Dates

Assuming 100% of unissued pool is granted and vested
Summary benefit conclusion tables (OPM)

As you can see from Exhibit 6.13, when we assume that 100% of the unissued option pool has been granted and vested, we end up with nearly the same value allocation today as we do one year from now. As a result, the value conclusions we draw for each class of stock remain fixed, which is highly unlikely for the reasons we mentioned earlier in this chapter. The impact of this popular simplifying assumption on some of the parties reviewing, distributing, and relying on this information can be substantial. Next, we briefly review the impact on several parties that either develop or rely on these types of simplifying assumptions concerning venture-capital investments.

Venture-Capital General Partners (GPs)

For general partners, assuming 100% of the unissued option pool has a constant claim on equity directly impacts their fund's compensation, its progress toward meeting return hurdles, and, potentially, the ability to distribute gains on winning exits to partners that were responsible for those gains. We will discuss this aspect further as we explore the other valuation approaches impacted by the popular simplifying convention.

Venture-Capital Limited Partners (LPs)

A venture-capital fund that assumes 100% of the unissued employee option pool has vested in the Microsoft case, where only one round of preferred stock has been issued, would understate its returns in 1981, 1982 and 1983, 1984 and 1985. This would cause limited partners to report lower returns from the venture fund invested in Microsoft that followed this methodology and lower IRRs at each period. When management fees were taken into account, and in the absence of an outside round, it's possible that limited partners could in fact be showing a loss on this fund, due to management fees and the failure to receive cash flow.

Obviously, in the case of a fund that had invested in Microsoft this would lead to poor decision making by its LPs concerning future allocations to that

EXHIBIT 6.13 Impact of Differences in Time on Indicated Value

	Total	TVI Preferred Stock Liq. Pref.		Common Participates	Options Exercised	TVI Preferred Stock Converts
1982 t=4		Breakpoint 1	Breakpoint 2	Breakpoint 3	Breakpoint 4	
Breakpoints		\$0	\$1,000,000	\$11,369,519	\$11,990,783	
Strike Price (K)		\$100,000,000	\$100,000,000	\$100,000,000	\$100,000,000	
BEV Estimate (\$)		\$72,339	\$5,831,422	\$338,149	\$93,258,091	
Breakpoint Call Value		\$0	\$5,831,422	\$297,055	\$75,822,495	
Common		\$81,950,972	\$0	\$0	\$6,946,452	
TVI Preferred Stock		\$7,518,791	\$0	\$0	\$10,489,143	
Options		\$10,530,237	\$0	\$41,094		
1981 t=5		Breakpoint 1	Breakpoint 2	Breakpoint 3	Breakpoint 4	
Breakpoints		\$0	\$1,000,000	\$11,369,519	\$11,990,783	
Strike Price (K)		\$100,000,000	\$100,000,000	\$100,000,000	\$100,000,000	
BEV Estimate (\$)		\$497,760	\$5,008,137	\$286,522	\$94,207,581	
Breakpoint Call Value		\$0	\$5,008,137	\$251,702	\$76,594,468	
Common		\$81,854,307	\$0	\$0	\$7,017,176	
TVI Preferred Stock		\$7,514,937	\$0	\$0	\$10,595,936	
Options		\$10,630,756	\$0	\$34,820		

Source: Liquid Scenarios, Inc.

particular VC fund and venture-capital investments in general. Similarly, if all VC funds were using a similar assumption in how they accounted for the unissued option pool, pension funds would erroneously be estimating their funded status, expected returns, and related assumptions.

Pension Fund Estimates

Pension fund estimates, especially those of large pension funds covering civil servants, can have a global impact for many reasons. Perhaps the most direct impact of public pension fund estimates is on how state and local governments tax their citizens to meet projected benefit obligations of retirement plans that have been used to retain public servants that might otherwise have to seek more competitive employment opportunities. A less obvious but equally important impact is on the market for all securities globally, across all asset classes. To see how a very small change in pension plan assumptions can have a massive impact on conclusions and investing patterns, look at the following letter from the Center for State and Local Government Excellence.

Why should decision makers care about the debate between actuaries and economists over what the appropriate discount rate should be to value pension liabilities? As Alicia H. Munnell, Richard W. Kopcke, Jean Pierre Aubrey, and Laura Quinby write in this issue brief, the stakes are high. They also argue that the debate over the discount rate should be separated from decisions over how to fund pension liabilities and how to invest pension assets.

What caught my eye was the CalPERS pension history they cite. In 1997, CalPERS reported that assets equaled 111 percent of liabilities using the traditional actuarial model. That upbeat report led the California legislature to enhance the benefits of both current and future employees. The legislature reduced the retirement age, increased benefit accrual rates, and shortened the salary base for benefits to the final year's salary.

If CalPERS liabilities had been valued at the riskless rate in 1997, the plan would have been 76 percent funded. The authors suggest that a riskless rate of valuing liabilities would minimize the temptation for elected officials to become overly generous in good financial times and would better protect funding levels when there is a downturn.

The authors acknowledge that reducing the discount rate from about 8 percent today to 5 percent under the riskless rate would raise new policy questions:

- *Should the amortization period be increased from 30 years to a longer period?*
- *Are changes needed in retirement ages and other provisions for new employees?*
- *How would plans pay for increases in their required payment for normal costs?*

These are important issues to consider as governments grapple with financial pressures and public skepticism.

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Elizabeth K. Kellar

President and CEO

Center for State and Local Government Excellence

Although the context of that analysis was across a much larger base of assets, and venture-capital investments account for only a portion of public pension funds assets, it's clear that a recursive relationship exists. So when you change one variable slightly, the assumptions, conclusions, and decisions that result can change substantially. You saw earlier in this book that when a high discount rate is applied to a future negative cash flow (such as a liability being settled), the conclusion can be erroneously interpreted as suggesting that a given investment opportunity has a higher present value than is the case. That's similar to the arguments being made in the letter above concerning how pension funds discount their future obligations. Applying too high a discount rate to future obligations can, in some cases, have a bigger impact than applying too high a return estimate to current investments.

Officers and Tax Advisors

For officers of the company, and tax advisors, the risks are that the amounts disclosed to investors, as compensation expense in the case of financial reporting or as fair value in the case of tax calculations, are not properly stated. If it's assumed that 100% of the option pool has been vested and the

Scenario 1		Scenario 2	
Name	Test	Name	Test
Chart	Default Breakpoints	Chart	Default Breakpoints
Term	5.00 Years	Term	5.00 Years
Risk Free Rate	13.95%	Risk Free Rate	13.95%
Volatility	60.00%	Volatility	60.00%
BEV Estimate	\$11,066,561	BEV Estimate	\$9,852,985
Last Round Test		Last Round Test	
Last Round	Common	Last Round	Common
Adjusted Issued Price	\$0.17	Adjusted Issued Price	\$0.17
OPM Value Per Share	\$0.42	OPM Value Per Share	\$0.41
Marketability Discount (DLOM)	16.19%	Marketability Discount (DLOM)	16.19%
Control Discount (DLOC)	0.00%	Control Discount (DLOC)	0.00%
OPM Value Net Of Discounts	\$0.35	OPM Value Net Of Discounts	\$0.34
Implied Enterprise Value		Implied Enterprise Value	
Test		Test	

EXHIBIT 6.14 Volatility and Discount Percentage Remain Constant—but Value Changes

Source: Liquid Scenarios, Inc.

valuation date is close to the date of the option pool creation, then the fair value of the common stock will be understated and compensation expense will be understated also. This means that for 409A tax calculations, the grant prices for options, and their assumed fair values, will be understated, which is not conservative for tax purposes. In the case of tax reporting, this risk is partially offset by the use of rather heavy discounts, such as DLOMs.

In Exhibit 6.14 we calculate a discount for lack of marketability using the protective put methodology discussed previously. As you can see, the discount applied is not sensitive to the changes in the total equity value estimate. As a result, when we generated a backsolve enterprise value of \$11.07 million 100% of the reserved (unissued) option pool had vested, we ended up with a DLOM of 16.19%. We got the same discount when we ignored the unissued option pool entirely.

In the prior examples, the discount for lack of marketability (DLOM) was calculated using a protective put. To do this, we set the strike price (K) and underlying OPM value net (S) to the backsolved enterprise values we

obtained previously, \$11,066,561 for in the case where the unissued option pool was ignored and \$9,852,985 in the case where 100% of the unissued option pool was assumed to be vested. So in the former case we set the strike price, $K = \$11,066,561$ and the stock or total company equity value $S = \$11,066,561$. In the latter case, where 100% of the unissued option pool was assumed vested, we set the strike price, $K = \$9,852,985$ and the stock or total company equity value $S = \$9,852,985$. In both cases, volatility, risk-free rate, and expected term were set equal to the active model, 3%, 60%, and 3 respectively.

With these inputs, the final step was simply to reverse, more or less, the default Black-Scholes calculation (which is a call option currently) so it becomes a put option. So we applied a formula with $P = Ke^{-rt} N(-d2) - SN(-d1)$. Dividing the resulting answers by their respective backsolved company equity values, \$11,066,561 for the case where the unissued option pool was ignored and \$9,852,985 in the case where 100% of the unissued option pool was assumed to be vested, generates the same percentage discount for lack of marketability (DLOM) of approximately 16.19%. Changing the expected exit horizon, variable t , from five years to three years increases the DLOM percentage, from 16.19% to 18.15%, but that percentage stays the same regardless of which of the two simplifying unissued option pool assumptions we use.

* * *

We could conclude that neither of these simplifying assumptions has an impact on the discount applied. If that were true, then the impact of these shortcut methods might appear more significant with respect to common stock than with respect to preferred stock being valued. However, as we expand our analysis of option pool reserves to other valuation approaches and techniques, such as the Market Approach and the PWERM, it will become clear that the option pool assumptions we make impact both the gross values and the net values concluded for common stock.

To illustrate this, we look at another case in addition to the Microsoft case using a company that had multiple rounds of funding, and multiple quarters of negative cash flow, prior to its liquidity event.