

Innovation and Profitability

By Bart Stuck and Michael Weingarten

Bart Stuck (barts @ signallake.com) and Michael Weingarten (mikew @ signallake.com) are Managing Directors of Signal Lake, an early-stage telecom venture capital fund (Westport CT and Boston MA).

In "Death of Innovation (Revisited)," we concluded from an examination of 1,300 high tech IPOs that the level of technological innovation is relatively low and has declined significantly since 1996, despite a ten-fold increase in the level of VC funding. The issue is why.

In this article, we examine one of the possible causes; namely, that real innovation is less profitable than lower-risk 'singles' and 'doubles.' If this were the case, rational VCs might rationally choose to avoid investing in genuine innovation plays with inherently higher levels of risk.

Is this theory valid? On one hand, innovation costs money, takes time and involves higher risks. On the other hand, the higher the technical hurdle, the greater the degree of competitive advantage once the hurdle is overcome.

To help answer the question of financial incentives on an empirical basis, we reviewed the IPO database and asked ourselves the following questions:

- Do companies with higher innovation rankings enjoy higher IPO values than companies with lower rankings?
- Post-IPO, do high-innovation companies enjoy higher valuations?
- Are we seeing significant changes over time in relative valuations of high versus low innovation IPOs?

Recap: Innovation Ranking Methodology

In "Death of Innovation (Revisited)," we developed the following 1-5 scale methodology for ranking degree of innovation, which we re-use here for our valuation analysis:

- We reserved our highest rank (T1) for new technologies representing a fundamental departure from anything existing previously, and whose commercialization made possible an entirely new (and important) business market. A good example is the invention of xerography.
- Moving down one notch, we ranked a company as T2 if it was able to demonstrate fundamental technology improvement in an existing product category. These include

Clay Christensen's 'disruptive technologies;' i.e., new technologies that supplanted old technologies in already-established markets, rather than creating new markets.

- Our T3 designation was reserved for companies able to demonstrate non-trivial technical improvements in existing product categories. However, the nature of the improvement was largely one of extending existing technologies (i.e., by using ASICs with .13 rather than .18 traces). The result of T3 innovations could well be the next Moore's Law jump in speed/computing capability. However, we see these as obvious (if non-trivial) serial extensions in existing technologies rather than truly disruptive innovations. We also tend to see T3 improvements as substantially less defensible long term than T1s or T2s. After all, a first-mover Moore's Law announcement by Player A invariably is matched within months by Players B, C and so on.
- Our T4 designation was used for companies able to demonstrate modest improvement in existing technologies, perhaps by repackaging a combination of already-commercialized technologies in novel ways. In many ways, T4 is like T3 but with less significant improvement over what came beforehand.
- Our T5 designation was used for companies who did not create new technology, but were able to successfully market existing technology. Alternatively, companies developing *new business models* using well-established Internet technologies (i.e., Ebay or Amazon) would receive T5 designations.

Study Results: 1993-1996

We begin by looking at the results for the 1993-1996 period, which we used in our previous article as a baseline against which we could measure changes in the 1997-2002 period.

Table 1 shows mean and median per-company valuations as of the IPO date. Given the small number of T1 and T2 companies, we have chosen to combine them in a single T1/T2 ranking.

The results indicate that at the IPO date, there was neither a premium nor a discount for T1/T2 companies versus the overall average. While there was a 20-40% premium for T3 and T5 companies, T4 companies ranked below the overall totals by 4-9%. We conclude that the market did not systematically apply a technology innovation factor in its IPO-day valuations during the 1993-1996 period – positively or negatively.

This picture changes dramatically if we look at the per-company valuations as of 12/31/02 (Table 2). The T1/T2 companies now have 6.8 times the overall mean valuation, and 9.1 times the overall median valuation. T3 companies are valued 30% above the overall mean, and 2.3 times the overall median, while T4s are well below the average (T5s are higher than T4s, but this is based on a small sample size and the T5 valuation remains well below the T1/T2 level).

Net-net, looking at the 1993-1996 results, we conclude that even though the market did not attach an initial IPO premium to innovation, six additional years of history resulted in a substantial premium for innovation. On a median basis, an investor in a T1/T2 company at the IPO date would have generated a nearly ten times increase in valuation as of year-end 2002.

Table 1
IPO Companies For 1993-1996
Mean and Median Per-Company IPO Values

Technology Ranking	Number of Companies	Mean IPO Value		Median IPO Value	
		\$MM	Index	\$MM	Index
T1/T2	20	\$153	103	\$96	103
T3	117	\$184	123	\$121	130
T4	301	\$133	89	\$89	96
T5	17	\$184	123	\$133	143
Total	455	\$149	100	\$93	100

Source: Morgan Stanley Technology IPO Yearbook; Signal Lake Analysis

Table 2
IPO Companies For 1993-1996
Mean and Median Per-Company Values
As Of 12/31/02*

Technology Ranking	Mean IPO Value		Median IPO Value	
	\$MM	Index	\$MM	Index
T1/T2	\$3875	681	\$937	910
T3	\$754	133	\$239	232
T4	\$289	51	\$82	80
T5	\$371	65	\$80	78
Total	\$569	100	\$103	100

Source: Morgan Stanley Technology IPO Yearbook; Signal Lake Analysis
 * Companies acquired prior to 12/31/02 are valued at year-end 2002 at their acquisition price

Study Results: 1997-2002

Table 3 shows IPO-day valuations for companies going public in the 1997-2002 period. In marked contrast to the 1993-2002 period (when T1/2 companies exhibited no valuation premium), T1/T2 companies now have 1.6-2.0 times the average IPO valuation. So clearly, by the end of 1996, the market was increasingly willing to place an IPO-day premium on innovation (perhaps having learned from the post-IPO performances of the 1993-1996 IPOs)

However, the market gave the same (or an even greater) opening day premium to T3 companies, which were valued at 90% above the average. Apparently, the market could not distinguish between the technology levels of T1/2 versus T3 companies.

T4 companies had approximately half the IPO mean value of T1/2/3 companies. Clearly, the market was able to discount the lower value of T4 companies versus T1/2/3.

**Table 3
IPO Companies For 1997-2002
Mean and Median Per-Company IPO Values**

Technology Ranking	Number of Companies	Mean IPO Value		Median IPO Value	
		\$MM	Index	\$MM	Index
T1/T2	5	\$1062	197	\$345	164
T3	41	\$1052	195	\$398	189
T4	320	\$456	84	\$196	93
T5	1	N/A	N/A	N/A	N/A
Total	368	\$540	100	\$211	100

Source: Morgan Stanley Technology IPO Yearbook; Signal Lake Analysis

Table 4 shows mean and median valuations as of year-end 2002. Looking first at the mean results, T3's had the highest per-company values (\$1.210B) and actually gained 15% in value versus the IPO-day mean valuation.

However, the T3 means are skewed by three companies that were sold (for stock) at the peak of the Internet frenzy at very high valuations (E-Tek to JDS Uniphase at \$15.4B; MMC to AMCC for \$4.5B, and Galileo Technologies to Marvell at \$2.6B). Even though Morgan Stanley lists the 12/31/02 valuations for these companies at their acquisition prices, we believe that these substantially overstate their long-term values (after all, at the end of 2002, the parent company valuations were down over 90%). If we exclude E-Tek, MMC and Galileo, the T3 mean for 2002 drops from \$1239 million to \$726 million, and the mean average declined 34.4% versus original IPO levels.

In comparison to the adjusted T3 means, T1/T2 companies had a 43% higher mean value (\$1,039 million versus \$726 million) and lost less value (-2.2% versus -34.4%).

T4 companies had substantially lower means (\$320 million) and lost 29.8% post-IPO.

So net-net, the mean results for 1997-2002 IPOs (valued as of year-end 2002) suggest (as did the 1993-1996 results) that the market rewards innovation increasingly over time, with T1/2 companies outperforming T3s (on an adjusted basis), and T3s outperforming T4s.

This is reinforced by looking at 1997-2002 median valuations as of the end of 2002. T1/2 companies outperformed the median T3 company by a factor of 2.1 times, and outperformed the median T4 company by around 8.6 times. T1/2 companies actually gained value post-IPO on a median basis (+73.9%; albeit on a small sample size of five companies), while than T3 and T4 companies lost 28% and 64%, respectively.

Table 4
IPO Companies For 1997-2002
Mean and Median Per-Company Values
As of 12/31/2002*

Technology Ranking	Mean 12/31/02 Value \$MM	Mean Index	% Change versus Original IPO Value	Median 12/31/02 Value \$MM	Median Index	% Change versus Original IPO Value
T1/T2	\$1,039	266	-2.2%	\$600	759	73.9%
T3	\$1,210/ \$726**	310/ 186**	15.0%/ -34.4%**	\$286	362	-28.1%
T4	\$320	82	-29.8%	\$70	89	-64.3%
T5	N/A	N/A	N/A	N/A	N/A	N/A
Total	\$390	100	-27.8%	\$79	100	-62.6%

Source: Morgan Stanley Technology IPO Yearbook; Signal Lake Analysis

* Companies acquired prior to 12/31/02 are valued at year-end 2002 at their acquisition price

** After excluding E-Tek, MMC and Galileo

Conclusions

The above analysis suggests that while the market in 1993-1996 did not value high innovation companies at a premium, this soon reversed itself, with T1/2 companies far outperforming T3/4/5 companies and being worth substantially more on average.

By the 1997-2002 time frame, the market had already learned to value innovation at a premium. As a result, T1/T2 companies were worth more than T3s (and T3s more than T4s) as of the IPO date. If we adjust for a few outliers that skew the results, the more innovative companies also lost less value over time – so that the T1/T2 premium increased post-IPO.

The relative improvement in both time periods of T1/T2 post-IPO valuations (compared to T3/4 companies) suggests that IPO-day valuations for T1/T2 companies incorporate lingering concerns about remaining technological risk and/or market potential. Once these are resolved successfully, the T1/T2 companies get an additional market cap reward.

These results only add to the quandary that we surfaced in “Death of Innovation (Revisited).” With a 10x increase in annualized VC investment in 1997-2002 compared to 1993-1996, and with the market valuing innovation at a premium, we should be seeing more innovation. Instead we’re seeing substantially less. What’s going on?

Sidebar: What About Non-IPO Valuations?

Our focus on IPO valuations raises the logical issue of whether we would see markedly different results if we were to look at valuations among startups that did not go IPO, but which instead were acquired privately by large high tech companies.

In “Death of Innovation Revisited”, despite the fact that we did not have a comprehensive list of high tech private startup acquisitions, we were able to put together a list of 213 private acquisitions by fourteen leading high tech firms,¹ which we then ranked according to our T1-T5 scale. Of these, 17 were in the 1993-1996 period and 196 were in the 1997-2002 period. Since we had limited data on the acquisition valuations of the 1993-1996 companies, we have limited ourselves to a review of the valuation data for the 1996-2002 companies (where available).

Results

Looking first at mean results for private acquisitions (Table 5), we see a clear premium for high innovation companies. The mean T1/2 company was acquired for \$1.8 billion (these included Cronos, OCLI, Epitaxx, Ramar and Qtera), compared to \$707 million for T3s, \$280 million for T4s and \$45 million for T5s.

Interestingly, the T1/2 private companies sold for a 69% premium compared to the \$1.06 billion for IPOs in 1997-2002. Apparently, acquiring companies like JDS Uniphase (which bought 4 of the 5 T2s), made offers that startup management couldn’t refuse. Aside from this, T3s and T4s sold at a 30-40% discount versus public IPOs.

Table 5
Mean High-Tech Valuations
Private Acquisitions Compared To IPOs
(Valued On Day Of IPO)
\$MM

Technology Ranking	IPO 1993-1996 Mean	IPO 1997-2002 Mean	Private 1995-2002 Mean	Ratio: Private vs 1997-2002 IPO Mean
T1/2	\$153	\$1062	\$1800	1.69
T3	\$184	\$1052	\$707	0.67
T4	\$133	\$456	\$280	0.61
T5	\$184	N/A	\$45	N/A
Total	\$149	\$540	\$445	0.82

Source: Morgan Stanley [Technology IPO Yearbook](#), [convergedigest.com](#), Signal Lake analysis

¹ Alcatel, AMCC, Broadcom, Cisco, Conexant, Ericsson, GlobeSpan, Intel, JDS Uniphase, Lucent, Nokia, Nortel, PMC Sierra, and Siemens

The same results hold true if we look at median values (Table 6). Indeed, the T1/T2 premium versus equivalent IPOs rises to 5.14 times (albeit on a small sample size of 5 private deals).

Table 6
Median High-Tech Valuations
Private Acquisitions Compared To IPOs
(Valued On Day Of IPO)
\$MM

Technology Ranking	IPO 1993-1996 Median	IPO 1997-2002 Median	Private 1995-2002 Median	Ratio: Private vs 1997-2002 IPO Median
T1/2	96	345	1775	5.14
T3	121	398	200	0.50
T4	89	196	185	0.94
T5	133	N/A	45	N/A
Total	93	271	195	0.72

Net-net, the private acquisition results reinforce our IPO analysis: the market rewards innovation. So why aren't we seeing more innovative companies?