Falconbury
Finance for Non-Financials

Module 6
Cash budgeting

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CASH BUDGETING

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CASH BUDGETING: PART 1

Cash flow forecasts

Cash flow forecasts are often the simplest financial statements to produce – they simply contain projections of cash flows – inflows from sales or investment and outflows due to cash payments for fixed asset purchase, operating costs or finance costs (interest and loan repayments).

The need for a cash flow forecast

Whether for a new business venture or continuation of an existing business, managers must be aware of the expected cash balance or requirement over the life of the business or project. If you run out of cash you go bust!

Cash flow forecasts require some basic budgeting skills – you need to know what your objective is, what your income/costs will be and when they will occur.

A very simple cash flow forecast is set out below:

Cash Flow Forecast			for the 6 months ending…				
	Jan	Feb	Mar	Apr	May	Jun	Total
Inflows							
Sales	500	2000	3000	5000	5000	5000	
Sundry							
Capital	20000						
	20500	**2000**	**3000**	**5000**	**5000**	**5000**	**40500**
Outflows							
Cost of sales	250	1000	1500	2500	2500	2500	
Wages	400	400	400	400	400	400	
Rent	100	100	100	100	100	100	
Fuel	50	50	50	50	50	50	
Insurance	40	40	40	40	40	40	
Fixed assets	19500						
Loan repayments		600	600	600	600	600	
	20340	**2190**	**2690**	**3690**	**3690**	**3690**	**36290**
Net Cash Flow	160	-190	310	1310	1310	1310	4210
Brought forward	0	160	-30	280	1590	2900	
Carried forward	**160**	**-30**	**280**	**1590**	**2900**	**4210**	

A prime aim of cash management, whether in the short or long-term, is to remain within the business's set cash parameters. For many businesses this means having a positive amount as a cash or bank balance at the end of any day or remaining within the maximum overdraft limit each day.

As an aid to understanding a business's cash position and cash requirements, it is essential to track and budget the cash flows in and out of the business. A cash flow forecast is the tool which enables a business's cash requirements to be modelled. The aim is to identify cash requirements over the period being studied, particularly the maximum requirement for funding – the required overdraft limit. Hopefully businesses

generate cash and therefore it is important to know the amount and timing of cash surpluses generated. This enables managers to plan payments to funders – dividends to shareholders, loan and interest payments to banks and investment in fixed assets.

Layout of cash flow forecasts and cash flow modelling

The exact amount of detail and layout of a business's cash flows will depend on the company's business and the preferences of the preparer. However, the essential layout and features are set out below.

Cash flow forecasts

Inflows – by type if appropriate

Outflows – by type as appropriate. It is better to group outflows by type, particularly distinguishing between capital (fixed asset), operating and financial (loan repayment and interest payment) cash flows.

Net flow for the period

Cumulative cash flow at period end

If the cash flow is prepared on a spreadsheet, it is sensible to build in as much flexibility as is necessary, that is, the more uncertain and material (large) figures should be input in a separate input area where figures can more easily be changed.

Input area

	Jan	Feb	Mar	April
Sales	2,000	3,000	4,000	4,000
sales margin		50%		
increase/decrease in sales		0%		

Cash flow forecast for the year ending…

Inflows					
	Sales	2,000	3,000	4,000	4,000
Outflows					
	Materials	1,000	1,500	2,000	2,000

with a 40 % margin, but sales 10% higher

Input Area

	Jan	Feb	Mar	April
Sales	2,000	3,000	4,000	4,000
sales margin		40%		
increase/decrease in sales		10%		

Cash flow forecast for the year ending…

Inflows					
	Sales	2,200	3,300	4,400	4,400
Outflows					
	Materials	1,320	1,980	2,640	2,640

With an input area and appropriate referencing of the cell content it is very easy to amend the content of the cashflow forecast. For example the opposite example could be changed:

The cell referencing used above is as follows:

	A	B	C
1			
2			
3	**Input area**		
4		Jan	Feb
5	**Sales**	2000	3000
6			
7	sales margin		0.4
8	increase/decrease in sales		0.1
9			
10			
11			
12	**Cash flow forecast**		
13			
14	**Inflows**		
15	Sales	=B$5*(1+$C$8)	=C$5*(1+$C$8)
16			
17	**Outflows**		
18	Materials	=B15*(1-$C$7)	=C15*(1-$C$7)
19			

Basic sales data is entered in B5, C5 etc. C7 contains the margin % which can be altered as required. The possible % changes in the expected sales (in B5, C5 etc) is entered in C8.

The formula for sales is then expected sales times 1+ % change = B$5*(1+$C$8), the $ sign simply locking the cell reference to simplify replication of the formula through the required range.

The formula for materials cost is then the sales figure times 1 – the margin % = B15*(1-c7).

A cashflow forecast can of course simply be rows and columns of figures, but the use of simple formulae as above permits quite comprehensive sensitivity analysis to be carried out.

The preparation of a spreadsheet with forecast figures is essential but equally a cash flow forecast which will be presented to a bank or the providers of finance must set out the objective of the business or project for which the cash is required and, most importantly of all, set out the sources of data from which the cash flow forecast is prepared and state any assumptions made.

Set out on the following pages is the outline of a simple cash flow forecast starting with the most important objectives, background, bases and assumptions.

Outline of a simple cash flow forecast

Toy trading company

Cash flow forecast for the first year of business to 31 December 2005

Outline and objectives of the business

The business will be a specialised retailer of small electronic toys.

The owners believe that the market for such products is at present not well served and there is every prospect of good sales now and in the future. Data on import and sales volume of such toys can be found in appendix A (not shown here).

The owners intend to invest 40,000 of their own funds to cover start up costs and as working capital – initial stock. After the first year of operation they expect to make a return on this investment of at least 15% after drawing reasonable salaries for the time they spend running and managing the business.

Business structure and details

The business will operate as a partnership from premises leased at_____

The partners are: names and addresses_____

_____

_____

Possibly bank, accountants, lawyers names _____

_____

Basis of data and assumptions

The following sources and basis have been used, any assumptions being clearly noted.

Sales

Sales are based on market research on existing total UK sales of such products, pro rated to the local area. An increase in base sales of 12% has been made as the consumer profile for the shop's customers indicates more higher spending individuals than the UK average. The data supporting this is given in appendix A (not shown here).

Cost of sales

The cost of sales is based on achieving a gross margin of 55%. This margin is regularly achieved by both large and small retailers selling such products. See appendix B (not shown here) then, wages, occupancy costs etc.

Summary

A very brief commentary describing the key figures from the most likely cash flow forecast outcome. For example, the growing sales, relatively fixed outflows and the increasing cumulative cash balance.

Cash flow forecast print outs

One or more print outs will be attached.

The best estimate or most likely outcome should be shown first. The key figures thereon could be discussed with, for example, the relationship of growing sales, with costs and thus outflows remaining relatively fixed in amount and thus the increasing cumulative cash balance.

The above is just an outline and a cash flow forecast could be much more detailed. It is however important to be as factual as possible, using as reliable data as possible to substantiate the figures. Flowery description may help sell the cash flow forecast to some, but it is prudent reliable figures which are wanted, particularly for inflows.

CASH BUDGETING: PART 2

What is capital expenditure?

Capital expenditure usually refers to expenditure of relatively large sums of money on long-term assets, typical examples are:

- Replacement of worn out assets with new ones.
- Development of new business opportunities.

Investment inevitably means the expenditure of cash and thus it is essential to budget and appraise this expenditure.

The essential criteria for any investment is that it should make a good or at least adequate return. This will be achieved through maximising income, minimising costs, maximising the use of the investment – maximising sales, production and the volume of business carried out with the assets. Finally the investment (in capital to be employed) should be kept to a minimum – investing only that capital which is necessary to achieve the desired output. Capital expenditure has also to be incurred to comply with safety and environmental regulations.

The challenge is to evaluate the benefits, worth or the projected return on the capital expenditure before committing expenditure. Budgeting capital expenditure is much wider than simply deciding what tangible fixed assets, plant and equipment should be purchased.

The word 'project' may be over used today, but it is sensible to think of the activities into which a company enters as being in the form of projects – discrete new ventures. Past events of a company may be presented in financial statements in many ways, but future events are most clearly seen as series of cash flows in and out of the business. The concepts and arithmetic of appraising the future cash flows of capital expenditure or projects can be employed to demonstrate the viability of investment.

This Section outlines the basic arithmetic used in appraisals, reviews the need for sound cash flow forecasts, indicates how models may be prepared, the measures which can be used and finally outlines a consistent and integrated process for budgeting capital expenditure or projects.

Basic arithmetic of appraisal

Introduction

The worth, value or cost of a project depends on two variables:

- The actual amounts of cash received or paid, and
- The timing of the receipts or payments.

Appraisal involves estimating both the future cash flows and the timing of the cash flows. This is the difficult part of capital expenditure budgeting or project appraisal, the arithmetic is simple.

Time value of money

The timing of receipts or payments is important because an amount of money received today is worth more than the same amount received later in time.

If you were offered 1,000 now or 1,000 in one year's time you would obviously take the money today. However, what if you were offered 1,000 today or 1,800 in one year's time, which would you chose? Firstly there is a cost of money, the so called time value of money. Money never comes free – it is a commodity (really a means of trading in other commodities) and thus in managed economies has an appropriate scarcity value. If there were no inflation in economies the 'real' cost of money, the real interest rate might be 4 or 5%. For practical business purposes the rate required will be the bank borrowing rate as an absolute minimum or more likely the opportunity cost of money – equal or greater than cost of capital of the company. In simple terms the cost of capital of a business is the weighted average of the rate of return required by shareholders and lenders.

For the remainder of this Section we shall use typical UK or US required rates of 12 to 20%.

Returning to the above example, if you could invest the 1,000 today to give a rate of return of say 15% then it would be worth while to wait for the 1,800. The 1,000 today would only be worth 1,500 in a year's time at the 15% rate of return. However, there is also the question of risk and it might be better to accept the 1,000 today rather than hold out for the 1,800 – a bird in the hand –! The concept of early certainty of cash flows in and out underlies a well known point on the importance of managing project and loan risk – get the money back quickly!

Compounding and discounting

The time value of money is accounted for by the simple concept of compounding interest.

There is a rate required, this can be the interest rate on a loan, the cost of capital of the company. If the calculations are concerned with discounting then strictly speaking the term discount rate should be used: the point is that there is a time value or rate for money, whatever it may be called.

Compounded amounts increase in a geometrical progression. At the end of a period – normally a year, 1 becomes 1 + the interest rate. With a rate of 12% 1 becomes = 1.12. This is then the base sum on which interest is calculated for the second year. The sum at the end of the second year = 1.12 x 1.12 = 1.2544 and so on.

Discounted future amounts are decreased by a similar progression. Discounting is the inverse of compounding.

The table below shows the progression in compounding or discounting over five years.

rate = 12% for one currency unit:-

Year	**compounded amount** (future amount, worth or value)	**discounted amount** (present amount, worth or value)
0	1.000	1.000
1	1.120	0.893
2	1.254	0.797
3	1.405	0.712
4	1.574	0.636
5	1.762	0.567

Tables of compound and discount factors exist, but it is easier to obtain the factors from a spreadsheet calculation as above. These factors form an integral part of an appraisal model. The formulae and notation are as follows:

Notation and formulae

Required/interest/discount rate	r or i
Number of years or periods	y or n
Future amount, worth or value	F
Present amount, worth or value	P

The compound factor = $(1+r)^{\wedge n}$

^ is the symbol for 'to the power', upper case on the key for 6 on the keyboard.

The discount factor = $1/(1+r)^{\wedge n}$ or $(1+r)^{\wedge n}$

In the spreadsheet below the formulae are 'locked' with the $ signs to the year column and the interest rate cell. This means that when entered in one appropriate cell the formulae may just be copied down to give the years' factors.

	A	B	C	D	E
1	rate =	0.12			
2					
3			**compounded amount**		**discounted amount**
4					
5	Year				
6	0		=(1+$B$1)^$A6		=(1+$B$1)^-$A6
7	1		=(1+$B$1)^$A7		=(1+$B$1)^-$A7
8	2		=(1+$B$1)^$A8		=(1+$B$1)^-$A8
9	3		=(1+$B$1)^$A9		=(1+$B$1)^-$A9
10	4		=(1+$B$1)^$A10		=(1+$B$1)^-$A10
11	5		=(1+$B$1)^$A11		=(1+$B$1)^-$A11
12					
13					

Cash flow forecasts

Assembling of figures of cash flows in and out is essential but equally essential a cash flow forecast which is to be used as a basis of appraisal must set out the following:

- The reasons or business objectives for the capital expenditure
- The sources of data from which the cash flow forecast is prepared
- A statement of any assumptions made.

The fact that it is future cash flows out and in which are to be appraised means that there should be no difficulties with cost definitions, however, common errors which are made are as follows:

- **Depreciation** costs are included. This is quite wrong as these costs are not cash costs and in any event if depreciation was included there would be double counting. The cash flow relating to the asset is the cash expenditure on the asset at the time of purchase. Depreciation is the accounting exercise of spreading or matching the cost of the asset over its useful working life.
- **Interest and loan repayments** are included. Again this is quite wrong as the exercise of discounting the cash flows over the life of the asset or project at the required rate takes account of the cost of money and will indicate whether or nor sufficient funds will be generated to cover loan interest and capital repayments.
- **Sunk and opportunity costs**. It is often the case that if a project is sanctioned then there will have been costs incurred in the past which benefit the project now being considered. These are sunk costs and have no relevance to the appraisal. Also the sanctioning of a project may give rise to a loss of income or costs to be incurred elsewhere – these costs may be relevant. The simple test to challenge anyone who wants to bring in sunk or opportunity costs is to ask the question 'do we have to spend cash or are we denying ourselves cash as a result of proceeding with this project?'

There are many appraisal measures – **NONE** of which tell us whether to invest or not – they can only indicate whether or not investment may be acceptable within the assumed parameters. Later the sensitivity of parameters and the risk of not achieving the desired outcome or return is considered. Firstly non-discounted and discounted methods which are commonly used are reviewed.

Non-discounted measures

Accounting rate of return (ROCE/ROI/RONA)

This is the calculation of the year by year accounting profit of a business earned on the investment – the historical return on capital employed or invested. It is thus a measure of past performance for one year.

It is not an acceptable appraisal measure for the following reasons, it only assesses one year's activities and assumes that all years' profits and capital employed are similar. It does not take account of the time value of money.

Payback period

This is the calculation of the time taken to recover the initial investment. It would be calculated as follows for the sample cash flows given below:

	cashflows:-			cumulative	
	cash out	cash in	net cash flow	non-discounted cash flow	
Year					
0	-9,000		-9,000	-9,000	
1		1,000	1,000	-8,000	
2		3,000	3,000	-5,000	
3		5,000	5,000	**0**	**payback year**
4		5,000	5,000	5,000	
5		4,000	4,000	9,000	

Whilst this is easy to calculate and comprehend it is too simplistic a measure. It takes no account of the time value of money and more significantly does not take account of cash flows after the date of payback – it therefore discriminates against longer term projects. It may be of help where risk has to be avoided and may also be of use when ranking alternatives.

Discounted cash flow techniques and measures

Both accounting rate of return and payback are too simplistic in approach and a fundamental weakness in both methods is the fact that they ignore the effect of the timing of investment outflows and related inflows.

Net Present Value (NPV) or Present Worth

This is defined as the present value of discounted inflows less discounted outflows.

If the NPV › 0 at the required interest rate then the project may be accepted.

If the NPV ‹ 0 at the required interest rate then the project should be rejected.

Using the same sample figures as for the calculation of payback the NPV can be calculated as follows:

rate = 12%					
			cashflows:		
	discount factor a	cash out b	cash in c	net cash flow d	discounted cash flows e = a x d
Year					
0	1.000	-9,000		-9,000	-9,000
1	0.893		1,000	1,000	893
2	0.797		3,000	3,000	2,392
3	0.712		5,000	5,000	3,559
4	0.636		5,000	5,000	3,178
5	0.567		4,000	4,000	2,270
			net present amount or value - NPV = (the sum of column e)		**3,291**

Internal Rate of Return (IRR) or DCF yield

The internal rate of return is calculated as being the rate at which the NPV of a project is zero. This is found by trial and error.

If the IRR › the required rate then the project may be accepted.

If the IRR ‹ the required rate then the project should be rejected.

Again, using the same sample data as for payback and NPV the IRR can be found by increasing the required rate to 23.38% at which rate the NPV is exactly zero. A higher required or discount rate would cause the NPV to be negative.

rate =	**23.38%**	**=**	**the internal rate of return - IRR**		
			cashflows:		
	discount factor a	cash out b	cash in c	net cash flow d	discounted cash flows e = a x d
Year					
0	1.000	-9,000		-9,000	-9,000
1	0.811		1,000	1,000	811
2	0.657		3,000	3,000	1,971
3	0.532		5,000	5,000	2,662
4	0.432		5,000	5,000	2,158
5	0.350		4,000	4,000	1,399
			net present amount or value - NPV = (the sum of column e)		**0**

Sensitivity analysis

Sensitivity analysis means measuring the sensitivity of the parameters in the basic model. This requires a 'most likely case' – neither optimistic or pessimistic, base model of the project. The simple but effective approach of carrying out a 'one at a time' sensitivity analysis may then be adopted.

'One at a time' approach

This method looks at changes in all or at least those considered the most critical (sensitive) parameters one at a time, eg if selling price is considered the most critical parameter what decrease from the expected sales can be tolerated before the project is not viable – that is NPV is down to zero.

Again, using the basic model, but with more detail showing sales inflows and operating outflows rather than just the net inflows, a sensitivity analysis of the model may be carried out.

rate =12%								
			cashflows:					
	discount	cash out	cash in	cash out	net		discounted	
	factor				cash flow		cash flows	
Year								
0	1	-9,000			-9,000	.000	-9,000	
1	0		2,000	-1,000	1,000	.893	893	
2	0		6,000	-3,000	3,000	.797	2,392	
3	0.712		9,000	-4,000	5,000		3,559	
4	0.636		9,000	-4,000	5,000		3,178	
5	0.567		8,000	-4,000	4,000		2,270	
						N P V =	**3,291**	

Expressing sensitivities

The question is how to determine and demonstrate in an intelligible manner the effect of changes in the parameters (estimates) one at a time. A good method of doing this is to express the maximum unfavourable change in a parameter as a percentage of the original estimate of the parameter, that is, the value of the parameter where the NPV becomes zero – in the example above a decrease of net present value of 3,291 can be tolerated. This present amount can then be related to the parameters one at a time.

By how much could the estimate of cost of the investment rise without the project being rejected?

For NPV to be zero, investment cost would have to rise by the amount of the NPV to 12,291 which is 36.56% more than the expected cost.

$$\frac{3{,}291}{9{,}000} = 36.56\%$$

The question can then be asked – is the estimate of original capital costs at all likely to be 36% out?

Sensitivity analysis is obviously more easily carried out with the use of spreadsheets.

rate = 12%						
			cashflows:			
	discount	cash out	cash in	cash out	net	discounted
	factor				cash flow	cash flows
Year						
0	1.000	-12,291			-12,291	-12,291
1	0.893		2,000	-1,000	1,000	893
2	0.797		6,000	-3,000	3,000	2,392
3	0.712		9,000	-4,000	5,000	3,559
4	0.636		9,000	-4,000	5,000	3,178
5	0.567		8,000	-4,000	4,000	2,270
		36.57%	0.00%	0.00%	**N P V =**	**0**

The example then goes on to show how the other parameters may be tested for sensitivity one at a time. A table of the results gives a useful overall guide to the sensitivity of the project. In the example the table of the three sensitive parameters has been compiled by trial and error and shows that with a fall in sales of 14.16% the NPV is zero. An important, obvious point is that the larger the parameter the more sensitive it will be. In this example cash in – the sales are almost twice the cash out, therefore any percentage change in cash in has almost twice the effect of an equal percentage change in cash out.

rate = 12%						
			cashflows:			
	discount	cash out	cash in	cash out	net	discounted
	factor				cash flow	cash flows
Year						
0	1.000	-9,000			-9,000	-9,000
1	0.893		1,717	-1,000	717	640
2	0.797		5,150	-3,000	2,150	1,714
3	0.712		7,725	-4,000	3,725	2,652
4	0.636		7,725	-4,000	3,725	2,368
5	0.567		6,867	-4,000	2,867	1,627
		0.00%	-14.16%	0.00%	**N P V =**	**0**
table of sensitivities		36.57%	-14.16%	30.07%		

This analysis is done not just to rule out sensitive projects, but should be considered in a more positive way, as a means of identifying potential problem areas and thus attempting to 'tie them down' and in some way minimise risk. An obvious limitation of the method is that not all parameters can be considered to change independently. In cases where parameters are inter-related then sensitivities can be considered over possible ranges of the related parameters.