VALUE-BASED CASH FLOW MODELING

A Practical Guide to Building Cash Flow Models Focused on Maximizing Value

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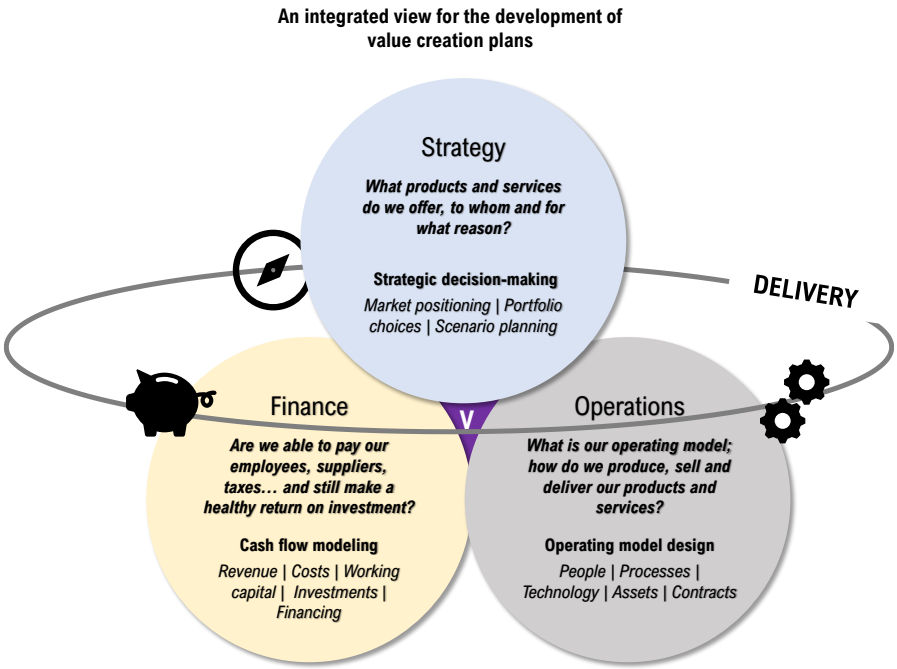
The Value Creation Framework

A financial model is only as good as its inputs. These inputs are obtained from all parts of the business.

A **value creation plan** only works if the full organization is involved in it. Value is the result of a joint strategic and operational effort Finance plays key role in ensuring this value is maximized by providing insight into the key financial levers of value. It also signals when you are actually not adding value, and may need to change something.

The figure below shows the relations between strategy, operations and finance. I find it a useful framework to understand a company, before starting any modeling.



Chapter 1: Introduction

So, you have an interest in cash flow modeling. You have come to the right place! This guide is just about that.

Cash flow forecast models are often prepared in situations of financial distress, or to value a company during an M&A deal. I find however that these forecasts are also useful for strategy development and long-term scenario planning in a 'going concern' situation.

"M&A-deals, restructuring, value investing, strategic decision making… they all require a forward looking cash flow model!"

Forecasts can be useful when you are starting you own business and want to understand if your business idea also works from a financial perspective. And it's a 'must-have' in case you want obtain funding from venture capitalists, private equity, banks or any other professional investment party.

During my professional career I have built many financial cash flow forecast models. I started as a business analyst for a boutique restructuring firm where I prepared a forecast for a family-owned retail business in distress. I remember this quite well – it was an emotional ride in which we eventually developed and implemented a completely new business model. It was during the financial crisis of early 2000s, and many more cash flow models for distressed companies would follow. Later I moved into the deal space and focused more on M&A valuation/bidding models and improvement plans/synergy cases as a consultant at a Big-4 firm.

This guide will explain to you how to develop your own 'three-statement' cash flow forecast model. By using the 'indirect method', that means building a forecast using standardized financial statements: the profit-and-loss statement, the balance sheet, and the cash flow statement. Some basic financial and accounting knowledge may come in handy but is not necessary.

You also don't need an advanced degree in algebra or be an Excel wizard to build a working version of a cash flow model. The difficulty lies more in 'predicting the future' and what values to assign to your input variables. And although each company is different and operates in different markets with differing operating models and products and services, each forecast follows a similar approach.

This guide is mainly targeted at companies in the early stages of scaling up their business. It may however be useful for modelers of larger companies as well: the same principles apply.

I hope you will enjoy reading this book, and of course that it will help you with building a cash flow forecast model of your own company!

Chapter 2: Model output - Expected cash flow

2.1 Introduction

The objective of preparing a cash flow model is to predict the expected level of cash in your bank account during a specific period in time, given your ideas about future (economic) developments.

This exercise will support you in both strategic ('should we invest in entering this new market segment?'), financial ('do we need a loan to support our growth plans, or can we finance it with our current cash flow?)', and operational ('what is the business case behind investing in this new piece of technology?') decision making.

Whatever the reason may be, a cash flow forecast can show you the expected financial effects of your intended decisions, based on your expectations about the future.

In the following examples we will look at a consolidated cash position as the key metric of output. But it is of course possible to look at different financial metrics such as financing ratio's, EBITDA or net debt.

Within your model, all key building blocks will be available to easily calculate the key financial parameters you may be interested in. Most examples presented in this guide will be on an annual basis, but you can also model on a quarterly or monthly of even weekly basis.

2.2 Example output 1 – cash position in case of steady growth

A simple cash flow forecast chart is depicted in figure 2.1. The cash position of this company starts in Year 1 just above €2m, and steadily grows to nearly €4m at the end of Year 2.

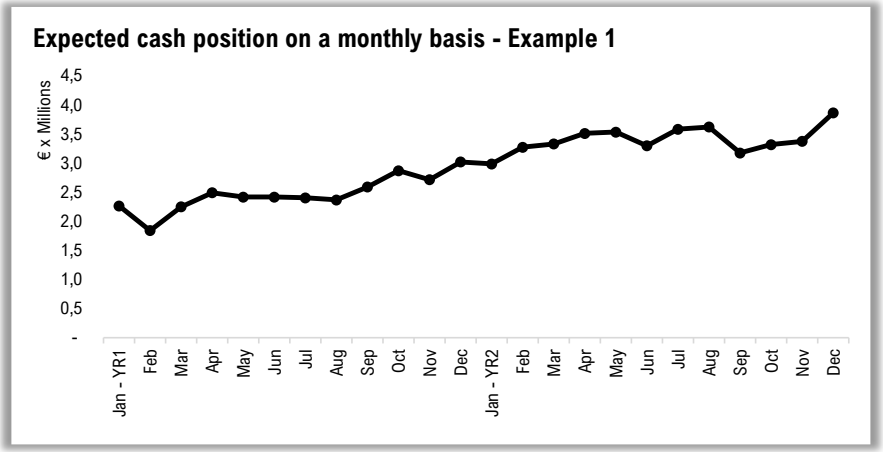


Figure 2.1: Example output – a monthly forecast of the consolidated cash position of a company

There seem to be no issues here, things are developing nice and steady and there are no apparent needs for some kind of restructuring measures. Maybe you can increase growth?

2.3 Example output: cash position in case of a cash deficit

Things get a little more interesting if it is not entirely clear if enough funding is in place to cover all outgoing cash. An example of this situation is shown in figure 2.2.

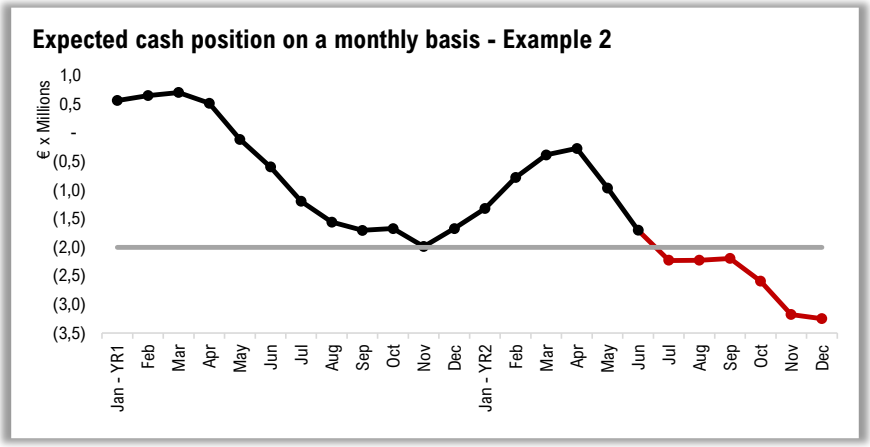


Figure 2.2: Example output – a monthly forecast of the consolidated cash position of a company, financed with external debt

Suppose a credit facility of €2m is in place and that the cash position starts at around €0.5m. During the Year 1, either due to investments, an economic downturn, or other unidentified reasons, the cash position is expected to fall to €0, and later even to a negative amount of €2m.

The grey line indicates a banking facility is available up to €2m. In Year 1, things are still in line with this arrangement, although a bit tight in November/December.

Management expects that somewhere around June/July in Year 2 additional cash will be required to be able to keep paying the bills. This is important to know, as actions can now be taken to ensure sufficient cash is available at that time.

The required actions depend on the situation of course – in case of growth, you may need a temporary source of cash (and are willing to pay high interest rates for this and turn to a venture capitalist). Or if you find yourself heading for bankruptcy, you may want to take restructuring measures and execute an improvement plan to become a healthy business again.

Other sources of financing you can use are debtors and creditors (part of 'working capital'). By stretching creditor payments, and asking customers to pay their invoices earlier, you may be able to generate cash – sometimes enough to prevent the need for external financing.

2.4 A perspective on business valuation

Sometimes, people are more interested in the value of a company rather than just seeing the development of the cash position over time. This is relevant for example when you want to sell or acquire a business or want to invest in stocks based on a 'value'-approach.

"To invest, or not to invest… that is the question"

For this purpose, you will need a cash flow forecast – but the final output would be a little bit different. Instead of predicting the cash position on your bank statements, you need to use the in- and outflow of 'free cash flow (FCF)': these are the cash flows that are available to flow to all investors, including the providers of debt. Free cash flow excludes for example interest payments, dividend payments, and payments on loans.

The free cash flow to investors is discounted at a specific discount rate to determine the net present value of these cash flows, ultimately resulting in a single figure.

Table 2.1 shows an example on how to calculate the net present value of a simple series of cash flow.

Net present value calculation example

Discount rate	10%				
Years		1	2	3	4

Discounting cash flows

	Year 1	Year 2	Year 3	Year 4
Free cash flow	200	200	200	200
Discount factor @10%	0,91	0,83	0,75	0,68
Discounted cash flow	**182**	**165**	**150**	**137**
Net present value per start of Year 1	**634**			

Table 2.1 How to calculate the net present value of a series of cash flows

Suppose investors expect an income of 200 per year for a period of four years starting at the end of Year 1. The value assigned to this expected cash flow is shown as 'net present value per start of Year 1´. It is calculated by discounting each payment based on a discount factor, in this case 10%, and then adding these to get to the total amount.

In above table, the discount factor in a specific year is calculated by the following formula:

$$Discount\ factor\ = \frac{1}{(1 + discount\ rate)^{\#\ years}}$$

In case you want to calculate the net present value of your company, you would need to include a view on the period *after* the final forecast year as well ('continuing value'). For more information on how to calculate the value of your business (for example, on the discount rate to use, how to calculate the continuing value, and other valuation-related questions) I suggest reading the book 'Valuation' by Koller, Goedhart and Wessels (McKinsey & Company). For now, I just wanted to show that you can also calculate the value of your business by using the cash flow model.

These models are called discounted cash flow (DCF) models. The idea behind all of this is to invest when your view of the value of the business is (considerably) lower than the asking price.

Enterprise Value versus Equity Value

The outcome of the discounted cash flow model exercise is also known as the 'Enterprise Value' of the firm you have valued.

Please be aware this is not the same as 'Equity Value'. Equity Value is the value of the shares of the company, Enterprise Value is its total value.

$$Enterprise\ Value + Cash - Debt = Equity\ Value$$

An example: You have valued a company at €1,0m on a cash-and-debt free basis. The company has €100k excess cash and €200k in loans. The Equity Value of this company is €900k.

2.5 Summary

Key take-away of this chapter: whether you are interested in the effects of a certain business case, want to understand the expected cash flow from a restructuring or financing perspective, or would like to know the value of a business for investment purposes - you need a cash flow model.

In the next chapters we will have a look at how to develop such a model for each of the following components: revenue, costs, key balance sheet items, funding, and finally the cash flow statement. For sake of simplicity, the examples show output on an annual basis, but the same logic can be applied however when moving to quarterly of monthly estimates.

2.6 Exercises

Time to try it yourself

2.1 – Can you go bankrupt from a lack of profit or a lack of cash and why?

2.2 – Why would it be useful to also look at monthly cash positions rather than only on an annual basis?

2.3 – How can you boost your cash position without capital injections or financing?

2.4 – Calculate the enterprise value of a cash flow of €500k per year for a period 10 years.

2.5 – If the enterprise value of a business is €2m and has €100k of free cash, and €500k of debt – what is the value of the shares of this company?

Chapter 3: Revenue forecasting

3.1 Introduction

The starting point of each forecast should be to get a clear and thorough understanding of the business model of the company you are making the forecast for. We first take a look at the revenue side. Key questions to ask before even opening your Excel spreadsheet include: 'What products or services does the company sell?' 'In which markets?', 'To what customers?', 'Who are its competitors?'. Try to really understand how money is made, how value is created, and what drivers to use in your financial model. There are various frameworks you can use to support this analysis; I find for example the Porter 'five forces' and the 'strategy canvas' (Chan Kim) helpful tools to quickly develop an initial view.

If the revenue model is unclear, you can look at what is on a typical invoice of the company to understand the drivers of revenue. **And I recommend going and check-out the actual product or service for yourself**. I remember visiting all of the stores of the family-owned retail company in distress when I was a business analyst – it gave really valuable insights!

In many companies, understanding the business model may be quite challenging. It may not be obvious what products and services are being sold, how prices are determined or how revenue may develop over time. Different business models therefore require different revenue forecasting techniques.

"In Lean, 'Gemba' reflects the philosophy that the best way to drive improvements is to go directly to the source to understand the real-world processes"

You can forecast revenue in many ways. From a very simple approach just based on growth rates, all the way to using elaborate statistical analyses or some kind of artificial intelligence to determine expected demand for your products or services. Ultimately however, the outcome is always the same: a line-item with the total estimated revenue in € for a number of years.

In this chapter, I will show a few methods to estimate revenue that are suitable for most business models and how to sense-check the outcomes.

3.2 Estimating revenue based on volume and price estimates

Suppose you are planning to start a coffee shop in the beautiful city of Utrecht in the Netherlands. You have some basic ideas about your business model: you plan to be open 6 days per week from 7am to 7pm and are closed on Mondays. You want to only sell black coffees and lemon drizzle cakes, a unique market positioning bound to be successful! Now, how could you forecast your expected annual sales?

As you don't have access to historical data, you will have to build a *driver-based estimate*. A good starting point would be to estimate the number of coffees you expect to sell on an hourly or daily basis, extrapolate these to an annual figure, and multiply with the price you want to charge for each coffee sold. An example model is shown in table 3.1.

Modeling the coffee revenue of your coffee shop

		Year 1	Year 2	Year 3	Year 4
Annual inflation rate	5%				
VAT	9%				
Average number of coffees per hour		15,0	15,0	15,0	15,0
Number of hours per day		12,0	12,0	12,0	12,0
Number of days per week		6,0	6,0	6,0	6,0
Number of weeks per year		50,0	50,0	50,0	50,0
Total # coffees sold per year		54.000	54.000	54.000	54.000
Price per cup including VAT		3,1	3,3	3,5	3,7
Price per cup excluding VAT		2,8	3,0	3,2	3,4
Revenue - coffee		**153.578**	**163.486**	**173.394**	**183.303**

Table 3.1: a simple driver-based approach to estimate revenue based on volume and price

In this model, the drivers of revenue are highlighted in yellow, calculated cells just have a white background color. Some of these drivers are more 'business decision'-type of assumptions that you can directly influence (such as your opening times) and some are

more difficult to estimate market-based or demand/supply-driven assumptions such as the number of coffees sold per hour, the inflation rate and pricing.

Some assumptions may influence other assumptions. For example, being open during evening hours may reduce the average number of coffees sold during a day. And the price level will likely impact your volume estimate as well. Therefore: keep sense-checking your model, the input and the corresponding output. Does the outcome make sense? If not, you should revisit your model.

In the example above, price is estimated including VAT first, and rounded after applying an annual inflation rate. This results in a nicely rounded price for a cup of coffee, the revenue in our profit-and-loss statement (P&L) however will exclude VAT.

Now let's add a second product category: cakes. After careful research, you have figured out that the 'cake-to-coffee-ratio' (a well-known coffee industry KPI) is 10%, meaning that for 10 coffees sold, 1 piece of cake is purchased by a customer. Combined with the price per cake, this results in a revenue estimate as shown in table 3.2.

Modeling the cake revenue of your coffee shop

		Year 1	Year 2	Year 3	Year 4
Cake-to-coffee ratio	10%				
Number of cakes sold		5.400	5.400	5.400	5.400
Price per cake including VAT		4,0	4,2	4,4	4,6
Price per cake excluding VAT		3,7	3,9	4,0	4,2
Revenue - cake		**19.817**	**20.807**	**21.798**	**22.789**

Total revenue

	Year 1	Year 2	Year 3	Year 4
Coffee	153.578	163.486	173.394	183.303
Cake	19.817	20.807	21.798	22.789
Total revenue	**173.394**	**184.294**	**195.193**	**206.092**

Table 3.2: adding some specific drivers to estimate revenue

You can model your demand any way you like. Some advanced forecasting models may use statistical analyses to forecast volumes. Think about weather forecast models to act as an input to estimate the revenue of a windfarm for example, or predictive models to forecast consumer demand on a product level.

You can add as much complexity as you like, but at the same time: please try to keep things as simple as possible. More detailed input does not always have a significant impact on the output.

3.3 Using product-market combinations

Now suppose your coffee shop is a huge success and you are opening up multiple stores across our planet. You don't change your successful formula of selling black coffees and lemon-drizzle cakes. To estimate your annual sales, you just have to add the new locations to your model, input the key metrics and sum the output. This is basically what is done when product-market combinations are used.

To generalize this method: markets may be segmented by geographies, but any other '*MECE*' (mutually exclusive, collectively exhaustive) segmentation is possible. For example, a technical installation service provider may distinguish between 'electronic' and 'heating' as market segments and sell different products or services in each segment (e.g., cables vs pipes). See figure 3.1 for a conceptual 'driver tree'.

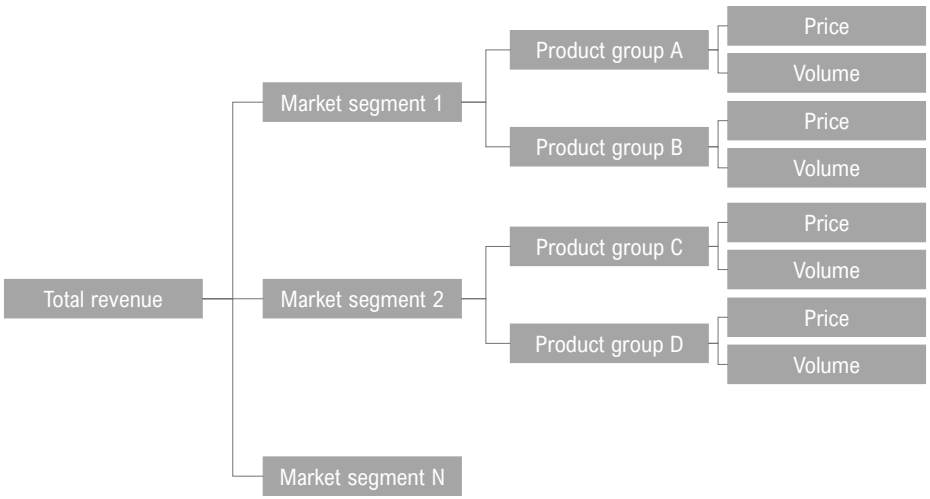


Figure 3.1: conceptual product-market revenue driver tree, based on price and volume metrics

Again: you can make the above as detailed as you want, but remember: the more granular the model, the more difficult it also becomes to prepare or update your forecast, and for your audience to understand it.

3.4 On growth rates and historical data

Using just growth rates can be quite useful when you need to develop a basic forecast in a limited amount of time and when limited information is available. The key challenge then lies in the decision of the revenue segmentation to use, and the actual % growth rates to use. To do this properly, extensive knowledge of the market would be very

useful. Strategy consultants / industry experts can make a nice living out of performing these type of market analyses.

It is important to segment your company's historical data in exactly the way as categorized in your forecast. If you don't have that available, you need to develop it to be able to make a forecast that can be sense-checked with historical data.

Would you rather keep your historical accounting segmentation, and forecast the market based on that view? Or would you prefer to use a new or improved view on market segmentation and adjust your historical records, although complex and time consuming? And would you be willing to restructure your organization to really implement this improved view?

Netflix – from DVD-rental services to provider of streaming content

Originally, Netflix provided a DVD-rental service, where customers could rent DVDs (for the younger audience: ask your AI-friend) and have them delivered at home.

We all know what happened: Netflix changed its business model and is now a leading player in the online streaming services business next to other players such as Disney and Amazon. Even developing its own content.

Simply forecasting the growth of the DVD-market and trying to figure out the market share of that market segment would not have worked here. It took a changed view on revenue and markets, and of course the ability to adapt to these changes!

Thinking about market drivers and future market developments is a key part of developing a cash flow model – these insights can also be used to calculate different scenario's to be able to compare outcomes of different strategic decisions.

3.5 Market share-based estimates

Another method to estimate revenue is based on market shares and market growth. Again, a good understanding of the markets you are operating in is crucial for a successful estimate.

In order to estimate market share, you first need an estimate of the total market size. For this you would need access to expert reports or databases, or subscriptions to industry agencies that may have data in place for this purpose. If not available, you have to develop your own definition of the market and gather the applicable data.

Let's have a look at smartphones in the Netherlands as an illustrative example. According to market research, about 42% of Dutch citizens own an Apple iPhone, and about 38% own a Samsung phone. It is estimated that approximately 6.9 million Apple smartphones, and 6.2 million Samsung smartphones are in use in the Dutch market. A simple analysis could be to estimate the annual replacement market for smartphones and base your sales estimate on maintaining market shares.

However, according to another source, Samsung is losing market share in the Netherlands to the iPhone. According to this source, the market share of Samsung declined to 36%, and Apple increased to 44%. Perhaps it would be wiser to work with these updated market shares when estimating sales. Or should you use declining/increasing market shares over time?

Another complication involves events and introductions of new models. Both Samsung and Apple are planning to introduce improved smartphone models. What does this mean for market shares?

Also, there are smaller and lower-priced Chinese brands active in the market. Will current inflation rates and the increased cost of living mean a demand for these alternative smartphones? Or delay the purchasing of a new phone? Maybe a marketing campaign is just about to start, offering a discount when purchasing a contract with a mobile phone operator…

Two things to keep in mind when you are modeling based on market size and market share: (i) you need a clear definition of how to calculate the market size and market share, and (ii) you need to **remain consistent** in applying these definitions during your forecast period. Otherwise, results will be unexplainable and skewed.

Some thoughts on financial modeling in Excel

Building a financial model is not that difficult. Building a simple yet flexible model that can easily be understood by others however is a bit more challenging.

To help you build a model that can be transferred, reviewed, explained, and used by others, I suggest taking into account below 'best practices'. They are loosely based on the 'FAST'-methodology.

For more information on how to build effective and structured financial models, check out this site: https://www.fast-standard.org.

- Your thoughts and model should be more or less self-explanatory: set an objective that you should be able to transfer your model to another modeler in an hour or less.
- When developing formula's, please don't add too many things: break your formula down into smaller parts to keep it simple when it gets too long. Use the rule of thumb: not to use a formula that is longer than your thumb.
- Use different Excel tabs for modeling your input and your output, e.g., an input tab for revenue calculations, or working capital assumptions, and an output sheet that just shows the profit-and-loss statement, balance sheet and cash flow statement without any further modeling that is: single references only.
- Use different colors for assumptions and drivers that require input or management estimates, and the calculated/output cells.
- Don't use hard coded numbers if not necessary and add your source if you use certain external data points so you can understand where it came from when you review you model after a while.
- Add comments in a comment field to explain your logic if you feel it is not obvious.

3.6 A brief overview of a 'SaaS' revenue model

In the technology industry, SaaS ('software-as-a-service') business models are often required to be modelled, usually with high financial expectations and an equally high level of uncertainty. SaaS is a subscription-based revenue model, which should be modelled as such. The difficulty lies with revenue recognition issues (see box) and the usage of terms such as 'ARPU' (average revenue per user), 'ACV' (annual contract value), 'TCV' (total contract value), and many more acronyms that may make things a bit confusing.

Suppose you have a cyber security business (you sell anti-virus software to small businesses) and sell subscriptions and some software installation support ('consulting services'). You charge a one-time setup fee and a 2-year subscription fee, which you invoice in full the moment the contract with your customer is signed.

To develop our revenue forecast, let's start with understanding the expected development of the number of customers, which ultimately drives revenues (P&L) and invoiced amounts (cash). A simple method is shown in table 3.3.

Estimating revenue for a subscription-based business model

	Year 1	Year 2	Year 3	Year 4
# customers year 1	10.000	10.000	8.000	6.400
# customers year 2		15.000	15.000	12.000
# customers year 3			20.000	20.000
# customers year 4				25.000
Churn rate			20%	20%
2-year license fee per new customer (€)	1.200	1.200	1.200	1.200
Annual license fee (€)	600	600	600	600
Revenue - licensing (€m)	**3,0**	**10,5**	**19,8**	**30,5**
Implementation fee per new customer	500	500	500	500
Revenue - consulting (€m)	**5,0**	**7,5**	**10,0**	**12,5**
Total revenue (€m)	**8,0**	**18,0**	**29,8**	**43,0**
Number of customers end of year	10.000	25.000	43.000	63.400
Average number of customers	5.000	17.500	33.000	50.900

Table 3.3: SaaS-business model revenue forecasting example

The development in the number of customers is estimated by using the starting point number of customers, adding the expected number of new customers, and subtracting the 'churn' – the number of customers that do not renew their 2-year contract. The assumed churn rate is 20%, meaning that 20% of customers whose contract has expired will not renew their contract for another year at the end of the 2-year period.

Based on this, we can calculate the development of each 'cohort' of customers by just calculating the churn and subtracting these from the starting position. In Year 4, this

gives us a total of 6,400 remaining customers from the Year 1 cohort (after churn), 12,000 customers from Year 2 (after churn), 20,000 customers in their first-year contract term from Year 3 (no churn yet) and 25,000 customers from Year 4 (no churn yet).

Revenue recognition: accounting revenue vs invoiced revenue

In this example of SaaS-revenue, we distinguish between revenue from a P&L perspective and the actual cash income from the business that you see on your bank account. The P&L revenue reflects an annualized amount, reflecting the value of services provided in a single year. This revenue line-item however does not really reflect the cash income from invoicing these customers.

In the coffee shop example, revenue and cash income are more or less the same. When you sell the coffee, you receive the cash. In the cyber security example, the customer pays the full 2-year contract amount in advance – but only a single year of revenue is recognized in the P&L. In order to adjust for this difference and get to cash flow, you don't adjust the revenue line-item, but you model this in the balance sheet section on working capital. More on this later.

As we do not know exactly when these customers were contracted, we just average the number of new customers to use for calculating revenues. As we want to estimate revenue as a P&L-item (and not cash income), we use the *annualized* license fee (not the invoiced subscription amount). To estimate the cash flow, you would need to model the balance sheet positions to reflect this adjustment in which you model the receipt of advance payments as an increase in liabilities. Invoicing in advance can have a large impact on your cash flow, but not on revenue!

Note the revenue from consulting service is shown as a separate line-item in the forecast, to be able to distinguish between recurring and one-off revenues. From this, you can clearly see the *scalability* of this licensing business model in which recurring revenue from software subscriptions grows much faster than the income from one-off software implementation activities and quickly surpasses consulting income also in absolute amounts.

An alternative, more elaborate, method would be to list each customer and/or to develop a forecast on a monthly basis – this would add some more detail and insight, especially in a fast-growing company. This approach basically follows the same logic as shown here but just in more detail.

3.7 Sense-checking or 'theory of constraints'

Quick question: how many cars can Tesla sell in a year? This is a typical recruitment case question, to test the analytical capabilities of the candidate. The idea behind it is that, even if you don't really know anything about the subject, you should still be able to make an educated guess, and at least come up with a sensible range.

The approach to answering above question is similar to what you would do to sense-check the outcome of your revenue model. Use your common sense and do some research as in real life you have a bit more time and access to the Internet:

- *Use (long-term) historical data to support your assumptions*; Actual sales could be a good predictor of future sales, what would be a reason that sales figures are changing?
- *Look at production constraints;* In terms of Tesla's: you can't sell more cars than you can produce (or at least not for long, depending on your stock level and production rate). This production rate provides a constraint for the sales volume estimate.
- *Calculate key ratios and compare to benchmarks;* is your EBIT (% revenue) and return on invested capital (ROIC) performance comparable to peers? If your performance is exceptionally high, this may be due to unrealistic revenue figures.
- *Calculate operational ratio's:* You know your business best and can probably think of some key operational KPI's. Calculate these KPI's and check if they make sense to you.

3.8 Exercises

Time to try it yourself

3.1 – Develop a Porter 5-forces model for your business.

3.2 – Develop a 'driver tree' for the revenue side of your business, using both price- and volume drivers.

3.3 – Recategorize your historical data to reflect your driver tree view.

3.4 – Model revenue using the above drivers in an Excel spreadsheet for year 1 to year 5 and sense-check the outcome.

3.5 – Which technological developments may disrupt your business in the future?

Chapter 4: Costs forecasting

4.1 Introduction

Costs represent an outflow of cash out of your company. You can categorize costs in several ways. As we are trying to develop the profit-and-loss statement, a logical starting point would be to start modeling the cost categories that are typically included there. In this chapter we will take a closer look at the below cost items:

- Costs of goods sold
- Employee expenses
- Other expenses
- Depreciation and amortization
- Interest expenses
- Corporate income tax

To distinguish costs from revenues, they are modelled as negative numbers and shown in parenthesis.

4.2 Cost of goods sold (COGS) estimates based on margin assumptions

The first category to estimate is the cost of goods sold line-item in your P&L. It is directly related to the goods you have sold, as probably is apparent from the name. If your business model is about buying and selling lamps for instance, this cost item would include the purchase price of the lamps you have sold. If you sell a lamp for €100,-, and you purchased it for €40,- then your ´cost of lamps sold´ would be €40,-. Your gross profit is €60,- and your gross margin is 60% ((€100,- – €40,-) / €100,-).

Ideally, you would provide a gross margin estimate for each product-market combination (PMC) you identified as part of your revenue estimate. Table 4.1 shows an example calculation for the coffee shop example, in which COGS is calculated as a % of revenue for each product.

Modeling COGS of your coffee shop

	Year 1	Year 2	Year 3	Year 4
COGS % revenue	15%	15%	15%	15%
Revenue coffee	153.578	163.486	173.394	183.303
COGS cofffee	**(23.037)**	**(24.523)**	**(26.009)**	**(27.495)**
COGS % revenue	20%	20%	20%	20%
Revenue cakes	19.817	20.807	21.798	22.789
COGS cakes	**(3.963)**	**(4.161)**	**(4.360)**	**(4.558)**
Total COGS	**(27.000)**	**(28.684)**	**(30.369)**	**(32.053)**
Gross margin coffee (%)	*85%*	*85%*	*85%*	*85%*
Gross margin cakes (%)	*80%*	*80%*	*80%*	*80%*
Total gross margin (%)	*84%*	*84%*	*84%*	*84%*

Table 4.1: a simple estimate of cost of goods sold (or gross margin) based on percentages

Semiconductor industry - wafer yield

When working for a semiconductor company, I had to develop a financial and operational model, including a view on production costs. Chips are produced on 'wafers', and some chips are of good quality, and some unfortunately are not and are considered waste.

An important metric here is the wafer yield: the number of 'good' chips as a percentage of total chips produced on a specific wafer. The higher the yield, the more cost effective the production process. There are various drivers that impact this yield such as the materials used, and the process and equipment used to manufacture the wafers.

With this information you can start modeling. E.g.: the number of wafers x yield = number of (non-defective) chips produced. The real question is: what yield percentage to use, and whether or not to model performance improvement.

Analyses such as these play an important role in value creation plans as well: what if we can improve yield, what is we use a different material – with a solid financial model you can easily understand impact on key financial metrics.

4.3 – Cost of goods sold (COGS) estimates based on cost price assumptions

Suppose you own a manufacturing company. You manufacture clogs, both for left and right feet and you sell them in pairs. Now, what is your COGS in this case? To simplify things a little, we only put the material costs in COGS. We will estimate labor costs (both direct and indirect labor costs), depreciation and all other costs elsewhere in our model. Note this may differ from an accounting or 'cost-price model' approach. In the end this is just a (re)categorization topic. Be aware when comparing KPI's, ratios or historical data that you compare on the basis of the same definitions ('like-for-like').

To produce your clogs, you only use wood. As COGS in our model consist of the materials you use to produce the clogs, you therefore would need to know the volume of wood you purchase, the cost of this material, and the amount of clogs you can make from the wood you have purchased. On this basis, you can calculate the (material) cost price of a pair of clogs: (volume of wood) x (price of wood) / (number of clog-pairs produced).

The amount of wood you have purchased should be somehow linked to your revenue forecast. If you sell 100 pairs of clogs, you may also want to produce 100 pairs of clogs (otherwise you build or use inventory). Your COGS is then 100 (volume estimate) x the price of wood per pair of clogs you use.

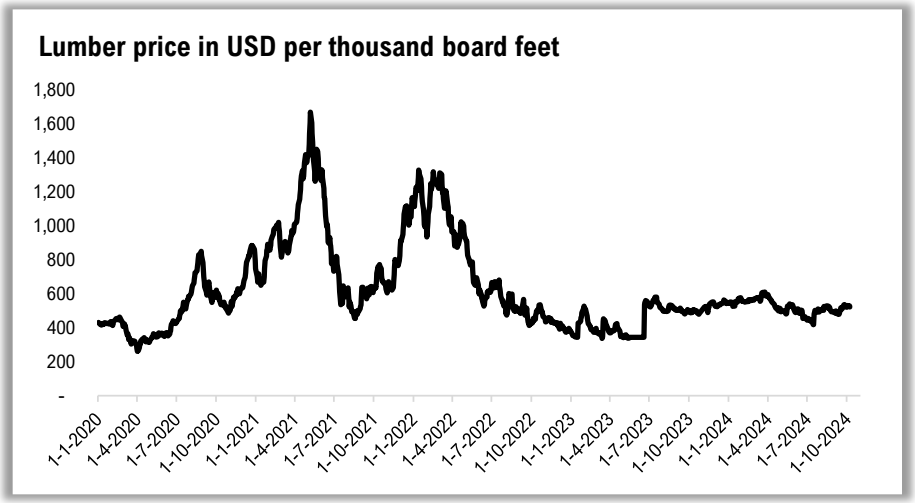


Figure 4.1: price development of lumber; source: https://www.macrotrends.net/2637/lumber-prices-historical-chart-data

To make your estimate forward looking, you need to estimate volumes and prices for multiple years in advance. You can base your volume estimates on your expected production rate, and you purchase price estimates on industry knowledge about the development of commodity prices. See for example figure 4.1 for the historical development of lumber. What do you think wood prices will do the coming months and years?

4.4 Employee costs

The next step in building the financial model is to estimate employee costs. As we have not included employee costs in the cost of goods sold line item (as it contains only material costs), both indirect and direct employee costs are estimated here. That saves us from having to assign the direct and indirect labels to employees!

Instead of number of employees, the number of FTEs (full-time equivalent) is used as the baseline, as employees may work part-time. For example, 1 FTE of workload may very well be performed by 2 employees that work part-time.

To develop your FTE forecast, you first have to develop the actual baseline in terms of number of FTEs. Usually, the HR department of an organization has this information available. And also usually, this information is not readily available in a format that can be used for forecasting purposes. Furthermore, you may not want to have employee-identifiable information due to privacy considerations in your model and may want to work with salary ranges instead of actual costs. And salary ranges need to be translated into some kind of 'cost to company' or 'fully-loaded' cost estimate.

Some things to consider for the baseline data:

- Make sure you have a thorough understanding of the operating model of your company: what departments exist, what activities to these departments perform, which activities are done in-house, and which activities are outsourced?
- You want to estimate both the number of FTEs on the payroll, as well as the number of FTEs that are contracted through agencies, so you need that information in your baseline as well.
- You need to decide on the definition of the fully loaded cost estimate. For example, include all personnel expenses (salaries, bonuses, pensions, social charges, lease cars) but exclude housing and workplace-related ICT costs – these two items are then estimated as part of 'other costs'.

Note that 'outsourced work' is often estimated as part of 'other costs' as well, depending on the nature of the activities. Just make sure the activity/costs are included in the model somewhere and you do not forget about these items. The same goes for double counting of items such as lease cars or training expenses.

A baseline employee cost table could look something as depicted in table 4.2. The table only shows a single year due to due width of the page. More years can of course be added next to Year 1 and modelled in a similar way based on expected number of FTEs and costs per FTE/ job grade.

Your coffee shop only has two employees, but you can add as many people/functions as you need to run your business. I have added some examples in the table.

Modeling employee expenses - FTE-based estimate

Social charges % gross salaries	20%
Other employee expenses % salaries	5%
Annual wage inflation	5%

	Year 1					
Function / department	**#FTE**	**Gross salaries**	**Social charges**	**Other**	**Total**	**#FTE**
Junior coffee and cake maker	1,0	(35.000)	(7.000)	(1.750)	(43.750)	1,0
Senior coffee and cake maker	-	(40.000)	(8.000)	(2.000)	-	-
Location manager	1,0	(50.000)	(10.000)	(2.500)	(62.500)	1,0
Operations	**2,0**				**(106.250)**	**2,0**
Sales employees	-	(35.000)	(7.000)	(1.750)	-	-
Marketing employees	-	(40.000)	(8.000)	(2.000)	-	-
Sales and marketing	**-**				**-**	**-**
Finance employee	-	(40.000)	(8.000)	(2.000)	-	-
HR employee	-	(40.000)	(8.000)	(2.000)	-	-
ICT employee	-	(40.000)	(8.000)	(2.000)	-	-
Management	-	(50.000)	(10.000)	(2.500)	-	-
Indirect employees	**-**				**-**	**-**
Total employee expenses	**2,0**				**(106.250)**	**2,0**

KPI box

Revenue per FTE	*86.697*

Table 4.2: Estimating employee expenses based on the operating model of a company

To sense-check your model, you can calculate certain industry-specific KPIs/ratio's that give insight into the current level and expected level of productivity. A simple example is sales per sales employee, or production volume per operations FTE. Make sure you can explain (changes in) productivity figures / KPIs – otherwise you may want to adjust the number of FTEs you expect to require for each department. This relates to both direct and indirect departments, i.e., your sales and marketing teams, manufacturing or

operational teams, R&D department, and more back-office type of departments such as Finance, HR, and IT.

4.5 Other expenses

Depending on your type of business, there may be many more cost categories applicable to your business. Housing costs for example, costs of outsourced work (see above), ICT costs, energy costs, costs of advisors (including your accountant, tax and legal experts). Depending on whether these costs are costs fixed or variable, you can forecast these as either to grow with inflation (fixed), with volume (variable), or simply as a percentage of revenue (variable). You can even use a combination of both if you feel like a category is for example partly fixed and partly variable.

Modeling other expenses of your coffee shop

		Year 1	Year 2	Year 3	Year 4
Revenue		173.394	184.294	195.193	206.092
Cost inflation	3,0%				
Rent		(20.000)	(20.600)	(21.218)	(21.855)
Other costs		(5.000)	(5.150)	(5.305)	(5.464)
Total other expenses		**(25.000)**	**(25.750)**	**(26.523)**	**(27.318)**
Other expenses % revenue		*14%*	*14%*	*14%*	*13%*

Table 4.3: Estimating other expenses based on cost inflation (for fixed costs)

4.6 Depreciation and amortization

Depreciation and amortization are related to investments in tangible fixed assets (depreciation) and intangible fixed assets (amortization). As both follow the same logic in forecasting technique, let's just focus on how to estimate depreciation.

When you invest in a certain asset, for example a machine, the value of this asset is put on the balance sheet under 'tangible fixed assets'. The asset is then depreciated over its lifetime, for example: an investment of €1m that is depreciated over a period of 10 years results in a depreciation cost of €100k per year. The asset value on the balance sheet is reduced with the amount of depreciation and the depreciation cost is a cost item in the P&L. The cash impact of the investment of course would be a cash-out of €1m in the first year.

Depreciation is a bit of a strange cost item the sense that this is purely an accounting invention, and the cost level does not represent an actual payment to a third party. The payment (€1m in the example above) has already been done, but P&L costs follow later. For comparison: employee costs are paid to employees, tax authorities and pension funds. And other costs are usually invoiced by a supplier and paid for. Depreciation is

not a payable amount, and in terms of modeling should therefore not have a direct cash impact (besides lowering your reported earnings before tax and thereby also corporate income tax).

Tangible and intangible fixed assets

Tangible fixed assets relate to physical assets such as land, buildings, and machines. They are depreciated over its lifetime.

Intangible fixed assets are about 'non-physical' assets such as software, brand-names, goodwill, and patents. They are amortized over the lifetime of the asset.

We start with entering the baseline of fixed assets, and the depreciation that follows from this baseline. This information is usually readily available in the asset register, specifying for example the purchase value, purchase date and the annual depreciation amounts of each asset. You can use this register to model the expected depreciation for the existing asset base. The coffee shop example starts in Year 1, and therefore no historical data is available. We start with a zero-asset base and build from there.

Once the baseline is in place, the next step is to add the new investments. The annual depreciation of these new investments is added to the existing amounts to calculate total depreciation per year.

Please refer to table 4.3 for an example calculation for the coffee shop. We work a single location for simplicity. At the beginning of the first year, you plan to invest €20.000, resulting in a depreciation amount of €2.000 in Year 1 and a book value of €18.000 at the end of Year 1. In Year 3, you expect to have to invest some more in refurbishments with similar results.

Note we have actually modelled three key items for each year with this overview:

a) the level of investment per year
b) the amount of depreciation per year
c) the level of fixed assets at the end of each year

We can now use this information to model 'depreciation' in the P&L and model our fixed assets in the balance sheet! The balance sheet is covered in the next chapter.

Modeling investments, depreciation, and fixed assets for your coffee shop

	Start of Year	Year 1	Year 2	Year 3	Year 4
Baseline fixed assets - book value		Not applicable in this example - these items can be based			
Baseline fixed assets - depreciation		on the asset register (no drivers required, based on actual			
New investments - Year 1					
Equipment (#)	1				
Purchase value	(20.000)				
Number of years to depreciate	10				
Annual depreciation	(2.000)				
Bookvalue new investments		18.000	16.000	14.000	12.000
Depreciation new investments		(2.000)	(2.000)	(2.000)	(2.000)
New investments - Year 3					
Equipment	1				
Purchase value	(15.000)				
Number of years to depreciate	10				
Annual depreciation	(1.500)				
Bookvalue new investments		-	-	13.500	12.000
Depreciation new investments		-	-	(1.500)	(1.500)
Model output					
a) Investments		(20.000)		(15.000)	
b) Fixed assets		18.000	16.000	27.500	24.000
c) Depreciation		(2.000)	(2.000)	(3.500)	(3.500)

Table 4.4: estimating investments, depreciation and fixed assets

4.7 Interest expenses

The next P&L item is interest expenses. Interest expenses are related to the amount of external debt you are using in your company to finance for example the investments you have made or are going to make. The actual modeling would depend on the agreements you have made with your bank or other investors, but basically comes down to an interest rate multiplied by an (average) outstanding amount.

To develop this, you first need to model the financing side of your model. Once you have done this, you can just reference the total interest payments per year that follow from these financing assumptions. Please refer to section 6.3 in the chapter on 'Funding' for further information.

4.8 Corporate income tax (CIT)

The final step in estimating cash flow is to determine the amount of corporate income tax you need to pay, assuming you are making a profit. The amount can be simply calculated by multiplying the applicable tax rate with your earnings before tax (EBT). In the Netherlands, different tax rates apply, depending on the amount of earnings before tax. You can model this by using the 'IF' function in Excel. An example calculation on CIT can be found in section 6.3.

Not all interest expenses are equal…

As you have seen, interest expenses are tax-deductible: they reduce your taxable profit. So, why not provide as much debt as possible and not pay any taxes? Funnily enough, rules have been developed to prevent this behavior.

In the Netherlands, there are numerous examples of companies that were considered 'overleveraged' by the tax authorities and had to pay more taxes. It includes professional private equity owned companies. These interest expenses can have a huge impact on the effective tax rate and therefore free cash flow and company value!

'Don't make that mistake'. Interest and taxes may look simple, but there are some special cases. Check for the ratio of debt to capital – if this gets exceptionally high you may want to check the applicable rules in your jurisdiction.

If you pay taxes in multiple countries, your model may need to differentiate between countries. You may need to develop a country-based financial model and consolidate the individual P&Ls for this purpose.

In case of special arrangements with the tax authorities or for example a tax-loss carry forward, keep in mind you want to model the cash flow and may need to make some adjustments via the tax positions on your balance sheet.

4.9 Output - P&L

An example output P&L for the coffee shop example (the single location case) is shown in Appendix A. Note that no more modeling should be done to arrive at this overview – you should only need to use single references to develop the P&L output table.

4.10 Exercises

Time to try it yourself:

4.1 – Select a driver and estimate COGS for year 1 – year 5, in line with your revenue model as developed in chapter 3 and calculate gross profit.

4.2 – Estimate employee costs based on actual employee figures and build a detailed forward looking operating model to calculate expected employee expenses.

4.3 – Determine which other costs you will incur and add these to your model. Calculate total cost and EBITDA on separate line-items.

4.4 – Determine the required investments for the coming 5 years. Calculate depreciation per year for these investments.

4.5 – Model the total level of depreciation per year by adding the level of deprecation of the current asset base. Calculate EBIT on a separate line-item.

4.6 – Leave an empty line-item for interest expenses, we will add this later.

4.7 – Calculate EBT, corporate income tax and net result.

4.8 – Calculate EBTIDA and EBIT as a % of revenue and sense-check the outcome: do the expected levels make sense, also when comparing your P&L performance to peers?

Chapter 5: Fixed assets and working capital forecasting

5.1 Introduction

In this chapter, we will discuss two key elements of the balance sheet and provide a few suggestions on how to estimate each item. The focus will be on fixed assets and working capital. For working capital, we will look into inventory, accounts receivable and accounts payable, and finally 'other assets and liabilities'. We will not delve into specific accounting details or more specific line-items, as this is beyond the purpose of this guide. Once you have figured out the structure and principles behind balance sheet forecasting, you can easily add more complex balance sheet positions that may be applicable to your business.

The funding side of the balance sheet (debt, equity) is discussed in chapter 6 and the (closing) cash position is discussed in chapter 7.

Some balance sheet basics

All balance sheets follow the same logic – they consist of assets and liabilities and the two sides 'balance' (or: are of equal value). Modeling the balance sheet is done for each item and explained in the following chapters.

Assets	**Liabilities**
Fixed assets (Ch. 5)	Equity (Ch. 6)
Working capital (Ch. 5)	Debt (Ch. 6)
Cash (Ch. 7)	Working capital (Ch. 5)
Total assets	**Total liabilities**

Note: Working capital is shown on both sides of the balance sheet. This is because some working capital items are assets (such as inventory), and some are liabilities (such as payables).

5.2 Estimating fixed assets

Fixed assets are assets that have a more long-term nature and require an investment. For example, a container ship for a shipping company. Or the specific machinery and equipment that is required to operate a chip-manufacturing company. Tangible fixed assets are depreciated with an annual amount and therefore reduce in book value each year until they reach their remaining value (or residual value, which can be equal to zero).

The formula for estimating tangible fixed assets A at time t is:

$$A_t = (A_{t-1}) + investments_t - depreciation_t$$

This means that the value of all fixed assets at the end of year 't' is equal to the value of fixed assets at the end of the previous year ('t-1'), plus all the investments in fixed assets, minus the amount of depreciation in that year.

We already had a look at depreciation and investments in the previous chapter and can use the exact same overview to arrive at the fixed asset schedule. Instead of adding the annual depreciation estimates, we just sum the annual book values in this overview. Please refer to table 4.3 for the coffee shop example.

The challenge of course lies in developing the required investment estimate: what capital expenditures are actually needed to support the business case? To get a good view, you would need to develop an investment or 'capex' plan. You need to get input from your operations teams and have some discussions on the list of requested investments (this is a typical 'operations due diligence' topic): do you really need that brand new 'AI-powered' coffee machine, or are there alternative (cheaper) ways to increase our coffee-brewing capacity?

5.3 Estimating working capital – inventory

Inventory can be estimated by providing a forward-looking estimate of 'days inventory outstanding', or 'DIO'. You can calculate the DIO in multiple ways – just make sure you use the same definition in your historical analysis and in your forecast model. An example definition is:

$$DIO_t = \frac{Level\ of\ inventory_t}{COGS_t} \cdot 365$$

DIO_t is a point-in-time estimate. I usually use the end-of-year convention, meaning that you choose a specific time point (31 December) to calculate the estimate. COGS is an

annualized amount. The formula above therefore reads (with t = 31 December Year 1): DIO on 31 December Year 1 equals the level of inventory on 31 December Year 1 divided by the total COGS for Year 1, multiplied by 365.

Once you have this number, you can simply use it in your forecast period to estimate the level of inventories going forward. You may want to assume improvements in the number of inventory days if you are for example implementing measures to reduce stock levels or increase it if you believe your historical level is not sustainable in the longer run. The calculation is simply reversed to estimate your end-of-year inventory position:

$$Level\ of\ inventory_t = \frac{DIO_t \cdot COGS_t}{365}$$

Alternatively, you could calculate the inventory level by using the 'production approach' in which you add your production figures and subtract your sales figures:

$$Inventory_t = Inventory_{t-1} + Production\ value_t - Sold\ value_t$$

It is useful to use and compare both methods to understand if your model output makes sense. For example, a negative level of inventory would not make sense, but is very well (technically) possible if you build a model based on production volumes. If this is the case, you may want to revisit your model assumptions.

You can add detail by estimating multiple line-items of inventory. A retail company for example may sell some high-margin products that have a long inventory turnover, and low-margin high-volume products that have a very short inventory period.

Note an increase in inventory levels corresponds to a 'cash-out': if you increase your inventory levels, the cash flow model should see this an outflow of cash and your cash position should be reduced (other things equal). Similarly, a reduction in inventory (other things equal), should increase your cash position when modelled correctly.

5.4 Estimating working capital – accounts receivable and accounts payable

The next step in estimating working capital relates to modeling the accounts receivable and accounts payable positions (or: debtors and creditors). You can model these items by using drivers such as 'days sales outstanding' (DSO) and 'days payables outstanding' (DPO), similar to the approach used to estimate inventory levels. Let's use the following definition for DSO:

$$DSO_t = \frac{Amount\ of\ accounts\ receivable_t}{Revenue_t} \cdot 365$$

In order to estimate the amount of accounts receivable in any given year, you just have to estimate the DSO going forward, multiply by the expected revenue (you have already estimated this earlier), and divide by 365:

$$Amount\ of\ accounts\ receivable_t = \frac{Revenue_t \cdot DSO_t}{365}$$

The key drivers of DSO are the actual amount of time that you provide your customers to pay their invoices (often a contractual term), and the efficiency of your invoicing processes (the speed at which you send an invoice to your customers, or time to resolve issues). Then there is of course the speed at which customers actually pay their invoices. You can model write-offs for bad debtors in your profit-and-loss statement (as a percentage of revenue for example). If you expect improvements in the number of DSO (getting your cash earlier, e.g., because of faster invoicing), you can reduce your DSO in your forward-looking model. You should increase the DSO if you expect that customers will take more time to pay their bills due, e.g., to an economic downturn or perhaps because you agreed to this with a key customer.

In the cash-flow model, an increase in accounts receivable corresponds to a 'cash-out'. On the other hand, a reduction in receivables corresponds to a 'cash-in'. This makes sense, as a payment from a customer reduces the accounts receivable position and increases the amount of cash on your bank account.

You can apply the same approach when estimating your accounts payable, but now we use COGS as the denominator instead of revenue:

$$DPO_t = \frac{Amount\ of\ accounts\ payable_t}{COGS_t} \cdot 365$$

The key drivers of DPO are the contractual terms and conditions with your suppliers, and of course your own payables process in which you have some room to maneuver to increase or decrease this balance sheet position. Do you pay early or late, or just-in-time?

In the cash-flow model a reduction in accounts payable, following a payment to a supplier, should reduce you cash position.

Working capital – an undervalued driver of value

Working capital is a key driver of value and its impact often underestimated or overlooked. Companies and advisors tend to focus on the P&L and profitability. Why is working capital also important?

An example of a working capital item is unpaid invoices by your customers ('accounts receivable'). Imagine these invoices never being paid… Or: what if you get paid in advance? I remember a client that had invested all its prepaid cash in several other business ventures, only to realize the company had run out of money to deliver the promised services…

The importance of working capital becomes obvious when in financial distress. And not taking investments in working capital into account in business case decisions can lead to nasty surprises.

On the other hand, working capital can also be a great source of value as shown by private equity investors. With ideas ranging from simple process improvements to the implementation of new business models that free-up cash.

5.5 Estimating working capital – other assets and liabilities

Other assets and liabilities contain other topics that are usually included in the balance sheet and should not be forgotten. The easiest way to model these items is to just model a simple driver, e.g. as a percentage of revenue, or as a percentage of employee expenses depending on the nature of the item. It may include for example employee-related liabilities (e.g. accrued employee expenses), tax-related items, prepaid rent, and so on.

5.6 Working capital modeling – an example

Modeling the working capital items could look like something like the figures presented in table 5.1 when applied to the coffee shop example:

- There is only a limited level of inventory required (coffee beans, flower, sugar, butter, eggs, lemons, milk). Because cakes have a limited shelf-life, and cold coffee ('frappucino') is not sold in your coffee shop there are no 'finished products' kept in storage to take into account. The level of inventory is

therefore relatively low and even expected to further reduce as you improve your production process.

- The accounts receivable position is also very limited as customers tend to pay immediately with their bankcard or phone.
- The accounts payable position is based on a 30-day payment term on average and expected to increase to 40 days.
- Other assets and liabilities are both estimated as a percentage of revenue.

Modeling working capital items for your coffee shop

	Year 1	Year 2	Year 3	Year 4
DIO	10	9	8	7
COGS	(27.000)	(28.684)	(30.369)	(32.053)
Inventory	**740**	**707**	**666**	**615**
DSO	2	2	2	2
Revenue	173.394	184.294	195.193	206.092
Account receivables	**950**	**1.010**	**1.070**	**1.129**
DPO	30	35	40	40
COGS	(27.000)	(28.684)	(30.369)	(32.053)
Account payables	**2.219**	**2.751**	**3.328**	**3.513**
Other assets % revenue	1,0%	1,0%	1,0%	1,0%
Revenue	173.394	184.294	195.193	206.092
Other assets	**1.734**	**1.843**	**1.952**	**2.061**
Other liabilities % revenue	3,0%	3,0%	3,0%	3,0%
Revenue	173.394	184.294	195.193	206.092
Other liabilities	**5.202**	**5.529**	**5.856**	**6.183**

Table 5.1: estimating several working capital items

Note 'accounts payable' and 'other liabilities' are liabilities but shown here as positive numbers. I have done this because I will use the standard balance sheet lay-out in the Appendix. An alternative would be to use the 'capital employed' lay-out – in that case you can use negative numbers for these liabilities.

5.7 Exercises

Time to try it yourself:

5.1 – You are going to model the balance sheet now. Start with entering your actual balance sheet positions in year 0 (31 December of last year) for all balance sheet items you want to model.

5.2 Model fixed assets for year 1 to 5 by using the investment and depreciation schedule you have developed in chapter 4.

5.3 – Model your working capital assets based on DIO, DSO, and percentage of revenue drivers for other working capital items.

5.4 – Add a line item on the asset side of the balance sheet called 'cash' and leave it blank for now and calculate 'total assets'. We will model the cash position in chapter 7.

5.5 – Model your working capital liabilities using DPO and percentage of revenue drivers for other working capital items.

5.6 – Add line items on the liabilities side of the balance sheet called 'Equity' and 'Debt', leave it blank for now and calculate 'total liabilities'. We will model these items in chapter 6.

5.7 – Which items are you missing from the balance sheet? Add them if you need to (use your annual report to identify all relevant items).

Chapter 6: Funding forecasting

6.1 Introduction

We have nearly reached the end of the balance sheet. The only remaining items to estimate are 'Equity' and 'Debt', also known as the 'funding' side of the balance sheet. We will model the resulting cash position in chapter 7.

Debt and equity

Generally speaking, equity is provided by shareholders, and debt by banks, or lenders. Providers of debt receive interest, and shareholders receive dividends and benefit from an increase in value of the company.

6.2 Modeling equity

The level of equity in your company only changes with the amount of net profit in a specific year, and the amounts of dividends paid to shareholders. To calculate equity at the end of year t, we take the level of equity at the end of last year and add net profit. After subtracting dividend payments, we end up with the equity estimate to use in your model.

$$Equity_t = Equity_{t-1} + Net\ profit_t - Dividend\ payments_t$$

The value of equity in the cash flow model actually is the book value of equity. This is different from the market value of equity (the value of your shares if you could sell your company on the stock market for example).

In case of our coffee shop we assume we start in Year 1 without any equity, and we also assume no dividends will be paid out. In this case, the equity value just increases with net profit. See Appendix A and Appendix B how this works in practice.

6.3 Modeling debt and interest payments

There are many different debt structures available. For the purpose of this guide, I will use a very simple example to show the impact of debt on cash flow.

Suppose you borrow €25.000 to start your coffee shop and you agree to pay back the loan on an annual basis in equal instalments for a period of 5 years with an interest rate of 7%. Table 6.1 shows the level of debt and corresponding interest payments for the period Year 1 – Year 4.

Modeling debt items and interest payments for your coffee shop

		Year 1	Year 2	Year 3	Year 4
Loan 1					
Total amount	25.000				
Annual payment (due end-of-year)	(5.000)				
Interest rate	7,0%				
Debt start of year		25.000	20.000	15.000	10.000
Debt end of year		**20.000**	**15.000**	**10.000**	**5.000**
Interest payment		**(1.750)**	**(1.400)**	**(1.050)**	**(700)**

Table 6.1: estimating debt and interest payments

The position of debt at the end of the year flows into the balance sheet line-item 'Debt', and interest payments can now be inserted in the P&L line-item 'interest expenses' that we left open earlier.

6.4 Modeling corporate income tax and the tax shield

We also calculate the 'tax shield' here, being the difference between 'tax on EBIT' and 'tax on EBT'. It basically represents the corporate income tax that is avoided by financing your company with debt, as interest payments are tax deductible. It is not really necessary to model your cash flow this way, but more of a 'best practice' approach. It is also helpful when moving to more advanced financial models or valuation techniques, and to cross-check if your model works properly.

In the example shown in table 6.2, the corporate income tax rate depends on the amount of earnings before tax. The tax rate for profit below €200k is expected to increase from 15% to 19%. The higher tax bracket is not relevant for the coffee shop as profit remains well below the threshold.

Modeling corporate income tax on EBT for your coffee shop

	Year 1	Year 2	Year 3	Year 4
EBT <= €200.000	15,0%	19,0%	19,0%	19,0%
EBT > €200.000	25,8%	25,8%	25,8%	25,8%
EBT	11.394	14.897	16.611	19.523
Corporate income tax (CIT) on EBT	**(1.709)**	**(2.830)**	**(3.156)**	**(3.709)**
Effective tax rate	*15%*	*19%*	*19%*	*19%*

Modeling corporate income tax on EBIT and the tax shield for your coffee shop

	Year 1	Year 2	Year 3	Year 4
EBIT <= €200.000	15,0%	19,0%	19,0%	19,0%
EBIT > €200.000	25,8%	25,8%	25,8%	25,8%
EBIT	13.144	16.297	17.661	20.223
Corporate income tax (CIT) on EBIT	**(1.972)**	**(3.096)**	**(3.356)**	**(3.842)**
Effective tax rate	*15%*	*19%*	*19%*	*19%*
Tax shield (€)	*263*	*266*	*200*	*133*

Table 6.2: estimating corporate income tax, and calculating the tax shield from leveraging your firm

You can see from this analysis that the interest payments result in lower taxes of €263,- in Year 1. We will use this figure in the cash flow statement, together with the tax on EBIT figure. The first tax item can be seen in 'cash flow from operating activities' (refer to 'NOPLAT'), and the tax shield is categorized under 'cash flow from financing activities'.

6.4 Cash

The line-item 'cash' on our balance sheet is the output line-item we are ultimately trying to estimate. It is the result of all the assumptions we have made up to here.

It is modelled in the next chapter and based on the outcome of the cash flow statement. Hang in there!

6.5 Exercises

Time to try it yourself:

6.1 – Model the equity line-item assuming no dividends are paid from year 1 – 5. Use the actual starting position from year 0 that you entered in chapter 5.

6.2 – Model your debt line-item based on the agreements you have with lenders.

6.3 – Calculate interest expenses and add them to the P&L statement line-item we inserted earlier.

6.4 – Calculate the tax shield (the difference between tax paid on EBIT and tax paid on EBT).

6.5 – Model a dividend payment and calculate the solvency ratio.

Chapter 7: Bringing it together: cash flow

7.1 Introduction

The final step to build a cash flow model is to calculate the cash position at the end of each period. For this purpose, we use the **cash flow statement** that provides us with the *change* in the cash position per year. We add this change in cash to the position at the end of the previous period to complete the model.

The cash flow statement consists of three parts:

- Cash flow from operating activities
- Cash flow from investment activities
- Cash flow from financing activities

We will discuss each of these parts below. Please refer to Appendix A for an example cash flow statement, and to Appendix B for an overview of some of the key relations between the profit-and-loss statement, balance sheet and cash flow statement.

7.2 Cash flow from operating activities

The first part of the cash flow statement shows the change in cash as a result of operating activities. It excludes investments in machines or equipment or other assets, and also excludes financing activities such payments due to loans, interest, or dividend payments.

The cash flow statement starts with a term called 'NOPLAT', or: 'net operating profit less adjusted taxes'. I will follow this approach here because it is a common practice and also because it provides the basis for performing valuations. 'Net operating profit' is equal to 'EBIT'. And 'Adjusted tax' just means you calculate corporate income tax using EBIT instead of EBT (the assumption basically takes out the result of interest payments on taxes payable, which is also known as the 'tax shield'). Luckily, we have already modelled this as part of our tax and interest line-items.

After NOPLAT, we adjust for other operating cash flow items: we add back depreciation as this is a non-cash item as discussed earlier. And we adjust for investments in working capital such as changes in accounts receivable, accounts payable and inventory. For example: if you receive a payment from a customer, the accounts receivable position is reduced and the cash flows into your bank account .

The cash flow from operating activities is shown in Appendix A for the coffee shop example.

7.3 Cash flow from investment activities

The second part of the cash flow statement shows the change in cash due to investment activities. Usually, investments mean an outflow of cash as suppliers need to be paid. But it is also possible to sell assets, in which case a cash-in would be expected.

We have already calculated the investment level as part of the depreciation and investment forecasts. We can also derive the investment level from the P&L and balance sheet by using the below formula – if you have made no mistakes, the amounts should be the same as in your input/driver sheet. It is recommended to build some of these checks in your model to ensure all is working smoothly and highlight them red in case an error occurs. These checks are an important part of the quality control of models.

$$Investment_t = Asset\ value_{t-1} - Asset\ value_t - depreciation_t$$

Changing the order of this formula a bit makes it easier to follow: the asset value at the end of the year (t) is equal to the asset value at the beginning of the year (t-1) plus investments minus depreciation. Make sure you use the correct signs.

7.4 Cash flow from financing activities

The final piece of the cash flow statement is about financing activities. Key items to consider here are (i) change in equity (for example, dividend payments), and (ii) change in debt. They can be calculated by using the following formulas:

$$Change\ in\ equity_t = Equity_t - Equity_{t-1} - Net\ profit\ after\ tax$$

Basically, the change in equity refers to all changes on top of the net result which is already added to the cash flow via the P&L statement. Most obvious is a dividend payment to shareholders which should reflect a cash out. Similar to investments, this can be rearranged to read: equity at the beginning of the period plus net profit (plus or minus) other changes is equity at the end of the period.

A similar approach is used for estimating changes in debt:

$$Change\ in\ debt\ _t = Debt_t - Debt_{t-1}$$

The outcome of this formula should reflect the cumulative effect of all payments on current loans, and the effect of any new loans.

Next to equity and debt this part of the cash flow statement shows all other financing cash flow items. For example, interest payments and the tax shield. Appendix A also shows this part of the cash flow statement for the coffee shop case.

7.5 Change in cash position

When you add the three cash flows, the total amount reflects the change in cash – the only remaining item we still had to estimate in our model.

To finalize the model, use the below formula to estimate you cash position. In words: the cash position at the end of year (t) is equal to the cash position end of last year (t-1), plus the change in cash during the year (the outcome of our cash flow statement).

$$Cash_t = Cash_{t-1} + (Change\ in\ cash)_t$$

Just input this formula in the line item 'cash' in the balance sheet and we are done! If you follow the steps (model the P&L, model the balance sheet, calculate the cash flow statement, model the change in cash) you should have a working cash flow forecast model.

Another simple check to see if you have made any mistakes is to compare total assets with total liabilities – these should be the same. If not, then you have made a mistake somewhere in your model.

The example output schedules are shown in Appendix A and further explained in Appendix B.

7.6 Exercises

Time to try it yourself:

7.1 – Calculate cash flow from operating activities: start with EBIT, adjust for tax on EBIT, calculate NOPLAT, add back depreciation and account for changes in working capital.

7.2 – Calculate cash flow from investing activities. Double-check your outcome by comparing the outcome to your investment input drivers and assumptions.

7.3 – Model cash flow from financing activities, include debt and interest payments and the tax shield.

7.4 - Calculate total cash flow.

7.5 – Add the change in cash as derived from question 7.4 into the cash position line-item on the balance sheet (see formula in chapter 7.5).

7.6 – Are total assets and total liabilities the same value?

Chapter 8. Next steps

Once you have built a simple working version cash flow forecast model of your business, you can start playing around with it and extending it. There are many possibilities and interesting things you can do, just to mention a few:

- Perform a **scenario analysis** to understand the impact of certain events or strategic options on your business performance;
- Perform a **sensitivity analysis** to understand how small changes in certain drivers impact your key ratio's;
- Model a **management buy-out (MBO)** financing model, to see how the deal works out from a financial perspective;
- Calculate the **enterprise value** and **equity value** of your company;
- Build a **monthly forecast model**, to be able to track budget vs actuals on a monthly basis or build the charts as shown in chapter 2;
- Calculate key **financial ratio's** related to e.g., profitability, return on capital, or debt;
- Identify improvement initiatives as the basis for a **value creation case**;
- … and many more things …

For now, I wish you good luck and fun with building your own model!

Appendix A - Model output financial statements for a coffee shop

Profit-and-loss statement

	Year 1	Year 2	Year 3	Year 4
Revenue coffee	153,578	163,486	173,394	183,303
Revenue cake	19,817	20,807	21,798	22,789
Revenue	**173,394**	**184,294**	**195,193**	**206,092**
COGS coffee	(23,037)	(24,523)	(26,009)	(27,495)
COGS cake	(3,963)	(4,161)	(4,360)	(4,558)
COGS	**(27,000)**	**(28,684)**	**(30,369)**	**(32,053)**
Gross profit	**146,394**	**155,609**	**164,824**	**174,039**
Employee expenses	(106,250)	(111,563)	(117,141)	(122,998)
Other expenses	(25,000)	(25,750)	(26,523)	(27,318)
Total costs	**(131,250)**	**(137,313)**	**(143,663)**	**(150,316)**
EBITDA	**15,144**	**18,297**	**21,161**	**23,723**
Depreciation	(2,000)	(2,000)	(3,500)	(3,500)
EBIT	**13,144**	**16,297**	**17,661**	**20,223**
Interest expenses	(1,750)	(1,400)	(1,050)	(700)
EBT	**11,394**	**14,897**	**16,611**	**19,523**
Tax	(1,709)	(2,830)	(3,156)	(3,709)
Net income after tax	**9,685**	**12,066**	**13,455**	**15,813**

Balance sheet (standard lay-out)

	Year 1	Year 2	Year 3	Year 4
Fixed assets	18,000	16,000	27,500	24,000
Inventory	740	707	666	615
Accounts receivable	950	1,010	1,070	1,129
Other assets	1,734	1,843	1,952	2,061
Cash	15,683	25,471	23,203	37,910
Total assets	**37,106**	**45,031**	**54,390**	**65,715**
Equity	9,685	21,752	35,206	51,020
Debt	20,000	15,000	10,000	5,000
Accounts payable	2,219	2,751	3,328	3,513
Other liabilities	5,202	5,529	5,856	6,183
Total liabilities	**37,106**	**45,031**	**54,390**	**65,715**

Cash flow statement

	Year 1	Year 2	Year 3	Year 4
EBIT	13,144	16,297	17,661	20,223
Tax on EBIT	(1,972)	(3,096)	(3,356)	(3,842)
NOPLAT	**11,173**	**13,200**	**14,305**	**16,380**
Change in inventory	(740)	32	42	51
Change in accounts receivable	(950)	(60)	(60)	(60)
Change in other assets	(1,734)	(109)	(109)	(109)
Change in accounts payable	2,219	531	578	185
Change in other liabilities	5,202	327	327	327
Change in working capital	**3,997**	**722**	**777**	**394**
Add back depreciation	2,000	2,000	3,500	3,500
a) Cash flow from operating activities	**17,170**	**15,922**	**18,583**	**20,274**
Investments	(20,000)	-	(15,000)	-
b) Cash flow from investment activities	**(20,000)**	**-**	**(15,000)**	**-**
Change in equity (e.g. dividend)	-	-	-	-
Change in debt	20,000	(5,000)	(5,000)	(5,000)
Interest expenses	(1,750)	(1,400)	(1,050)	(700)
Tax shield	263	266	200	133
c) Cash flow from financing activities	**18,513**	**(6,134)**	**(5,851)**	**(5,567)**
Total cash flow	**15,683**	**9,788**	**(2,268)**	**14,707**

Appendix B.1 - Relations between financial statements

See Appendix B.2 and Appendix B.3 for the supporting schedules.

1: Changes in working capital are calculated as the difference in value between the consecutive years of these items. An increase in accounts receivable corresponds to a net investment of €60,- in Year 2 in this example. Note that an increase in a liability has the reverse effect on cash flow. Make sure the signs are correct, this can be confusing – especially when using the capital employed setup for your balance sheet instead of the standard setup.

2: Investments are calculated as the difference in book value of assets between two consecutive years and adjusted for the amount of depreciation. You can cross-check the outcome with your input sheet as the calculated value here should correspond to your assumed level of investments in that specific year.

3: Change in debt is calculated as the difference in the debt position between two consecutive years. A payment is a cash-out, an increase in the level of debt is a cash-in.

4: The tax shield is calculated as the difference between tax on EBIT (or: taxes when no funding is in place and therefore no interest deduction is applicable) and taxes on EBT.

5: Change in equity is determined by the level of equity on the balance sheet at the beginning of the period and increases (in this case) with the amount of net profit after tax.

6: The cash position is calculated by adding the 'change in cash', as determined by the cash flow statement, to the cash position of last year.

Appendix B.2 - Explaining some relations between financial statements (continued)

Profit-and-loss statement

	Year 1	Year 2	Year 3	Year 4
Revenue coffee	153,578	163,486	173,394	183,303
Revenue cake	19,817	20,807	21,798	22,789
Revenue	**173,394**	**184,294**	**195,193**	**206,092**
COGS coffee	(23,037)	(24,523)	(26,009)	(27,495)
COGS cake	(3,963)	(4,161)	(4,360)	(4,558)
COGS	**(27,000)**	**(28,684)**	**(30,369)**	**(32,053)**
Gross profit	**146,394**	**155,609**	**164,824**	**174,039**
Employee expenses	(106,250)	(111,563)	(117,141)	(122,998)
Other expenses	(25,000)	(25,750)	(26,523)	(27,318)
Total costs	**(131,250)**	**(137,313)**	**(143,663)**	**(150,316)**
EBITDA	**15,144**	**18,297**	**21,161**	**23,723**
Depreciation	(2,000)	(2,000)	(3,500)	(3,500)
EBIT	**13,144**	**16,297**	**17,661**	**20,223**
Interest expenses	(1,750)	(1,400)	(1,050)	(700)
EBT	**11,394**	**14,897**	**16,611**	**19,523**
Tax	(1,709)	(2,830)	(3,156)	(3,709)
Net income after tax	**9,685**	**12,066**	**13,455**	**15,813**

Balance sheet (standard lay-out)

	Year 1	Year 2	Year 3	Year 4
Fixed assets	18,000	16,000	27,500	24,000
Inventory	740	707	666	615
Accounts receivable	950	1,010	1,070	1,129
Other assets	1,734	1,843	1,952	2,061
Cash	15,683	25,471	23,203	37,910
Total assets	**37,106**	**45,031**	**54,390**	**65,715**
Equity	9,685	21,752	35,206	51,020
Debt	20,000	15,000	10,000	5,000
Accounts payable	2,219	2,751	3,328	3,513
Other liabilities	5,202	5,529	5,856	6,183
Total liabilities	**37,106**	**45,031**	**54,390**	**65,715**

Cash flow statement

	Year 1	Year 2	Year 3	Year 4
EBIT	13,144	16,297	17,661	20,223
Tax on EBIT	(1,972)	(3,096)	(3,356)	(3,842)
NOPLAT	**11,173**	**13,200**	**14,305**	**16,380**
Change in inventory	(740)	32	42	51
Change in accounts receivable	(950)	(60)	(60)	(60)
Change in other assets	(1,734)	(109)	(109)	(109)
Change in accounts payable	2,219	531	578	185
Change in other liabilities	5,202	327	327	327
Change in working capital	**3,997**	**722**	**777**	**394**
Add back depreciation	2,000	2,000	3,500	3,500
a) Cash flow from operating activities	**17,170**	**15,922**	**18,583**	**20,274**
Investments	(20,000)	-	(15,000)	-
b) Cash flow from investment activities	**(20,000)**	**-**	**(15,000)**	**-**
Change in equity (e.g. dividend)	-	-	-	-
Change in debt	20,000	(5,000)	(5,000)	(5,000)
Interest expenses	(1,750)	(1,400)	(1,050)	(700)
Tax shield	263	266	200	133
c) Cash flow from financing activities	**18,513**	**(6,134)**	**(5,851)**	**(5,567)**
Total cash flow	**15,683**	**9,788**	**(2,268)**	**14,707**

Appendix B.3 - Explaining some relations between financial statements (continued)

Profit-and-loss statement

	Year 1	Year 2	Year 3	Year 4
Revenue coffee	153,578	163,486	173,394	183,303
Revenue cake	19,817	20,807	21,798	22,789
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Total costs	**(131,250)**	**(137,313)**	**(143,663)**	**(150,316)**
EBITDA	**15,144**	**18,297**	**21,161**	**23,723**
Depreciation	(2,000)	(2,000)	(3,500)	(3,500)
EBIT	**13,144**	**16,297**	**17,661**	**20,223**
Interest expenses	(1,750)	(1,400)	(1,050)	(700)
EBT	**11,394**	**14,897**	**16,611**	**19,523**
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Total assets	**37,106**	**45,031**	**54,390**	**65,715**
Equity	9,685	21,752	35,206	51,020
Debt	20,000	15,000	10,000	5,000
Accounts payable	2,219	2,751	3,328	3,513
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Total liabilities	**37,106**	**45,031**	**54,390**	**65,715**

Cash flow statement

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Add back depreciation	2,000	2,000	3,500	3,500
a) Cash flow from operating activities	**17,170**	**15,922**	**18,583**	**20,274**
Investments	(20,000)	-	(15,000)	-
b) Cash flow from investment activities	**(20,000)**	**-**	**(15,000)**	**-**
Change in equity (e.g. dividend)	-	-	-	-
Change in debt	20,000	(5,000)	(5,000)	(5,000)
Interest expenses	(1,750)	(1,400)	(1,050)	(700)
Tax shield	263	266	200	133
c) Cash flow from financing activities	**18,513**	**(6,134)**	**(5,851)**	**(5,567)**
Total cash flow	**15,683**	**9,788**	**(2,268)**	**14,707**

Appendix C – Glossary

Capex – Capital expenditures or investments in fixed assets.

CIT – Corporate income tax payable on profit (EBT) as shown in the profit-and-loss statement.

COGS – Cost of goods sold, used to calculate of gross profit.

DCF model – Discounted cash flow model. A valuation method used to estimate the value of an investment based on its expected future cash flows, which are discounted at a specific discount rate to account for the time value of money.

Depreciation and amortization – Depreciation is an accounting method in which the book value of a tangible fixed asset (for example a machine or a building) is gradually reduced over its lifetime. The purpose is to spread investment costs over a longer period of time rather than fully account for is in a single year. Depreciation is part of the profit-and-loss statement. There is no direct cash impact. Amortization is similar to depreciation but applies to intangible fixed assets such as patents, software, and goodwill.

DIO – 'Days inventory outstanding' is the number of days a certain item is in stock before it is sold.

DPO – 'Days payables outstanding' is the number of days before invoice of a supplier is paid versus the invoice date.

DSO – **'**Days sales outstanding' is the number of days between the invoice date and the payment date of the customer.

EBIT – Earnings before interest and tax.

EBITDA – Earnings before interest, tax, depreciation and amortization.

EBT – Earnings before tax.

Enterprise Value – Total value of the business (including net debt and equity)

Equity Value – Value of the shares in the business.

Free cash flow (FCF) – Cash flow available to all investors, i.e., cash flow from operations + cash flow from investments. It therefore does not include for example interest payments, dividend payments, loan payments or any other payments that flow

to providers of capital. The free cash flow shows the amount of cash for distribution to investors and can be used to calculate the enterprise value of a company by calculating the net present value.

Gross margin – Gross profit as a percentage of revenue.

Gross profit – Revenue minus cost of goods sold.

Invested capital – Total amount of invested capital in the company, defined as fixed assets + working capital excluding (excess) cash. It is also equal to debt plus equity.

KPI – Key performance indicator.

LBO – Leveraged buyout.

M&A – Mergers and acquisitions,

MBO – Management buyout.

NOPLAT – Net operating profit less adjusted tax – basically the starting point of the cash flow statement from operating activities. Adjusted tax means the effect of interest payments on tax is removed here and shown under cash flow from financing activities.

PE – A private equity firm.

PMC – Product-market combination – an important driver of strategic, operational and financial structure to base your model on.

ROIC – Return on invested capital calculated as net operating profit after tax divided by invested capital.

Tax shield – The difference between tax on a leveraged vs an unleveraged firm due to tax-deductibility of interest expenses.

About Carlo Fiscalini

Carlo Fiscalini is the founder of 'X-ASTRiS', a Dutch advisory firm specialized in the design and implementation of value creation programs such as improvement or restructuring plans and carve-outs / integrations.

Before X-ASTRiS, Carlo worked for a start-up company at an incubator in Amsterdam and for Accenture as an operational excellence consultant. He later joined Deloitte to work on M&A deals and restructuring programs, with a specialization in carve-outs.

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Visit www.x-astris.com for an easy-to-use financial modeling application, built by myself. Model your business in minutes by entering a few baseline figures. Play with scenario's and see cash impact instantly.