

THE DARK SIDE OF VALUATION

In 1990, the ten largest firms, in terms of market capitalization, in the world were industrial and natural resource giants that had been in existence for much of the century. By January 2000, the two firms at the top of the list were Cisco and Microsoft, two technology firms that had barely registered a blip on the scale ten years prior. In fact, six of the ten largest firms¹, in terms of market capitalization, at the beginning of 2000 were technology firms, and amazingly, four of the six had been in existence for 25 years or less.

In an illustration of the speeding up of the life cycle, Microsoft, in existence only since 1977, was considered an old technology firm in 2000. The new technology firms dominating financial markets were the companies that use the internet to deliver products and services. The fact that these firms had little in revenues and large operating losses had not deterred investors from bidding up their stock prices and making them worth billions of dollars.

In the eyes of some, the high market valuations commanded by technology stocks, relative to other stocks, were the result of collective irrationality on the part of these investors, and were not indicative of the underlying value of these firms. In the eyes of others, these valuations were reasonable indicators that the future belongs to these internet interlopers. In either case, traditional valuation models seemed ill suited for these firms that best represented the new economy.

Defining a Technology Firm

¹ The six firms were Cisco, Microsoft, Oracle, Intel, IBM and Lucent. Of these only IBM and Intel had been publicly traded firms in 1975. Microsoft went public in 1986, Oracle in 1987 and Cisco in 1990. Lucent was spun off by AT&T in 1996.

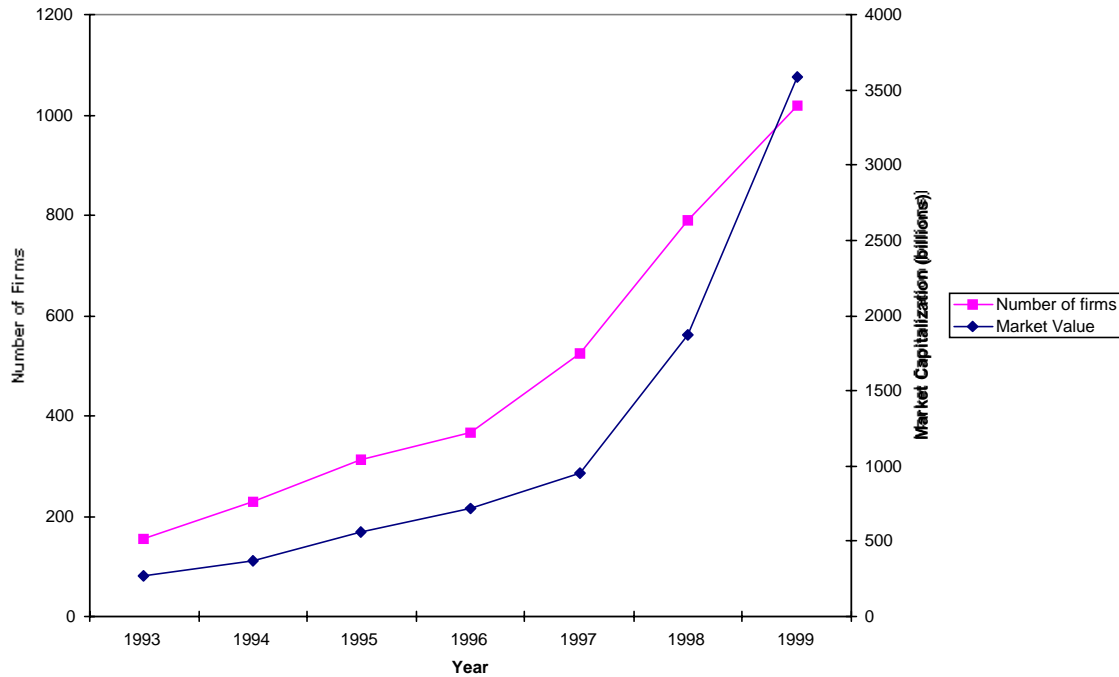
What is a technology firm? The line is increasingly blurred as more and more firms use technology to deliver their products and services. Thus, Wal-Mart has an online presence and General Motors is exploring creating a web site where customers can order cars, but Wal-Mart is considered a retail firm and General Motors an automobile manufacturing firm. Why, then, are Cisco and Oracle considered technology firms? There are two groups of firms that at least in popular terminology, technology firms. The first group includes firms like Cisco and Oracle that deliver technology-based or technology-oriented products – hardware (computers, networking equipment) and software. You could also include high growth telecommunications firms such as Qualcomm in this group. The second group includes firms that use technology to deliver products or services that were delivered by more conventional means until a few years ago. Amazon.com is a retail firm that sells only online, leading to its categorization as a technology firm, while Barnes and Noble is considered a conventional retailer. This group is further broken up into firms that service the ultimate customers (like Amazon) and firms that service other businesses, often called B2B (Business to Business) firms. As the number of technology firms continues to expand at an exponential rate, you will undoubtedly see further sub-categorization of these firms.

There are more conventional measures of categorizing technology firms. Services such as Morningstar and Value Line categorize firms into various industries, though the categorization can vary across services. Morningstar has a technology category that includes firms such as Cisco and Oracle, but does not include internet firms like Amazon. Value Line has separate categories for computer hardware, software, semiconductors, internet firms and telecommunication firms

The Shift to Technology

The shift in emphasis towards technology in financial markets can be illustrated in many ways. Look at three indicators. In figure 1.1, note the number of firms that were categorized as technology firms each year from 1993 to 1999².

Figure 1.1: The Growth of Technology



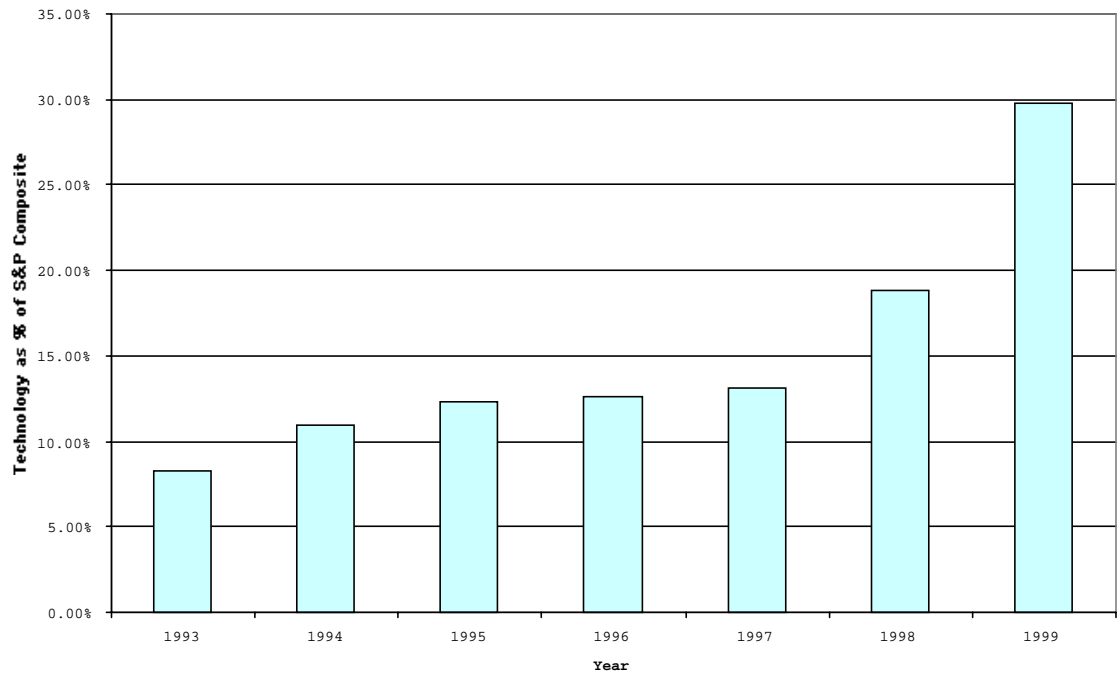
Source: Bloomberg, Standard and Poor's

The number of firms increases almost ten-fold from 1993 to 1999. The growth in the number of firms is matched by the increase in market capitalization of these firms, also shown in Figure 1.1.

While the overall market has also gone up during the period, technology stocks represent a larger percentage of the market today than they did five years ago. Figure 1.2 shows the percent of the S&P 500 represented by technology stocks:

² The Bloomberg categorization of technology firms is used to arrive at these numbers.

Figure 1.2: Technology as % of S&P 500

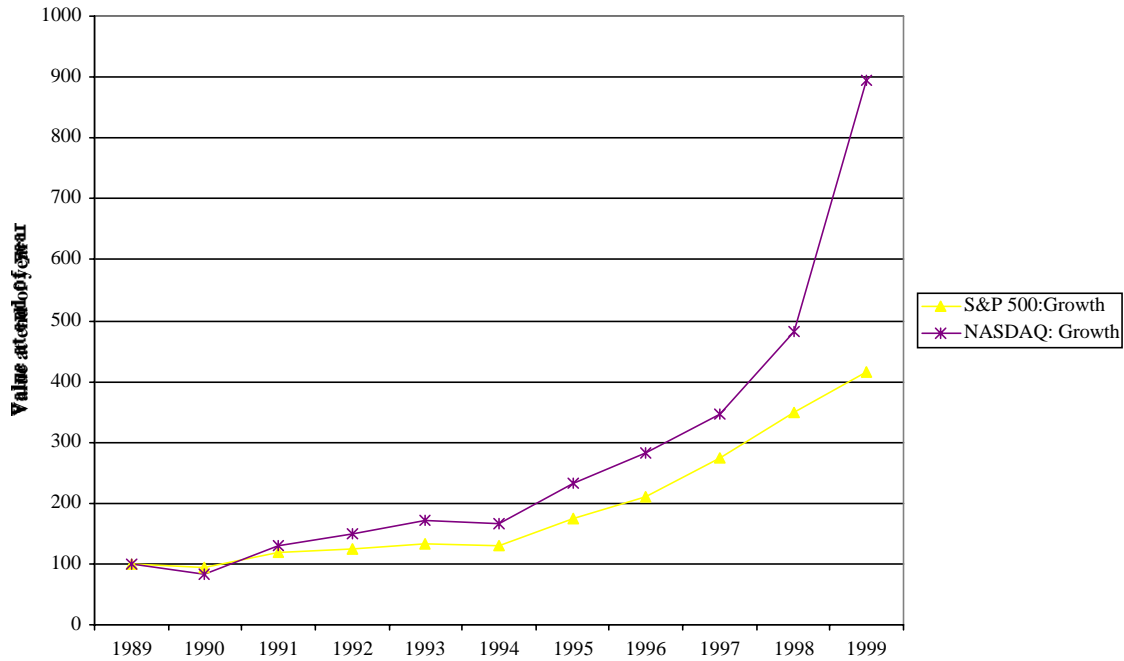


Source: Standard and Poor's

In 1999, technology stocks accounted for almost 30% of the S&P 500, a more than three-fold increase over the proportion six years earlier.

The growth of technology firms can also be seen in the explosive growth of the market capitalization of the NASDAQ, an index dominated by technology stocks. Figure 1.3 graphs the NASDAQ from 1990 to 2000, and contrasts it with the S&P 500.

Figure 1.3: NASDAQ vs S&P 500
Growth of \$ 100 invested in 1989



While both indices registered strong increases during the 1990s, the NASDAQ increased at almost twice the rate as the S&P 500. In fact, the effect of technology is probably understated in this graph, because of the rise of technology in the S&P 500 itself³.

Finally, the growth of technology is not restricted to the United States. Exchanges such as the JASDAQ (for Japan), KASDAQ (for Korea) and EASDAQ (for Europe) mirror the growth of the NASDAQ. In an even more significant development, the conglomerates and manufacturing firms that had conventionally dominated Asian and Latin American markets were displaced by upstarts, powered with technology. In India, for instance, InfoSys, a software firm with less than 2 decades of history, became the largest market capitalization stock in 1999.

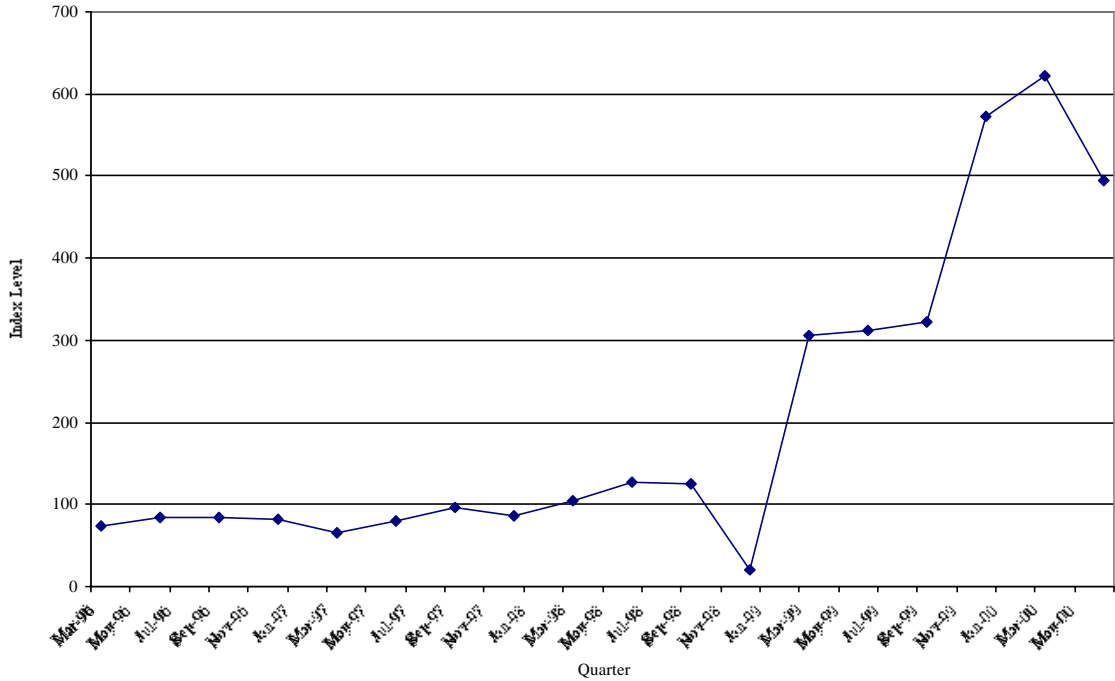
Old Tech to New Tech

³ In other words, a large portion of the increase in the S&P 500 can be attributed to the growth in market value of technology stocks like Microsoft and Cisco.

While there has been a significant shift to technology in the overall market, there has been an even more dramatic shift in the last few years toward what are called new technology firms. Again, while there is no consensus on what goes into this categorization, new technology firms shared some common features. They were younger, tended to have little revenue when they first come to the market and often reported substantial losses. To compensate, they offered the prospect of explosive growth in the future. The surge in public offerings in these firms coincided with the growth of internet use in homes and businesses, leading many to identify new technology firms with dot.com businesses.

The growth of new technology firms can be seen in a number of different measures. While there were no firms categorized as internet companies by Value Line in 1996, there were 304 in that category by 2000. Second, the increase in market value has been even more dramatic. Figure 1.4 graphs the [Inter@ctive](#) Week Internet Index, an index of 50 companies classified as deriving their business from the Internet from its initiation in 1996 to June 2000.

Figure 1.4: Inter@ctive Week Internet Index



This index, notwithstanding its ten-fold jump over the four-year period, actually understates the increase in market value of internet companies because it does not capture the increase in the number of new internet companies going into the market in each of the quarters. At their peak, these internet companies had a value of \$ 1.4 trillion in early 2000. Even allowing for the decline in market value that occurred in 2000, the combined market value of internet companies in June 2000 was \$682.3 billion.⁴

What did these firms have to offer that could have accounted for this extraordinary increase in value? By conventional measures, not much. The combined revenue of internet firms in 1999 was \$18.46 billion, about one third of the revenues in 1999 of one old economy firm, General Electric⁵. The combined operating income for internet firms was -6.7 billion in 1999, and only 23 of the 304 firms had positive operating income. In contrast, GE alone had operating income of about \$ 10.9 billion in 1999. In summary, then, these were firms with very limited histories, little revenue and large operating losses.

Stretching the Valuation Metrics

While there are dozens of valuation metrics in existence, there are two that have been widely used over time to measure the value of an investment. One is the price-earnings ratio, the ratio of the market price of a security to its expected earnings, and another is the price to sales ratio, the ratio of the market value of equity in a business to the revenues generated by that business. On both measures, technology firms, and especially new technology firms, stand out relative to the rest of the market.

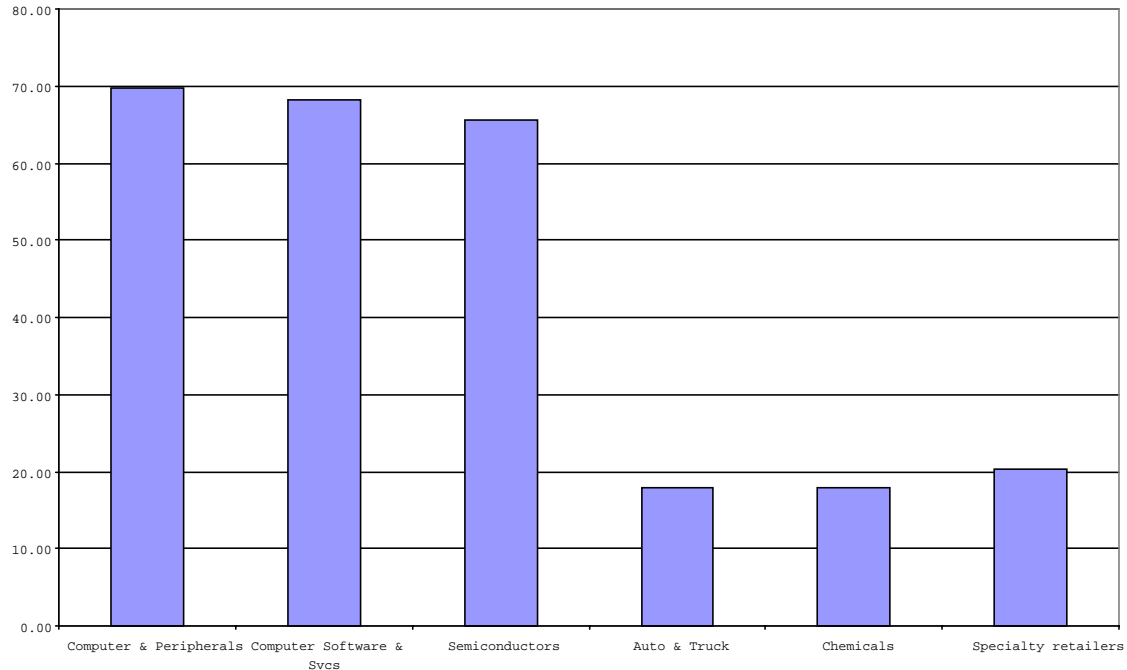
Consider, first, the price earnings ratio. The price earnings ratio for the S&P 500 stood at 33.21 in June 2000, while Cisco traded at 120 times earnings at the same point in

⁴ The Value Line categorization of internet firms is used to arrive at this value.

⁵ General Electric reported revenues of \$51.5 billion in 1999.

time. Figure 1.5 compares the price earnings ratios for three technology sectors (computers, semiconductors and computer software) with the price earnings ratios for three non-technology sectors (automobiles, chemicals and specialty retailers).

Figure 1.5: PE Ratio Comparison across Sectors

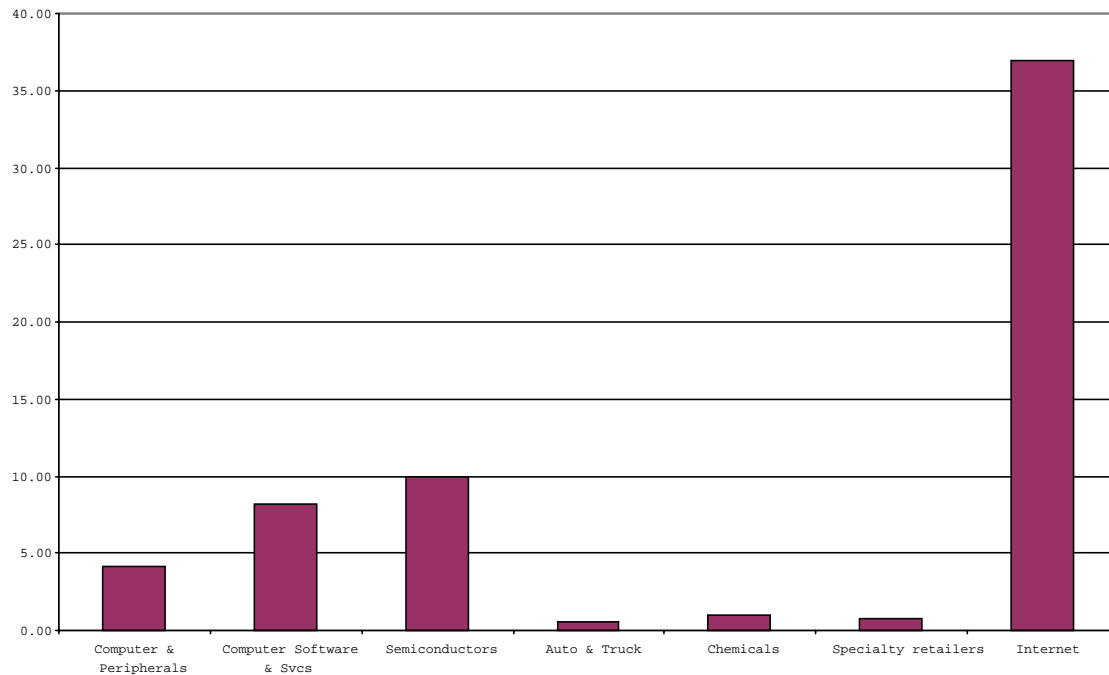


The average PE ratios for the technology sectors are much higher than the ratios for non-technology sectors.

In fact, the price earnings ratio for the entire S&P 500, an index that, as noted in Figure 1.2, has an increasingly large component of technology stocks that have increased over the last decade from 19.11 in 1990 to 33.21 today. Some, or a large portion, of that increase can be attributed to the technology component.

The new technology stocks cannot, for the most part, even be measured on the price earnings ratio metric, since most report negative earnings. To evaluate their values, look at the price to sales ratio. Figure 1.6 summarizes the price to sales ratio for the six sectors listed above, as well as for internet firms.

Figure 1.6: Price to Sales Ratios by



Technology firms, and especially new technology firms, therefore command much higher multiples of earnings and revenues than other firms. Can the difference be attributed to the much higher growth potential for technology? If so, how high would the growth need to be in these firms to justify these large price premiums? Is there an appropriate assessment being made for the risk associated with this growth? These are the questions that have bedeviled investors and equity research analysts in the last few years.

The Implications for Valuation

When valuing a firm, you draw on information from three sources. The first is the *current financial statements for the firm*. You use these to determine how profitable a firm's investments are or have been, how much it reinvests back to generate future growth and for all of the inputs that are required in any valuation. The second is the *past history of the firm*, both in terms of earnings and market prices. A firm's earnings and revenue history over time lets you make judgments on how cyclical a firm's business has been and how much growth it has shown, while a firm's price history can help you

measure its risk. Finally, you can look at the *firm's competitors or peer group* to get a measure of how much better or worse a firm is than its competition, and also to estimate key inputs on risk, growth and cash flows.

While you would optimally like to have substantial information from all three sources, you may often have to substitute more of one type of information for less of the other, if you have no choice. Thus, the fact that there exists 75 years or more of history on each of the large automakers in the United States compensates for the fact that there are only three of these automakers.⁶ In contrast, there may be only five years of information on Abercrombie and Fitch, but the firm is in a sector (specialty retailing) where there are more than 200 comparable firms. The ease with which you can obtain industry averages, and the precision of these averages, compensates for the lack of history at the firm.

What makes technology firms, and especially new technology firms, different? First, they usually have not been in existence for more than a year or two, leading to a very limited history. Second, their current financial statements reveal very little about the component of their assets – expected growth – that contributes the most to their value. Third, these firms often represent the first of their kind of business. In many cases, there are no competitors or a peer group against which they can be measured. When valuing these firms, therefore, you may find yourself constrained on all three counts, when it comes to information.

How have investors responded to this absence of information? Some have decided that these stocks cannot be valued and should not therefore be held in a portfolio. Their conservatism has cost them dearly as technology stocks powered the overall markets to increasing highs. Others have argued that while these stocks cannot be valued with traditional models, the fault lies in the models. They have come up with new and

⁶ The big three auto makers are GM, Chrysler and Ford. In fact, with the acquisition of Chrysler, only two are left.

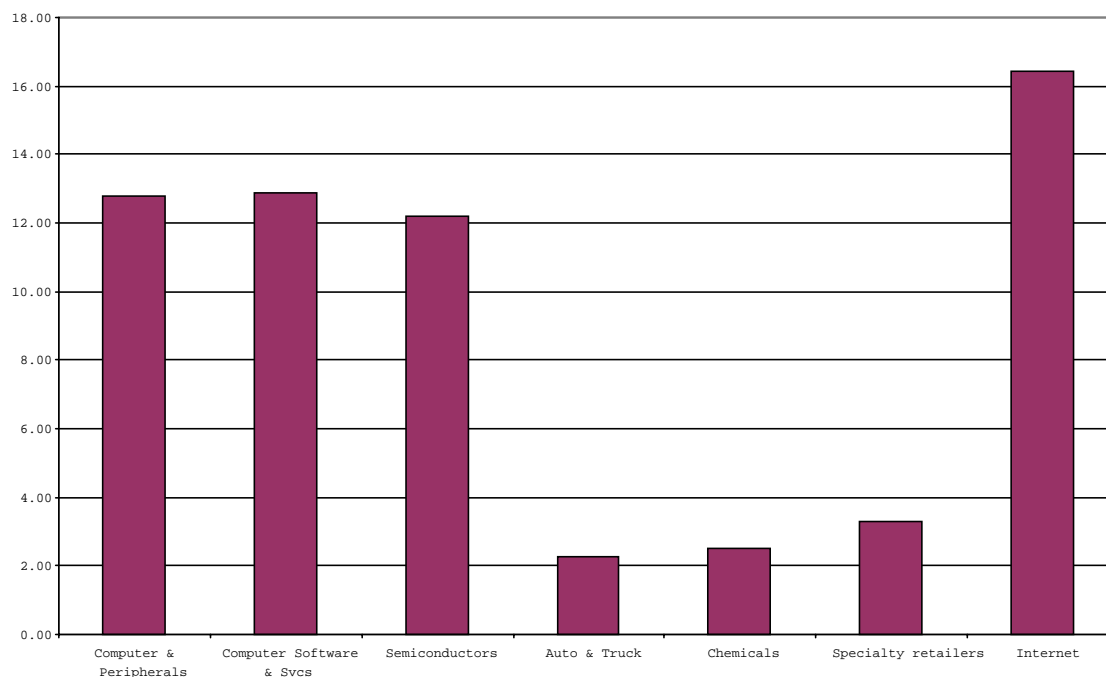
inventive ways, based upon the limited information available, of justifying the prices paid for them.

New Paradigms or Old Principles: A Life Cycle Perspective

The value of a firm is based upon its capacity to generate cash flows and the uncertainty associated with these cash flows. Generally speaking, more profitable firms have been valued more highly than less profitable ones. In the case of new technology firms, though, this proposition seems to be turned on its head. At least on the surface, firms that lose money seem to be valued more than firms that make money

There seems to be, at least from the outside, one more key difference between technology firms and other firms in the market. Technology firms do not make significant investments in land, buildings or other fixed assets, and seem to derive the bulk of their value from intangible assets. The simplest way to illustrate this divide is by looking at the ratio of market value to book value at both technology and non-technology firms. Like the price earnings and the price to sales ratios, the price to book value ratio at technology firms is much higher than it is for other firms. Figure 1.7 compares the price to book value ratio for technology sectors to that of non-technology sectors:

Figure 1.7: Price to Book Value Ratios by



The negative earnings and the presence of intangible assets is used by analysts as a rationale for abandoning traditional valuation models and developing new ways that can be used to justify investing in technology firms. For instance, internet companies in their infancy were compared based upon their value per site visitor, computed by dividing the market value of a firm by the number of viewers to their web site. Implicit in these comparisons is the assumptions that more visitors to your site translate into higher revenues, which, in turn, it is assumed will lead to greater profits in the future. All too often, though, these assumptions are neither made explicit nor tested, leading to unrealistic valuations.

This search for new paradigms is misguided. The problem with technology firms, in general, and new technology firms, in particular, is not that they lose money, have no history or have substantial intangible assets. It is that they make their initial public offerings far earlier in their life cycles than firms have in the past, and often have to be

valued before they have an established market for their product. In fact, in some cases, the firms being valued have an interesting idea that could be commercial but has not been tested yet. The problem, however, is not a conceptual problem but one of estimation. The value of a firm is still the present value of the expected cash flows from its assets, but those cash flows are likely to be much more difficult to estimate.

Figure 1.8 offers a view of the life cycle of the firm and how the availability of information and the source of value changes over that life cycle:

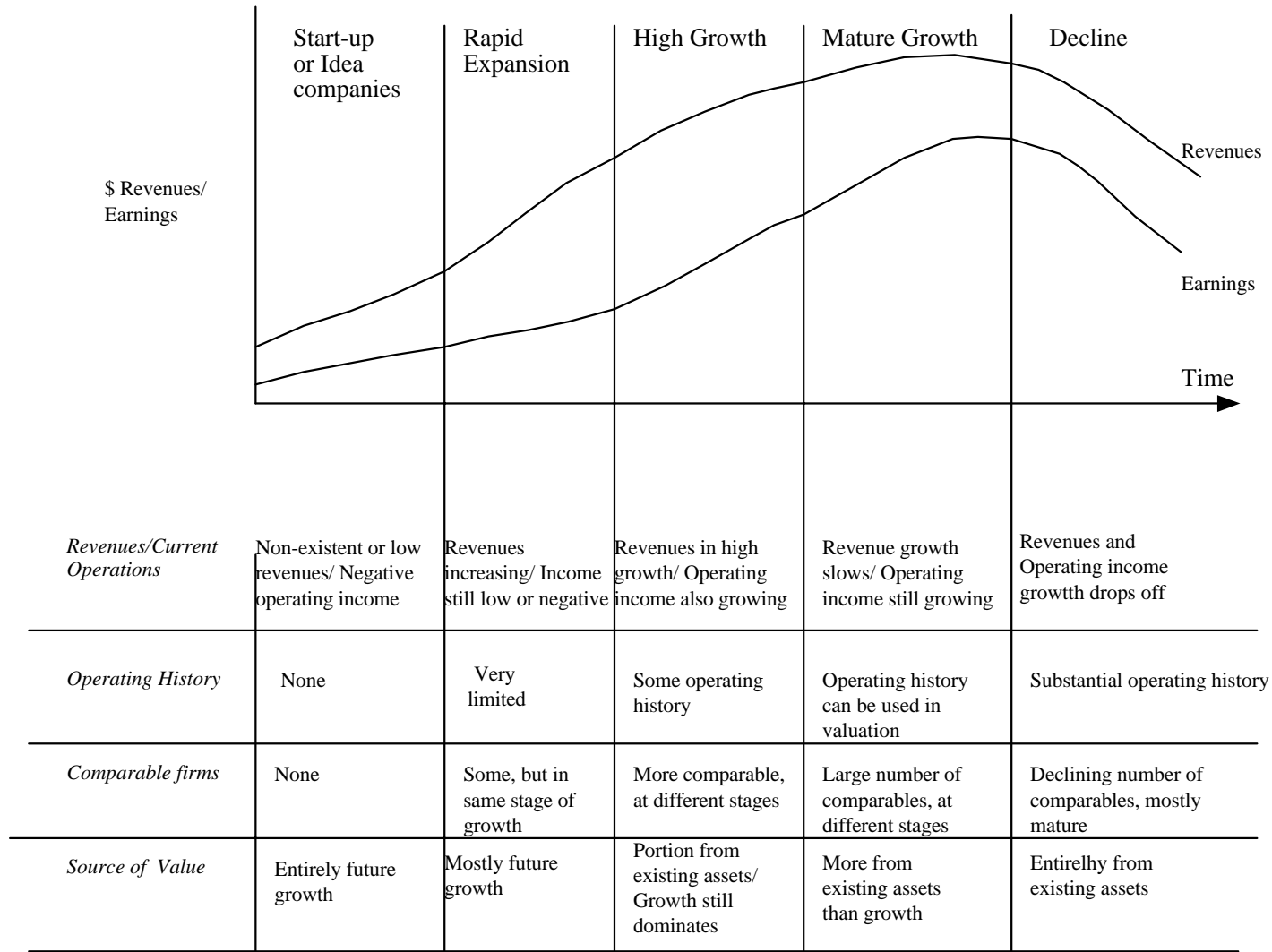
- *Start-up*: This represents the initial stage after a business has been formed. The product is generally still untested and does not have an established market. The firm has little in terms of current operations, no operating history and no comparable firms. The value of this firm rests entirely on its future growth potential. Valuation poses the most challenges at this firm, since there is little useful information to go on. The inputs have to be estimated and are likely to have considerable error associated with them. The estimates of future growth are often based upon assessments of the competence of existing managers and their capacity to convert a promising idea into commercial success. This is often the reason why firms in this phase try to hire managers with a successful track record in converting ideas into dollars, because it gives them credibility in the eyes of financial backers.
- *Expansion*: Once a firm succeeds in attracting customers and establishing a presence in the market, its revenues increase rapidly, though it still might be reporting losses. The current operations of the firm provide useful clues on pricing, margins and expected growth, but current margins cannot be projected into the future. The operating history of the firm is still limited, and shows large changes from period to period. Other firms generally are in operation, but usually are at the same stage of growth as the firm being valued. Most of the value for this firm also comes from its expected growth. Valuation becomes a little simpler at this stage, but the information

is still limited and unreliable, and the inputs to the valuation model are likely to be shifting substantially over time.

- *High Growth:* While the firm's revenues are growing rapidly at this stage, earnings are likely to lag behind revenues. At this stage, both the current operations and operation history of the firm contain information that can be used in valuing the firm. The number of comparable firms is generally be highest at this stage, and these firms are more diverse in where they are in the life cycle, ranging from small, high growth competitors to larger, lower growth competitors. The existing assets of this firm have significant value, but the larger proportion of value still comes from future growth. There is more information available at this stage, and the estimation of inputs becomes more straightforward.
- *Mature Growth:* As growth starts leveling off, firms generally find two phenomena occurring. The earnings and cash flows continues to increase rapidly, reflecting past investments, and the need to invest in new projects declines. At this stage in the process, the firm has current operations that are reflective of the future, an operating history that provides substantial information about the firm's markets and a large number of comparable firms at the same stage in the life cycle. Existing assets contribute as much or more to firm value than expected growth, and the inputs to the valuation are likely to be stable.
- *Decline:* The last stage in this life cycle is decline. Firms in this stage find both revenues and earnings starting to decline, as their businesses mature and new competitors overtake them. Existing investments are likely to continue to produce cash flows, albeit at a declining pace, and the firm has little need for new investments. Thus, the value of the firm depends entirely on existing assets. While the number of comparable firms tends to become smaller at this stage, they are all likely to be either in mature growth or decline as well. Valuation is easiest at this stage.

Is valuation easier in the last stage than in the first? Generally, yes. Are the principles that drive valuation different at each stage? Probably not. In fact, valuation is clearly more of a challenge in the earlier stages in a life cycle, and estimates of value are much more likely to contain errors for start-up or high growth firms, the payoff to valuation is also likely to be highest with these firms for two reasons. The first is that the absence of information scares many analysts away, and analysts who persist and end up with a valuation, no matter how imprecise, are likely to be rewarded. The second is that these are the firms that are most likely to be coming to the market in the form of initial public offerings and new issues, and need estimates of value.

Figure 1.8: Valuation Issues across the Life Cycle



Illustrative Examples

The estimation issues and valuation challenges are different for firms at different stages in the life cycle. Consider five technology firms that span the life cycle, from idea or start-up to mature growth.

- *Motorola*, a company that started off manufacturing televisions and then found success making semiconductors is one example. In recent years, Motorola has found success in telecommunications with its cellular phone venture, though it has had its share of disappointing ventures (such as Iridium). As technology firms go, Motorola is an old firm that is still viewed as having growth potential.
- In early 2000, *Cisco*, for a brief period, became the largest market capitalization firm in the world, an astonishing feat given its short history. In many ways, Cisco is the growth firm that young start-ups would like to emulate, and, as such, is an example of a high growth firm. It is also a company that has had unique success in building itself up through acquisitions of smaller firms with promising technology, and converting it into commercial success.
- *Amazon.com* became a symbol for the new technology firms, both because of its visibility and because it operates a business that is easy to understand – it sells books. Are the drivers of value different for a dot.com than they are for a brick and mortar firm? To answer this question you will value Amazon as a firm that is in rapid expansion.
- *Ariba*, is also a new-technology/internet firm that offers business solutions to other businesses. There is more of a technology component to Ariba than there is to Amazon, and valuing it allows you to examine whether firms that sell to other businesses (b2b) are different, from a valuation perspective, than firms that sell to the

final consumer. It is also a younger firm than Amazon, and has barely made the transition from the idea stage to producing revenues.

- As a final example, you look at *Rediff.com*, an initial public offering at the time this book was written. Rediff.com is a portal serving the Indian market that chose to go public on the NASDAQ. Coverage of this firm is intended to illustrate several points. The valuation of a firm very early in its life cycle, the effects of country risk on value and the consequences of having limited historical information are all examined in the valuation of Rediff.com. In addition, there is the very real possibility that Rediff could make the shift into other businesses in the near future, such as online retailing, especially if it succeeds in its initial push to raise capital and expand its presence in the market.

Summary

Technology stocks account for a larger percent of the market capitalization of stocks than ever, mirroring the increasing importance of technology to the economy. As more and more technology firms get listed on financial markets, often at very early stages in their life cycles, traditional valuation methods and metrics often seem ill suited to them. While the estimation challenges are different for these firms, you will discover through this book that the fundamentals of valuation do not and should not change when you value technology firms.