

# G2G GUIDE TO FINANCIAL CALCULATIONS AND VALUATION PRINCIPLES

# G2G Guide to Financial Calculations and Valuation Principles

<b>Introduction</b> .....	<b>3</b>
<b>1 Basic Accounting Principles</b> .....	<b>3</b>
1.1 Profit & Loss statement.....	3
1.2 Balance Sheet .....	8
1.3 Cash Flow.....	9
<b>2 Financial Planning</b> .....	<b>11</b>
<b>3 Valuation</b> .....	<b>13</b>
3.1 Why valuation is needed?.....	13
3.2 Valuation methods .....	14
3.3 Benchmark evaluation.....	14
3.4 Estimation value with multiples .....	14
3.5 Discounted Cash Flow Method.....	15

# Introduction

Financial calculations are nothing more than a structured way of calculating the value of all the issues discussed in the previous chapters and summarised in the form of a pro-forma Balance Sheet, Income Statement and Cash Flow. This section of the guide shows some examples of how those projections should look like. The purpose is to clarify the logic behind the financial calculations and how they fit with the rest of the business plan, but not to go into financial and accounting details. For this reason this section contains examples of financial statements and projections with explanatory notes to them, complemented by some very basic background accounting information.

Another note of importance is that the examples for financial projections may differ slightly from those required for official financial statements. Since you prepare your financial figures to present them to investors and not to the tax authorities, they need to have a rather analytical content. Also, they need to be clearly understandable and derived from your development strategy as described earlier in the business plan. The examples from different sectors clearly illustrate how business logic affects content and structure of financial statements in a business plan.

## 1 Basic Accounting Principles

Financial statements consist of three parts: the Profit & Loss statement (P&L), the Balance Sheet (BS), and the Cash Flow table.

### 1.1. Profit & Loss statement

This displays company's revenues and costs in a standard form. The items and the groups may vary from country to country, due to differences in accounting practices. However, the logic behind it remains the same everywhere: the P&L statement shows the result of the business activity, together with its major components for a standard period of time.

Following is an example of a very simple P&L statement. The sequence of the arithmetic operations is also included for easier tracking of calculations.

**Example 1 (P&L):**

<b>Sample Company Ltd.</b>		<b>31.12.2000</b>
Income Statement (in '000€)		
+ Sales		11 136
<b>= Total Revenue</b>		<b>11 136</b>
- Cost of materials		135
- Personnel expenses		6 365
- Other costs		909
<b>= EBITD</b>		<b>3 727</b>
<i>EBITD % of Total Revenue</i>		<i>33%</i>
- Depreciation		2 014
<b>= EBIT</b>		<b>1 713</b>
<i>EBIT % of Total Revenue</i>		<i>15%</i>
+ Financial income		9
- Interest expenses		39
<b>= PBT</b>		<b>1 683</b>
- Taxes		321
<b>= PAT</b>		<b>1 362</b>
<i>PAT % of Total Revenue</i>		<i>12%</i>

Abbreviations used:

**EBITD** - Earnings Before Interest, Tax and Depreciation;  
**EBIT** - Earnings Before Interest and Tax;  
**PBT** - Profit Before Tax; synonyms:  
**EBT** - Earnings Before Tax;  
**PAT** - Profit After Tax; synonyms:  
**Net Profit, Net Earnings**

Figures representing '% of Total Revenue' normally do not appear in an official P&L statement. However, they facilitate the reader and we propose to include them. Following is another example of a P&L items, taken from the financial analysis of a production unit of a real company:

**Example 2 (production):**

<b>XXXX Plc</b>	
<b>Income Statement</b>	
Sales (domestic)	
Sales (exports)	
Sales Related Revenues	
<b>Total Revenue</b>	
Material	
Fuel & Electric Power	
Direct Services	
<b>COGS</b>	
<b>Gross Margin</b>	
<i>Gross Margin % of Total Revenue</i>	
Other Operating Income	
Services & Others	
Wages	
Social Taxes	
Other Direct Expenses	
Marketing Expenses	
<b>EBITD</b>	
<i>EBITD % of Total Revenue</i>	
Depreciation	
<b>EBIT</b>	
<i>EBIT % of Total Revenue</i>	
Financial Income	
Interest Expenses	
Other Financial Expenses	
<b>PBT &amp; EXTRAORDINARY ITEMS</b>	
Extraordinary Income	
Extraordinary Costs	
<b>PBT</b>	
Income Tax	
<b>PAT</b>	
<i>PAT % of Total Revenue</i>	

Explanatory notes:

**COGS - Cost Of Goods Sold** represents costs directly associated with production - raw and consumable materials, components purchased, contracts for external services, etc.

**Gross Margin**  
= Total Revenue - COGS

Please note the existence of 'Cost of Goods Sold' (see box next to chart). Those are only the costs directly incurred in the production process.

In general, there is not much difference from the first example. More positions exist, the costs are split into more descriptive items, but the logic remains the same:

### **Sample Company Ltd.**

#### **Income Statement**

+ Sales
<b>= Total Revenue</b>
- Cost of Sales
<b>= Gross Margin</b>
- Operating expences
<b>= EBITD</b>
- Depreciation
<b>= EBIT (Operating result)</b>
+ Financial income
- Interest expenses
<b>= Profit Before Tax</b>
- Taxes
<b>= Net Profit</b>

The next example comes from the biotech industry and contains real figures, reported by *Rhein Biotech N.V.* in their Annual Report of 1999. This is a mature, listed company. The Company is already in production phase for vaccines, immune modulators, industrial enzymes and some other products. Also, it maintains high level of research & development activity:

**Example 3 (biotech):****Consolidated statements of operations**

years ended December 31, 1999, 1998 and 1997 (in EUR)

	1999 EUR	1998 EUR	1997 EUR Pro Forma
<b>Revenues:</b>			
Contract development	1,071,395	1,731,176	1,890,642
Technology transfer	2,955,541	976,915	824,531
Royalties	807,114	285,168	161,752
Product sales	1,163,270	605,570	235,926
<b>Total revenues</b>	<b>5,997,320</b>	<b>3,598,829</b>	<b>3,112,851</b>
<b>Cost of sales</b>			
Cost of sales	1,063,822	248,441	214,774
<b>Gross Profit</b>	<b>4,933,498</b>	<b>3,350,388</b>	<b>2,898,077</b>
<b>Operating expenses:</b>			
Research and development costs	3,557,896	2,282,739	1,292,821
Selling and distribution expenses	192,436	67,519	145,134
Administrative and general	2,378,484	1,648,195	1,017,798
Amortization of goodwill	118,068	-	-
<b>Total operating expenses</b>	<b>6,246,884</b>	<b>3,998,453</b>	<b>2,455,753</b>
<b>Income (loss) from operations</b>	<b>(1,313,386)</b>	<b>(648,065)</b>	<b>442,324</b>
<b>Other income</b>	<b>440,077</b>	<b>328,742</b>	<b>279,801</b>
Interest income/(expense) and other	259,420	(183,599)	(552,100)
<b>Income (loss) before income taxes and minority interest</b>	<b>(613,889)</b>	<b>(502,922)</b>	<b>170,025</b>
<b>Income tax provision</b>	<b>102,117</b>	<b>83,370</b>	<b>208,658</b>
<b>Loss before minority interest</b>	<b>(716,006)</b>	<b>(586,292)</b>	<b>(38,633)</b>
<b>Minority interest</b>	<b>139,622</b>	<b>21,506</b>	<b>165,545</b>
<b>Net income (loss)</b>	<b>(576,384)</b>	<b>(564,786)</b>	<b>126,912</b>

Source: Rhein Biotech N.V. and Subsidiaries, Annual Report 1999

The structure of Profit & Loss statement does not change a lot from the previous example.

The next example comes from the e-business/e-content. eJay is a provider of music software and online music entertainment, listed on the German Neuer Markt:

**Example 4 (e-content):**

**Profit and loss account as of 31 December 2000 in accordance with US-GAAP**

PROFIT AND LOSS ACCOUNT		
	Dec. 31, 2000	Dec. 31, 1999
	TEUR	TEUR
Turnover	10,971	2,702
Cost of goods sold	-1,922	-423
Gross operating result from turnover	9,049	2,279
Operating expense		
Sales and marketing costs	-5,451	-1,154
General accounting costs	-2,926	-634
Research and development costs	-1,687	-89
Depreciation	-820	-292
	-10,884	-2,169
Operating result	-1,835	110
Other revenue/expenses (13)	-239	89
Earnings before interest and tax	-2,074	199
Financial results (14)	90	7
Profit or loss on ordinary business activities before taxes on income and earnings	-1,984	206
Taxes on income and earnings (15)	163	-87
Annual deficit (previous year: annual net profit)	-1,821	119

Source: eJay, Annual Report 2000

Please note how much the cost structure changes, compared to the biotech sector. eJay has a relatively low Cost of Goods Sold, but much higher marketing costs. As far as every company is unique in a way and is following its own business model, you will never see two P&L Statements that will contain the same figures or have the same sales/costs structure.

## 1.2. Balance Sheet

On any particular date, a company's affairs should be in a state of balance, which can be represented by the simple equation:

$$\text{Assets} = \text{Liabilities} + \text{Owners' Equity}$$

The Balance Sheet is the financial representation of this equation and is simply a "snap-shot" of the financial position of the company on the day that the balance sheet was created. It does not itself imply that the company is in a satisfactory state of financial health and it could change from one day to the next if the company's circumstances change.



**Example 5 (simple BS):**

<b>Sample Company Ltd.</b>	
Balance sheet (in '000€)	31.12.2000
<b>ASSETS</b>	
Cash	30
Receivables	20
Inventory	50
<b>Total Current Assets</b>	<b>100</b>
<i>Current Assets % of Total Assets</i>	<i>24%</i>
Land & Buildings	110
Machinery & Equipment	200
<b>Total Fixed Assets</b>	<b>310</b>
<b>Total Assets</b>	<b>410</b>
<b>LIABILITIES &amp; EQUITY</b>	
Creditors	25
Short-term Debt	25
<b>Current Liabilities</b>	<b>50</b>
<b>Long Term Debt</b>	<b>250</b>
<b>Total Liabilities</b>	<b>300</b>
<i>Liabilities in % of Total Assets</i>	<i>73%</i>
Share Capital	100
Reserves	5
Retained Earnings	5
<b>Total Equity</b>	<b>110</b>
<b>Total Liabilities and Equity</b>	<b>410</b>

**Current Assets** - assets available at short notice, include cash, current accounts, receivables, raw materials, work-in-process, goods-in-stock;

**Fixed Assets** - consist of land and building, movable equipment, construction-in-progress, intangible assets, financial investments;

**Current Liabilities** - liabilities with term up to 1 year, consist of: notes-, accounts-, salaries-, taxes-, and dividend-payables; accrued expenses; short-term debt;

**Long-term debt** - debt/payables with term over 1 year, e.g. bank loans, mortgages etc.

**Retained earnings** - accumulated profit/loss from current + previous periods

The **equity** includes:

- Share Capital subscribed by the owners (of which only a part payment has been made - "called up")
- Retained profit for the year (from the Profit and Loss Account. This would be negative if the company had made a loss)
- Reserves, i.e., amounts set aside as "savings" to be used for exceptional items of expenditure. The Revaluation reserve arises when the company's assets are re-valued upwards (increased property values, for example).
- Less any amounts drawn by the owners as dividends during the year (in the present case, none).

Unlike the Income Statement, the structure of a Balance Sheet remain mostly the same across the different industries.

### 1.3. Cash Flow

The cash flow statement shows whether the company is generating or consuming cash within a period of time. There are two ways of calculating it: direct and indirect.

#### Direct Cash Flow

This approach is based on the real movement of cash in and out of the company. Its logic is as follows:

<b>Sample Company Ltd. Monthly Cash Flow (Direct)</b>	
+	Payments received on invoices
=	<b>Income from Sales</b>
-	Cost of Materials purchased
-	Personnel expenses (incl. social security)
-	Marketing Expenses
-	Rent
-	Tax
-	Interests
=	<b>Cash Flow</b>
-	Investments
=	<b>Liquidity</b>
	<b>Cumulated liquidity</b>

**Income from Sales** - please note that outstanding invoices or confirmed orders do not count. The only thing that matters is whether payment is received;

**Liquidity** shows cash out- or inflow only for a single period.

**Cumulated liquidity** is sum of all single period Liquidity from the beginning of the interval, e.g.

**Cumul. Liq. (Sept)** = Liq. (Jan) + Liq. (Feb)  
+ ... + +Liq. (Sept)

### Indirect Cash Flow

It serves the same purposes as the direct approach, but the calculation methodology is based on the Balance Sheet and P&L figures:

<b>Sample Company Ltd. Monthly Cash Flow (Indirect)</b>	
	Net Earnings
	Plus Depreciation
	<b>Funds Generated =</b>
	Investments in Working Capital
	Plus Increases in Payables
	Less Increases in Receivables
	Less Inventory Increases Raw Materials
	Less Inventory Increases Work-In-Process
	Less Inventory Increases Goods-In-Stock
	Investments in Working Capital =
	<b>Operating Cash Flow =</b>
	Investments
	Less Investments in Land & Buildings
	Less Investments in Machinery & Equipment
	Less Financial Investments
	Less Investments in Intangible Assets
	<b>Free Cash Flow =</b>

The idea behind the above calculations is to find out how much external financing is needed to maintain market expansion, investment needs, or time/money lag between production and receipt of payments.

## 2 Financial Planning

The financial planning section should give answers to the following questions:

- How much money is needed by the company?
- How much profit will the company make?
- What are the assumptions underlying the planning?

You may consider starting doing financial calculations by using the format proposed in the BP Budgeting Module.

This downloadable excel file contains all major components of financial statements in a generally accepted form. It also has some basic functionality and logic for automatic calculations of certain items. However, this is not a plug-and-ready tool. It gives only a simple framework of the results which has to come from financial planning. Also, we suggest starting planning on a monthly basis, and later aggregate the annual figures.

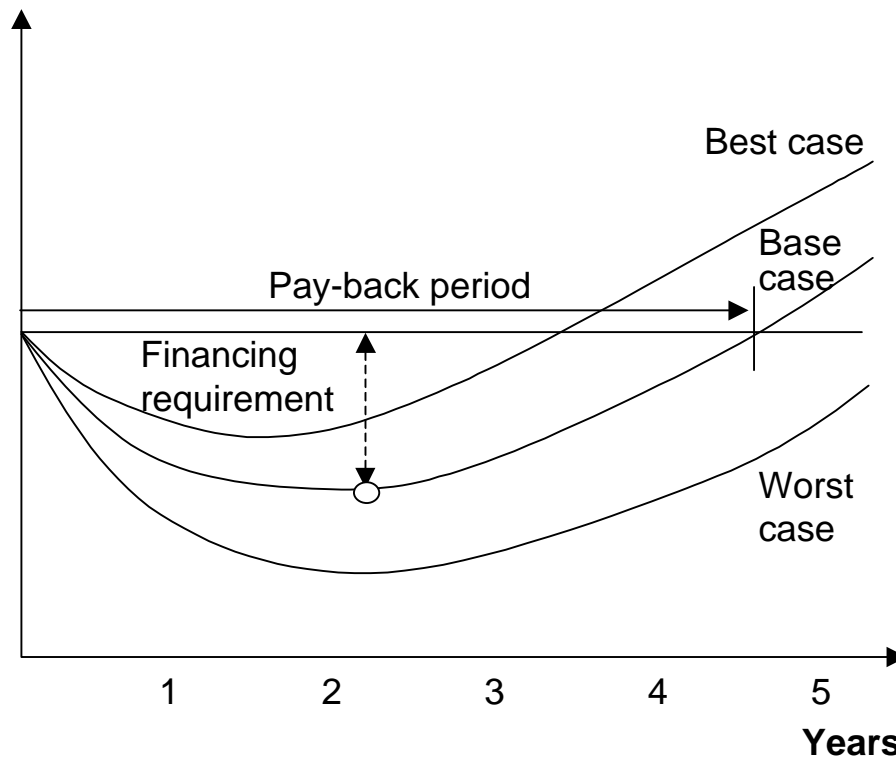
Start with a forecast of sales. Base this on numerical assumptions, derived from the market analysis and the strategy you follow. It may be useful to create a separate table with those calculations and to link it to the Profit & Loss Statement of your model. In this way you will achieve a high level of flexibility and will be able to make quick tests of different scenarios.

After forecasting sales, move to the next items of the financial statements. Some of them can be calculated or assumed to be a function from other items. For example receivables, inventories, raw materials, payables etc. are often proportional to sales. Hence, these may be calculated as a % from the sales volume. What the exact % is depends on the specific case, the business, the strategy etc.

Other figures can be derived directly from the previous parts of the business plan. The personnel costs for example, are based on the personnel planning elaborated in a previous chapter. Whenever item turns out to be complex to calculate, do not hesitate to create a help table, containing breakdown or series of calculations. Attach those tables as appendixes to the business plan, as they contain the numerical information about your business model.

Have in mind that it will take a considerable amount of time to build a balanced financial model of your future business. The financial model you create should be the most-probable scenario for the development of the company. Try changing the basic assumptions, and generate 2 additional models: the optimistic and the pessimistic scenarios. Putting them together gives the following picture:

### Cumulated cash flows



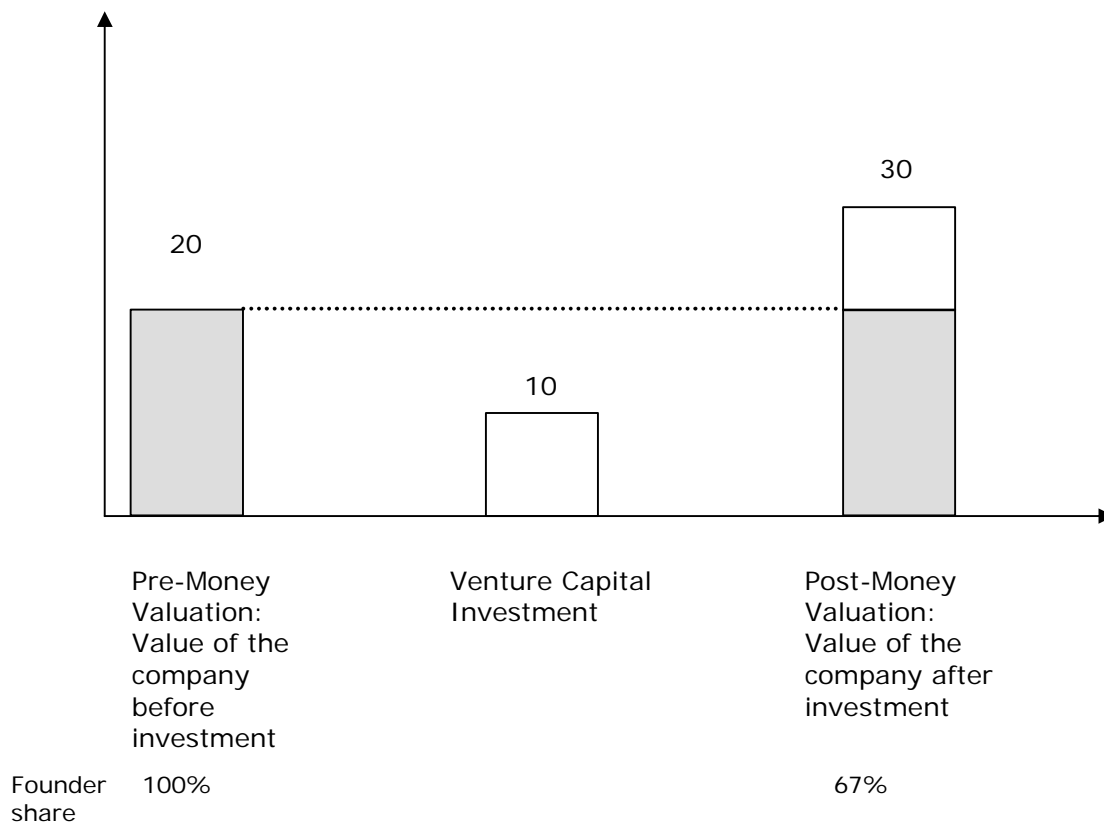
The negative values of the company cash flow indicate the amount of financing needed across the time-span of your business plan.

Present all major assumptions and results from the financial planning in the body of the business plan, and attach all major tables as appendixes.

## 3 Valuation

### 3.1. Why valuation is needed?

Equity investments always affect the ownership structure of the company. In other words - what % of the company will the investor have after investing X amount of money. The deal can be illustrated in the following way:



If you know the amount of the investment needed, you have to know the pre-money valuation of your company in order to determine the % that the investor will acquire. A simple formula describes this:

$$InvestorShare\% = \frac{Investment}{preMoneyValuation + Investment} * 100$$

The formula can be reversed:

$$preMoneyValuation = Investment * \frac{100 - InvestorShare\%}{InvestorShare\%}$$

So, if you make the statement: "I will give you 1/3 share in the company for 10mil€", then the investor immediately knows that you value your company at 20mil€ prior to his investment.

### 3.2. Valuation methods

There is no definitive way to determine the value of your company. It will depend on several factors: the stage of development, the economic climate, the situation of the stock market, the position of your company in the market, the prospects for the sector in which the company operates, the competition or lack of it among capital providers to invest in your company and the likelihood that your company will need cash in a later stage to achieve the objectives.

A company that is starting up will have no financial track record. All it will have, are projections based on what the company's management team believes it can achieve. In this case, the entry valuation of the VC will depend on qualitative factors such as the investor's return expectations, the proportion of the company that the management is willing to give up in exchange for the investment and the investors' view of the opportunity for the new concept, product or service.

The "value of a company" generally means the market value of its equity. As start-ups are not listed on a stock exchange, their market value can only be determined indirectly. To value start-ups and early stage companies, benchmark valuation, the multiples method, or the discounted free cash flow methods are usually applied.

### 3.3. Benchmark Valuation

Find a number of companies similar to your venture in terms of products, growth cycle, position in the value chain, market coverage etc. Assess the comparability and the differences from your company. For the best fit find out data on the amount of investment and post-money valuation after each round of investment in these benchmark companies. If you find a very 'close fit' - company already having passed through several rounds of financing, you may expect that your own company has similar value.

### 3.4. Estimating value with multiples

The value of the business can also be estimated with the aid of comparable values from already established businesses. This method is known as 'multiples'.

You need to identify comparable companies in the same way as in the benchmark valuation. As a next step, define relevant multiples for which data are available.

These depend in most cases on the sector you operate in, and you need to search through investments reports or publications of investment banks in order to determine the proper multiples and their values.

For example in the telecom sector, end-user voice- and data providers are often valued on a 'number of customers' basis: i.e. the number of subscribers is multiplied with the particular multiple for the sector in the specific country, which results in the approximate value of the telecom.

One of the most-often used multiples is the Price/Earnings (or P/E) ratio. You multiply the net profit with the relevant multiple. This calculation gives you the value

of the business at the end of your potential investor's investment horizon, also known as the exit point.

This value is then discounted to give the current value of the business.

The disadvantage of this method is that it is a typical valuation tool for established companies with a reasonable track record. Another shortcoming is that it is not usable if there is 0 or negative net profit at the exit point.

### 3.5. The Discounted Free Cash Flow (DFCF) Method

From an investor's point of view, the value of the company is determined by the money it can generate, rather than the assets it may have.

In this method, all the future free cash flows are discounted to the present moment and added together. The result is the 'net worth' of the company, or the current value of the equity + outstanding debt. The calculation sequence is as follows:

Activities	Results '000 €																																																								
<ol style="list-style-type: none"> <li>① Derive cash flows from profit and loss statement and balance sheet                             <ul style="list-style-type: none"> <li>• Choose direct or indirect computation</li> </ul> </li> <li>② Discount the computed cash flow by appropriate rates</li> <li>③ Estimate continuing value                             <ul style="list-style-type: none"> <li>• Use <math>CV = \frac{FCF(1+g)}{r-g}</math></li> <li>where FCF is free cash flow at the end of last forecast year and r discount rate and g annual rate of growth of the cash flow for subsequent periods (in our example g=0)</li> </ul> </li> </ol>	<table border="1"> <thead> <tr> <th>Year</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>Continuing value 6 and on</th> </tr> </thead> <tbody> <tr> <td><b>Cash flows</b></td> <td>-1500</td> <td>-400</td> <td>-150</td> <td>380</td> <td>1200</td> <td>6000</td> </tr> <tr> <td><b>Discount rate</b></td> <td colspan="6">20 Percent</td> </tr> <tr> <td><b>Discount factor</b></td> <td>0.83</td> <td>0.69</td> <td>0.58</td> <td>0.48</td> <td>0.40</td> <td>0.33</td> </tr> <tr> <td><b>Current value</b></td> <td>-1,250</td> <td>-278</td> <td>-87</td> <td>183</td> <td>482</td> <td>2,009</td> </tr> <tr> <td><b>Entity value</b></td> <td colspan="6"><math>\Sigma = 1,059</math></td> </tr> <tr> <td><b>Debt</b></td> <td colspan="6">= 0</td> </tr> <tr> <td><b>Company value</b></td> <td colspan="6">= 1,059</td> </tr> </tbody> </table>	Year	1	2	3	4	5	Continuing value 6 and on	<b>Cash flows</b>	-1500	-400	-150	380	1200	6000	<b>Discount rate</b>	20 Percent						<b>Discount factor</b>	0.83	0.69	0.58	0.48	0.40	0.33	<b>Current value</b>	-1,250	-278	-87	183	482	2,009	<b>Entity value</b>	$\Sigma = 1,059$						<b>Debt</b>	= 0						<b>Company value</b>	= 1,059					
Year	1	2	3	4	5	Continuing value 6 and on																																																			
<b>Cash flows</b>	-1500	-400	-150	380	1200	6000																																																			
<b>Discount rate</b>	20 Percent																																																								
<b>Discount factor</b>	0.83	0.69	0.58	0.48	0.40	0.33																																																			
<b>Current value</b>	-1,250	-278	-87	183	482	2,009																																																			
<b>Entity value</b>	$\Sigma = 1,059$																																																								
<b>Debt</b>	= 0																																																								
<b>Company value</b>	= 1,059																																																								

The discount rate can be matter of controversy. Venture capitalists often use the return they expect as the discount rate. This may be between 30 % (MBO/MBI) and 100% or more (seed or start-up).

# Gate 2 Growth



The Gate2Growth Initiative  
is supported by the European  
Commission  
DG Enterprise - Innovation/SMEs  
programme



Legal notice: the views in this publication are those of the authors and do not necessarily reflect the policies of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the information contained herein.

© European Communities, 2002. All rights reserved.