

Valuation of start-up companies

The valuation of start-up companies is a challenging task for both the entrepreneurs and their investors. For technology-based companies the challenge is even greater. Traditional models which are based on discounted cash flows cannot be applied to companies that will see profits only many years along the way.

We propose a benchmarking methodology that produces a logical framework for negotiation on the value of the company. Our methodology consists of 6 simple steps, and is based on data that can be easily obtained from the company's business plan.

Stage 1: selecting the industry

The industry is selected from a wide list of 214 industries in 10 sectors. The list of industries in the Technology and Healthcare sectors is presented in the appendix herein.

As an example we will use a company in the Drug Delivery industry.

Stage 2: obtaining the data from the business plan

The required data are presented in the following table (in the green cells):

| Data from the Business Plan | |
|---------------------------------------|-----------|
| Base year | 2011 |
| Year of beginning of sales | 2013 |
| Last year in the financial projection | 2021 |
| Sales in the first year (\$) | 750,000 |
| Sales in the last year (\$) | 8,000,000 |
| Requested investment (\$) | 3,000,000 |
| Calculated growth rate | 34.4% |

In our example the BP was written in 2011; according to the financial projection sales will begin in 2013 and will amount to 750,000 USD. The financial projection was done for a period of 10 years, and in 2021 the expected sales volume will be 8 million USD. The company is seeking an investment of 3 million USD.

The annual average growth rate of sales volume is calculated from the data and is 34.4%,

Stage 3: obtaining the parameters of the industry

Parameters of the industry are taken from a database of publicly traded companies in the USA. The averages values of the following variables are calculated (extreme values were excluded from the calculations):

Long term growth rate is measured by the past 5 years average annual growth rate.

Beta is the specific industry risk factor. Beta measures the risk of the industry compared to the risk of the overall stock market. Beta larger than 1 means that the industry is riskier than the overall stock market.

Price to Sales is the ratio of the market value of the company's shares to its annual sales volume.

| Parameters | September-11 |
|--|---------------|
| Industry | Drug Delivery |
| Number of firms | 32 |
| Average long term growth rate (1) | 11.0% |
| Average Beta (1) | 1.17 |
| Average Price to Sales (1) | 8.91 |
| (1) Extreme values were excluded from the calculations | |

There are 32 companies in the database that are part of the Drug Delivery industry. The average annual growth rate was 11%; the average Beta was 1.17, which implies that the industry is riskier than the overall stock market; the average price to sales ratio was 8.9 (all data are for September 2011).

Stage 4: evaluating the sales potential

The major factor that determines the value of the company is its potential sales. The BP provides financial projections for sales, however BPs are notoriously optimistic and tend to underestimate the risk. We develop 3 scenarios for the company's sales in the end of the projection period.

Optimistic scenario – is based on the BP.

Conservative scenario – projected sales volume is calculated using the average long term growth of the industry.

Middle scenario - projected sales volume is calculated using the mid value between the BP's projected growth rate and the long term growth of the industry.

| Sales potential | | | |
|-----------------------|-------------|------------|-------------------|
| | Growth rate | Sales (\$) | Market Value (\$) |
| Conservative scenario | 11.0% | 1,729,727 | 15,405,384 |
| Middle scenario | 22.7% | 3,858,560 | 34,365,301 |
| Optimistic scenario | 34.4% | 8,000,000 | 71,250,000 |

The projected sales values are used to calculate the company's market value at the end of the projection period. The market value is the product of the projected sale volume and the average Price to Sales ratio.

Stage 5: evaluating the market prospects

The market values of the company in the 3 scenarios should be discounted to the present. The discounting factor takes into account the alternatives that are available to investors in the stock market. If the alternatives are favorable, investors will demand higher valuations for the company.

| Market prospects | | | | | |
|---|-------------------------------|-------------------------|---------------------------------|---------------|-----------------|
| | Risk premium - general market | Risk premium - industry | Compensation due to illiquidity | Discount rate | Discount factor |
| Low discount | 3.5% | 4.1% | 6.1% | 8.3% | 0.45 |
| High discount | 6.5% | 7.6% | 11.4% | 13.6% | 0.28 |
| Yield on 10 years government bonds (US) | 2.2% | | | | |

The discount rate has four components:

- The risk free rate which is determined by the yield to maturity on 10 years US government bonds (currently 2.2%).
- The risk premium of the general stock market – based on historical analysis such risk premium is in the range of 3.5% to 6.5%. The former represent a gloomy prospect to the stock market, while the latter is consistent with the performance of the stock market during the 20th century.
- The industry risk premium is the product of the general market risk premium by the industry's Beta.
- To compensate for the lack of liquidity of private placements we multiply the industry risk

premium by a factor of 1.5.

The discount rates for our company are 8.3% - which represents low discounting by a factor of 0.45, and 13.6% which represents high discounting by a factor of 0.28.

Stage 6: valuation scenarios

The aforementioned analysis provides 6 scenarios which are based on the anticipated sales growth rates and the prospects for the general stock market.

| Valuation scenarios | | |
|---|---------------|--------------|
| | High discount | Low discount |
| Conservative scenario | 4,316,216 | 6,929,730 |
| Middle scenario | 9,628,327 | 15,458,379 |
| Optimistic scenario | 19,962,528 | 32,050,046 |
| Share of company which is due to investors | | |
| | High discount | Low discount |
| Conservative scenario | 69.5% | 43.3% |
| Middle scenario | 31.2% | 19.4% |
| Optimistic scenario | 15.0% | 9.4% |

Adopting the financial projections of the BP means that the current (post-money) value of the company is between 20 – 32 million USD. Thus the investment of 3 million USD is equal to 15% - 10% of the company.

In the other hand adopting the conservative scenario means that the current (post-money) value of the company is between 4.3 – 6.9 million USD. In such case the investment of 3 million USD is equal to 70% - 40% of the company.

Since the financial projections in such initial stages are not very reliable, the middle scenario can provide a reasonable compromise between investors and entrepreneurs. In such case the current (post-money) value of the company is between 9.6 – 15.4 million USD, and the investment of 3 million USD is equal to 30% - 20% of the company.

Appendix: list of industries in the Technology and Healthcare sectors

| Technology | |
|------------|-------------------------------------|
| | Application Software |
| | Business Software & Services |
| | Communication Equipment |
| | Computer Based Systems |
| | Computer Peripherals |
| | Data Storage Devices |
| | Diversified Communication Services |
| | Diversified Computer Systems |
| | Diversified Electronics |
| | Healthcare Information Services |
| | Information & Delivery Services |
| | Information Technology Services |
| | Internet Information Providers |
| | Internet Service Providers |
| | Internet Software & Services |
| | Long Distance Carriers |
| | Multimedia & Graphics Software |
| | Networking & Communication Devices |
| | Personal Computers |
| | Printed Circuit Boards |
| | Processing Systems & Products |
| | Scientific & Technical Instruments |
| | Security Software & Services |
| | Semiconductor - Broad Line |
| | Semiconductor - Integrated Circuits |
| | Semiconductor - Specialized |
| | Semiconductor Equipment & Materials |
| | Semiconductor- Memory Chips |
| | Technical & System Software |
| | Telecom Services - Domestic |
| | Telecom Services - Foreign |
| | Wireless Communications |

| Healthcare | |
|------------|---------------------------------|
| | Biotechnology |
| | Diagnostic Substances |
| | Drug Delivery |
| | Drug Manufacturers - Major |
| | Drug Manufacturers - Other |
| | Drug Related Products |
| | Drugs - Generic |
| | Health Care Plans |
| | Home Health Care |
| | Hospitals |
| | Long-Term Care Facilities |
| | Medical Appliances & Equipment |
| | Medical Instruments & Supplies |
| | Medical Laboratories & Research |
| | Medical Practitioners |
| | Specialized Health Services |