Pricing internet stocks

by Javier Estrada

Traditional methods of stock valuation can give very conflicting results in e-business

Terra Networks, the crown jewel of Spanish Internet companies, went public on November 17, 1999 at €11.87. It closed its first day of trading at €37, and quickly went on to reach a high of €139.75 on February 25, 2000, for a gain of over 1,000%. It was all downhill thereafter; by late August the stock was trading at around €40, thus losing over 70% of its value. Trying to explain these huge changes in valuation with fundamental analysis is difficult, to say the least. And Terra is not the exception but the rule in the Internet world.

To be sure, there are many disagreements about how to value "old-economy" companies; but when it comes to Internet stocks, most analysts are often shooting in the dark. Is Terra nowadays fairly valued, undervalued or outrageously overvalued? There are market participants who support all three positions – a situation which may stem from the wide range of different valuation models being used. In this article, I will first summarize some methods of relative valuation, and then some "traditional" methods of absolute valuation which, I will suggest, should not be forgotten when pricing Internet stocks.

Methods of Relative Valuation

Many of the methods of relative valuation currently used illustrate the analysts' ongoing struggle with finding some measure (any measure!) that helps them assess the value of Internet companies. Some of these methods, and their pros and cons, are described below.

Price-Earnings Ratios

Price-earnings ratios, or P/E ratios for short, are defined simply as a company's current stock price divided by its (past or expected) earnings per share. This method, used to assess the value of both new-economy and old-economy companies, simply consists of comparing a company's P/E with an "appropriate" P/E, in order to determine whether the company is undervalued, fairly valued, or overvalued. The issue, of course, is what is the "appropriate" P/E?

There are at least three possibilities: historical, industry-wide, and theoretical benchmarks. A historical benchmark involves estimating an average P/E based on the company's past P/Es; an industry-wide benchmark involves estimating an average P/E based on the P/Es of companies in a given sector; and a theoretical benchmark involves building a model based on some predetermined variables that yields equilibrium P/Es.

A simpler alternative is to make a straightforward comparison of the P/E of two companies at a given point in time. To illustrate, by the end of July, 2000, the P/Es of Yahoo and Lycos stood at 386 and 309, respectively, thus implying that Yahoo is expensive relative to Lycos.

Pros P/Es are widely used for their simplicity. In addition, they have a theoretical underpinning, for they can be expressed in terms of a company's fundamental variables.

Cons Deciding what is the "appropriate" or benchmark P/E is a mix of art and science (hence, the use of more than one benchmark may be desirable). In the Internet world, historical benchmarks are usually misleading, for most companies have very short trading histories, and hence no reliable "equilibrium" historical P/E. Industry-wide benchmarks in principle solve this problem but, if the whole industry is overvalued, then an industry-wide P/E will lead to overvalue the shares of individual companies. Theoretical benchmarks beg the question of what are the right variables to include in the model to estimate equilibrium P/Es and, to the best of my knowledge, nobody has built such model. Finally, perhaps the most important objection to this method: Many (if not most) internet companies have no earnings, anyway!

Price-to-book Ratios

Another widely-used measure of valuation is a company's price-to-book ratio, which is obtained by dividing a company's stock price by its book value per share. This measure, just as the P/E ratio, also needs a benchmark to determine relative valuation.

Again, a simpler alternative is to compare the price-to-book ratios of two companies at a given point in time. To illustrate, by the end of July, 2000, the price-to-book ratios of Yahoo and Lycos stood at 41 and 5, respectively, thus implying that Yahoo is significantly more expensive than Lycos.

Pros The main advantages of price-to-book ratios are similar to those of P/E ratios; that is, their simplicity on the one hand, and their theoretical underpinning on the other, as they can also be expressed in terms of a company's fundamental variables.

Cons The main drawback of this technique is that the book value of most internet companies is largely meaningless. Most of them have very few tangible assets, and most of their value

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resides in the talent of their employees, brand names, or other intangibles. They also suffer from the problems pointed out above regarding appropriate benchmarks.

Price-to-Sales Ratios

This measure, which is defined simply as the ratio between a company's stock price and its sales per share, is not widely used to value non-Internet companies. Just as the previous two measures, price-to-sales ratios also need an appropriate benchmark to determine relative valuation.

Again, a simpler alternative is to compare the price-to-sales ratios of two companies at a given point in time. To illustrate, by the end of July, 2000, the price-to-sales ratios of Yahoo and Lycos stood at 91 and 25, respectively, thus implying that Yahoo is (again) more expensive than Lycos.

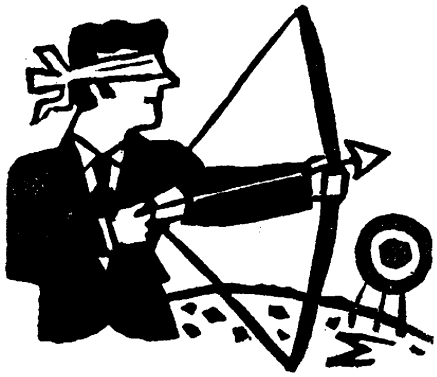
Pros Price-to-sales ratios are, as most other methods of relative valuation, easy to use. In addition, although many Internet companies do not have earnings (nor do they expect to have them in the foreseeable future) and the book value of their assets is virtually meaningless, they do have sales.

Cons There are at least three. First, since this measure is not widely used for non-Internet companies, it is difficult to make comparisons across with non-Internet industries. Second, it ignores profit margins, which are critical to the determination of profitability and hence valuations. Third, the problems regarding appropriate benchmarks discussed for the previous two measures.

Market Cap per Visitor

Given that many Internet companies have no earnings, that book values are largely meaningless, and that price-to-sales ratios ignore profit margins, some analysts prefer to use the market cap per visitor. This measure is simply defined as a company's market cap divided by the number of visitors to the company's Web site (a number reported by Media Metrix).

To illustrate, by the end of July, 2000, the market caps of Yahoo and Lycos were $70.7 billion and $6.7 billion, respectively,



and the number of unique visitors to each company's Web site during the month of June, 2000, was 48,421,000 and 31,286,000, respectively. Therefore, the market cap per visitor is $1,460 for Yahoo and $214 for Lycos, thus pointing again to the fact that Yahoo is more expensive than Lycos.

Pros The number of visitors to a site should be correlated with expected advertising revenues, transaction fees, and some other profit-related variables. In addition, this approach invites interesting questions, such as why is a Yahoo visitor almost seven times as valuable as a Lycos visitor.

Cons The number of visitors may be a very noisy signal of future profitability. In addition, differences in the market cap per visitor may be at least partially justified by the different profits generated by each visitor. This extension is considered immediately below.

Profit per Visitor

An improvement over the previous measure is the profit per visitor, which considers both the revenue and cost generated by the average customer. Lycos' profit per visitor, for example, is $1.87 against Yahoo's $10.31 – perhaps a partial justification of the different market cap per visitor (and the difference in other ratios) reported above.

Yahoo's $10.31 profit per visitor is arrived at after considering a gross profit per customer of $16.42, and sales and marketing costs per customer of $6.11. (In contrast, Amazon has a per-customer gross profit of $20.79 and sales and marketing costs of $42.47, thus yielding a loss per customer of $21.68.)

Pros This measure does consider several variables relevant to valuation such as revenues and costs, as well as the number of visitors.

Cons Unlike many of the traditional methods of valuation, this measure neither considers expected cash flows nor discounts them at a risk-adjusted rate.

Traditional Methods of (Absolute) Valuation

Some habits die hard, particularly when there is a good reason for their existence. It should not be surprising, then, that many analysis still hang on to valuation models used for old-economy companies, which are mostly variations of the discounted cash flow (DCF) model.

The DCF Model

This model, widely used for the valuation of most companies, is not very often used to value Internet companies, for most of these companies neither have positive cash flows nor do they expect to have them in the foreseeable future. And there is more.

Discount rates are typically estimated with the Capital Asset Pricing Model (CAPM) or one of its many variations. In principle it is possible to apply the CAPM to Internet stocks, but the critical input of this model, the company's beta (a measure of relative volatility), requires several years of data for its estimation (the standard practice is five years of monthly returns), not available for most Internet companies.

Therefore, with serious problems to forecast cash flows, and a very limited (and hardly ever representative) history of returns to estimate discount rates, the DCF is rarely used to value Internet stocks. Let's look then at two variations of this model.

Reverse Valuation

The method of reverse valuation, for lack of a better name, is basically a technique to expose the assumptions implicitly built into stock prices in order to evaluate their plausibility. In words, it basically goes like this: "If a and b happen, then this stock trading at $x a share is fairly valued; now, are a and b likely to happen?"

At what rate should we discount those earnings? A reasonable estimate of Yahoo's cost of capital is around 23%. At what rate can Yahoo's earnings grow in the steady state? Let's assume that from the year 2014 on those earnings will grow at 5%. If we put all these inputs together in the standard two-stage DCF model, we get... where, b and m stand for billion and million, respectively. Now the question is, at what rate (g1) would Yahoo's earnings have to grow over the next 15 years to justify its market cap of $113.9 billion?

The answer to that is 65%. But the analysis, of course, does not have to stop there; in fact, it should be taken one or more steps further. For example, we could go on to argue that if the number of visitors to Yahoo's site were to grow by x% a year, then Yahoo's earnings could grow at 65% over the next 15 years; now, is the number of visitors likely to grow at x% a year? Or we could say that if Yahoo's advertising revenues were to grow by y% a year, then Yahoo's earnings could grow at 65% over the next 15 years; now, are advertising revenues likely to grow at y% a year? Essentially, the analyst needs to get to a point where he can reliably answer 'yes' or 'no' to this type of questions, thus making a judgment about the plausibility of a company's valuation.

Note, finally, that in this type of analysis we do not argue that Yahoo's earnings will grow at 65% over the next 15 years. The reverse-valuation technique is an "if-then" analysis; hence, we are saying that if Yahoo were to be fairly valued at $113.9 billion, then earnings over the next 15 years would have to grow at an annual rate of 65%. In other words, this technique helps the analyst determine the "if" conditions under which a company is fairly valued, and the analyst's critical next step is to determine the plausibility of these conditions, which will ultimately determine his judgment on the valuation of the company.

Exhibit 1

$$\$113.9b = \frac{\$142.8m(1+g_1)}{(1.23)} + \frac{\$142.8m(1+g_1)^2}{(1.23)^2} + \ldots + \frac{\$142.8m(1+g_1)^{15} \quad \frac{[\$142.8m(1+g_1)^{15}](1.05)}{(.23-.05)}}{(1.23)^{15}}$$

Exhibit 2

Scenario 1: Equally Likely				
State	**Earnings growth**	**Probability**	**Market Cap**	**Expected Value**
Superb	60.0%	25.0%	$74,327.9*m*	**$22,399.8*m***
Great	40.0%	25.0%	$12,830.3*m*	
Fair	15.0%	25.0%	$1,608.0*m*	
Bad	5.0%	25.0%	$833.0*m*	

Exhibit 3

Scenario 2: Optimistic				
State	**Earnings growth**	**Probability**	**Market Cap**	**Expected Value**
Superb	60.0%	80.0%	$74,327.9*m*	**$62,028.4*m***
Great	40.0%	20.0%	$12,830.3*m*	
Fair	15.0%	0.0%	$1,608.0*m*	
Bad	5.0%	0.0%	$833.0*m*	

Scenario 3: Pessimistic				
State	**Earnings growth**	**Probability**	**Market Cap**	**Expected Value**
Superb	60.0%	0.0%	$74,327.9*m*	**$988.0*m***
Great	40.0%	0.0%	$12,830.3*m*	
Fair	15.0%	20.0%	$1,608.0*m*	
Bad	5.0%	80.0%	$833.0*m*	

Consider the situation of Yahoo at the beginning of this year. (Exhibit 1) The market value of the company stood at $113.9 billion, on 1999 pro-forma earnings of $142.8 million and revenues of $588.6 million. Let's simplify and equate cash flow with earnings, so we start from those 1999 earnings of $142.8 million.

Expected Values and Scenarios

The use of expected values stems from the fact that as we look into the future several paths are possible, each of those paths are not necessarily equally likely, and in each of those paths we will obtain a given result. Then, by taking into account the paths (states), their likelihood of occurrence (probabilities), and their impact on us (payoffs), we can make educated decisions.

Let's go back to Yahoo's 1999 earnings of $142.8 million, a cost of capital of 23%, and a steady-state growth of earnings of 5% after the year 2014. Let's also consider four states:

- **Superb** → Yahoo's earnings grow at 60% a year through the year 2014
- **Great** → Yahoo's earnings grow at 40% a year through the year 2014
- **Fair** → Yahoo's earnings grow at 15% a year through the year 2014
- **Bad** → Yahoo's earnings grow at 5% a year through the year 2014.

Next, we need to estimate how much Yahoo is worth in each of these four states. To do this, we just impose our assumptions on the two-stage DCF model, from which we get

- **Superb** → Market cap: $74,327.9 million
- **Great** → Market cap: $12,830.3 million
- **Fair** → Market cap: $1,608.0 million
- **Bad** → Market cap: $833.0 million.

Finally, we need to assess how likely is each of these states. For the sake of simplicity, let's assume that the four states are equally likely (so that each occurs with a probability of 25%) and call this scenario 1.

So what is, under the assumptions we've made, our estimate of Yahoo's fair value? Just multiply Yahoo's market cap in each state by the probability of that state and you should get

(.25)($74,327.9m + $12,830.3m + $1,608.0m + $833.0m) = $22,399.8m .

So, our assessment of Yahoo's fair value, if the four states we defined are equally likely, is roughly $22.4 billion. The main points of the analysis are summarized in Exhibit 2 (left).

Now, when looking into the future, different analysts may consider different states, probabilities, and payoffs. That's why some people think that many Internet companies are not necessarily overvalued (or even cheap) and some others talk about an "Internet bubble."

To illustrate this point, let's consider an optimistic scenario in which only "good" things can happen, and a pessimistic scenario in which only "bad" things can happen. Details of each scenario, as well as Yahoo's valuation in each case are reported in Exhibit 3.

At least two lessons can be drawn from this exhibit. The first is that the valuation of Yahoo (or any other company) crucially depends on the scenario considered by investors. The second is that the differences in valuation among different scenarios can be very large.

A third lesson may throw some light into the issue of why Internet stocks are so volatile. Imagine that investors are not quite certain about the probability of the four states we contemplated and therefore decide to consider them equally likely; that would imply a $22.4 billion market cap for Yahoo.

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...News flash on the chat rooms...

"Yahoo announces it doubled the number of visitors with respect to the same month a year ago." Turmoil! Investors suddenly become optimistic about the company and reassess the likelihood of our four states. The result? Yahoo's stock is bid up and its market cap reaches $62 billion, almost three times as high!

...News flash on the chat rooms...

"Terra and Lycos announce merger and aim to dethrone Yahoo." Now all hell breaks lose. Investors believe the Terra-Lycos threat and the expectations about Yahoo become pessimistic. In a matter of a few days they bid Yahoo's stock down and its market cap plunges to $988 million, for a fall of over 98%!
Of course, this is an exaggeration. Besides, our states, probabilities, and scenarios were not fine tuned. But the point remains that investors' changing perception about the success of Yahoo (or any other Internet company) can imply huge changes in valuation. If these investors react to news quickly and abruptly (as they usually do), and if the floats are small (as they usually are), then the high volatility of Internet stocks follows.

Conclusions

Many of the models of relative valuation currently used have serious deficiencies, and by and large reflect "desperate" attempts at assessing the value of Internet companies. Each individual model may throw a little light, but unlike traditional DCF models, most of the relative-valuation approaches fail to articulate all the variables relevant to valuation.

The traditional DCF method, on the other hand, is rarely applied to the valuation of Internet companies, though some of its variations like the reverse valuation model are widely used. But remember, regardless of the merits of "new" measures, the value of any company always was, is, and always will be equal to the present value of the cash flows the company is expected to generate.

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