# Cash forecasting

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## Introduction

Cash forecasting can be a valuable aid to the cash manager if it is prepared well and used properly. Where it is prepared badly, it can be a significant waste of time to all involved. In companies that make good use of cash forecasting it may be used as an aid for some, or all, of the following:

- to set borrowing limits and minimise cost of funds;
- to maximise interest earnings;
- for liquidity management;
- for foreign exchange risk management;
- for setting and monitoring longer term investment and funding strategies;
- for financial control;
- to monitor and set strategic objectives;
- for monitoring various lender and investor ratios;
- for budgeting for capital expenditure and project appraisal; and
- as a tool for working capital management.

### ■ Set borrowing limits and minimising cost of funds

The knowledge that funds are required in advance gives the cash manager time to ensure adequate funds and borrowing limits are available, to look for surpluses from other parts of the group that can be used via inter-company loans to fund the shortages and to look for the cheapest source of funds from the financial markets. Having to provide liquidity at short notice, or even immediately if a deficit occurs, often means paying a premium as there may not be time to put the most appropriate borrowing facilities in place or identify the cheapest sources of funds.

### ■ Maximising interest earnings

This is a similar exercise to minimising the cost of funds; knowing that a surplus will occur in advance enables the cash manager to look for the most effective ways to invest funds. This is achieved first by looking internally for parts of the group that could use this potential source of cheaper funds. This may be a group company needing funds for a similar period to that of the identified surplus, or it may be able to be used to refinance more expensive external financing resources (e.g. bank borrowings) and, if not needed internally, notice will enable the cash manager to identify higher yielding instruments in which to invest, to maximise returns.

### ■ Liquidity management

It is the cash manager's basic job to provide the company with sufficient liquidity to enable the operating units to function. When assessing potential surpluses and deficits of cash it is necessary not only to assess amounts and currencies, but also the periods for which the surpluses or shortages will arise. Some companies build in a cushion into their calculations in case of unexpected cash calls.

Intra-group funding, practised by most large groups, is always carried out more effectively if it is based on planned and expected positions rather than being a reaction to short-term situations. This is particularly important where cross-currency and/or cross-border liquidity management are concerned. Moving money cross-border can be expensive. As well as bank costs, 'hidden' elements such as losses of value while the funds are in transit, the imposition of 'lifting charges' or 'beneficiary deductions' in some countries also add to costs.

Cross-currency swaps are increasingly being used for this purpose (i.e. to move funds from one location where subsidiaries may have surpluses to locations in deficit). Again, these work best where amounts and tenors can be identified in advance. The swap 'locks in' exchange rates and provides an automatic hedge.

Some companies fund subsidiaries for very short periods using swaps based on equally short-term cash forecasts. They may be for periods as short as one or two days.

### ■ Foreign exchange risk management

Some companies require their business units to produce both local currency (home currency to the unit) and foreign currency cash forecasts. This enables treasury to identify the size and timings of currency flows and either 'match' them against opposite flows within the company, or hedge them in the currency markets.

Identification of currency flows will enable the company to identify where currency accounts may be necessary (or no

longer necessary) and should form the second stage of an annual plan, following on from an operating plan and operating budget. Like all forecasting, currency cashflow forecasting is only useful for risk management purposes if it is regularly updated and refined, as potential flows, currencies and estimated timings become more certain.

### ■ Setting and monitoring longer-term investment and funding strategies

In this case cash forecasting techniques can be used as modelling tools. These should be able to identify future structural cash shortages and surpluses. Generally, this will be for periods in excess of one year.

### ■ Financial control

Cash forecasting can often be used to model payables and receivables against known sales and purchases. This type of forecasting identifies mismatches between credit periods granted to customers and the amount of credit acutally taken (Days Sales Outstanding). It can also enable comparison with credit taken from suppliers (Days Purchases Outstanding) and hence to identify working capital financing requirements. Such forecasts may be reconciled against actuals to ensure that subsidiary companies are managing their cashflows in line with plans and corporate policy (see also below section on working capital management).

### ■ Monitoring and setting strategic objectives

Various corporate strategies and objectives can be planned using cash forecasting and reviewed or monitored by comparing actual cashflows relating to specific products, projects, or business units, against those planned.

### ■ Monitoring various lender and investor ratios

Borrowers normally have to comply with covenants set by lenders, or the company itself may either impose ratios on itself or use them to benchmark itself against peer groups. Cash forecasting would be one of the techniques used within the company to monitor and even plan certain types of ratios.

### ■ Capital budgeting

This type of cashflow projection will often be carried out by companies to ascertain that they are generating sufficient cash, not only to finance normal operating needs but also to finance the acquisition of new capital goods (e.g. machinery). It is also often requested by banks or finance companies to ensure that potential borrowers are generating sufficient cash to enable them to make loan and interest payments without jeopardising the other activities of the business.

### ■ Working capital management tool

Increasingly cash forecasting techniques are being linked to working capital management. In this respect concepts such as 'just in time' delivery of raw materials can be refined and linked with 'just in time' payments and cash management. As raw materials are ordered, paid for and consumed, and stocks of finished goods are warehoused or sold the cash forecasts can be continually refined so that they become both a detailed cash

planning tool and a method for managing actual and predicted cashflows and account balances.

## Cash forecasting time horizons

### ■ Short-term forecasting

Short-term cash forecasting will be used for periods from 'end of business today' forward to 30 days. The objective of short-term forecasting is to identify cash receipts and payments with reasonable accuracy to aid day-to-day management of bank accounts.

It seeks to identify short-term funding requirements and short-term surpluses that can be used for investment and will aid the cash manager in his borrowing and investment decisions. Short-term forecasting should be the main tool used to ensure that there are no idle balances sitting on non-interest or low-interest-bearing accounts.

### ■ Medium-term forecasting

Medium-term forecasting is used to estimate net cash positions for periods from one month to one year. This seeks to establish overall averages, rather than detailed daily positions, and gives the treasurer a feel for the overall funding/investment patterns expected over the year.

Typically, companies using medium-term forecasting have a rolling monthly forecast that might be projected 12-months forward. In some volatile industries, where going as far forward as 12 months makes no sense, companies may only project forward three months. The forecasts should be regularly updated on a monthly or quarterly basis as figures become more solid and as events change (e.g. sales forecasts being exceeded or not being met).

Monthly rolling forecasts are used extensively for liquidity management by larger companies to plan actions related to credit lines or issues or sales of commercial paper. In cash-rich companies, monthly forecasts will normally be the basis on which an investment programme is planned. Finally, they may also be used to monitor and adjust credit extension to a firm's customers or for justifying negotiating longer credit terms from suppliers.

Medium-term cash forecasts (i.e. rolling forward for one year) are a common monitoring tool used by banks granting credit facilities, particularly overdrafts, to companies. Companies that are in difficulty and require close supervision may be required to submit forecasts to the bank each month, while those in good standing may present them annually during the banks' review process to support the level of facilities granted. Multinationals would rarely be requested by banks for forecasts, except to support special facilities such as project finance.

### ■ Long-term forecasting

Long-term forecasting covers periods in excess of one year and considers the longer-term sales, purchases and product strategies of the company. Such forecasts may also be used to support the acquisition of capital equipment that may be amortised over many years, to enable management to gauge pay-back periods and potential profit contributions.

Long-term forecasting is usually based on accounting projections of revenues, expenses and changes in balance sheet

items. This will probably be produced on an accruals basis, with adjustments for the effects of changes in assets and liabilities on the cashflow.

The accuracy of forecasts, however well produced, becomes less and less reliable the further they roll into the future. The fundamental basis on which all major treasury management systems operate is cashflow forecasting. For example, a five-year loan or investment will be broken down by the system into its cashflows as follows:

- inflow/outflow of principal at start of period;
- repayment schedule (if any);
- interest payments/receipts; and
- outflow/inflow of principal at end of period.

Such forecasts based on real treasury transactions will be highly accurate and have strong practical impact.

The type of cash forecasting used must be appropriate to each company's business. The form and application of cash forecasting will differ according to the type of business, the size of the cashflows, the different time horizons used and the type and quality of the information on which it is based.

## Sensitivity

Longer-term forecasts need to be subjected to sensitivity analysis as things can change from year to year. The sensitivity used will vary depending on the type of situation being modelled, but may make allowances for currency fluctuations; interest movements; changes in rates of inflation; economic influences; changes in the market place and competitor strategies.

Therefore, companies using sensitivity analysis may produce several cash forecasts based on a number of 'what if' scenarios.

## The forecast process

Flows should be divided by inflows and outflows and split into components.

Forecasts often include items with different levels of certainty, ranging between flows that are assured, those that can be forecast to some extent, and those that are less predictable.

The cash manager will need to identify sources of information for the forecasts. These may be: last year's actual cashflows; sales projections; purchases projections; accounts payable and receivable data and investment plans (capital budgeting) including plans for acquisitions or divestments.

Accurate information will be more difficult to obtain in decentralised groups and its collection may need to be delegated to remote business units which may be unaware if the importance of the task. This often affects the quality and accuracy of the forecasts.

The experienced forecaster will become adept at data selection and organisation. Optimistic subsidiaries that never meet cash targets will be identified, as well as those that underestimate and end up with unplanned surpluses. Data will then be manipulated accordingly.

Customer payment histories can similarly be studied to ascertain payment frequency. Some large customers may only pay once per month, others will only include invoices received by an internal cut-off period set by them. Some will always take more credit than they are officially allowed; others will always pay on a fixed date, irrespective of the number of invoices to be settled.

## Short-term forecasting techniques

Short-term forecasting techniques, known as 'operational cash forecasts', are normally used for periods of up to one month. Some companies also use the same technique for longer periods. There are two models that are frequently used:

### ■ The receipts and disbursements model
This model will start with a separate schedule of receipts and payments. Receipts will include funds from sales to customers, any unearned income, or funds received from the sale of assets.

Payments will include purchases, payment of other expenses (manufacturing, wages, selling and marketing costs, etc) interest payable and the purchase of any assets.

Some companies will add to this a minimum cash holding to cover unforeseen circumstances, while others may seek to run cash at zero or in a slightly deficit (overdrawn) position.

## ■ Example 1 : Receipts and disbursement forecast

|  | Week 1 (EUR ,000) | Week 2 (EUR ,000) | Week 3 (EUR ,000) |
| --- | --- | --- | --- |
| Cash receipts | 2,000 | 2,200 | 1,900 |
| Cash payments | (1,740) | (2,900) | (2,000) |
| Net cashflow | 260 | (700) | (100) |
| Cash at beginning | 200 | 460 | (240) |
| Cash at end | 460 | (240) | (340) |
| Minimum cash required | (100) | (100) | (100) |
| Finance needed | – | (340) | (440) |
| Funds for investment | 360 |  |  |

Example 1 shows a simple forecast using summarised receipts and disbursements technique and a weekly time horizon. All amounts are shown as '000s. In week one, cash receipts are expected to be EUR 2,000 and outgoings EUR 1,740. This gives a net cashflow surplus of EUR 260. If cash carried forward from the previous period is EUR 200, then the cash holding at the end of the period will be EUR 460. If company policy is that there must always be a minimum balance at the bank of EUR 100, there will be EUR 360 available to invest, and so on.

Example 2 shows a format for a more detailed daily cash forecast using the same technique. In this case no minimum cash holdings have been specified.

### ■ The distribution model

The distribution model looks at total estimated flows and allocates proportions of these flows to the number of days in the period concerned with a view to estimating movements that will occur on each day.

Proportions may be calculated by using simple averages, but these may be adjusted using historical data to cover known events such as patterns seen at month or quarter ends, certain days of the week, pay-day, VAT payment dates, etc.

Adjustments might also incorporate seasonal changes (for example, in industries like the fashion business).

### ■ Example 2 : Daily forecasting format

|  | Day 1 | Day 2 | etc |
|---|---|---|---|
| **Cash at beginning of day** |  |  |  |
| CASH RECEIPTS |  |  |  |
| – Cash sales |  |  |  |
| – Open account collections |  |  |  |
|   Vehicles |  |  |  |
|   Parts |  |  |  |
|   All other |  |  |  |
| – Miscellaneous income |  |  |  |
|   Interest |  |  |  |
|   All other |  |  |  |
| – Borrowings |  |  |  |
| **TOTAL RECEIPTS** |  |  |  |
| CASH DISBURSEMENTS |  |  |  |
| – Payroll |  |  |  |
| – Vendor payments |  |  |  |
|   Material |  |  |  |
|   Parts |  |  |  |
|   Facilities |  |  |  |
|   Other |  |  |  |
| – Taxes |  |  |  |
|   Income tax |  |  |  |
|   Income duty |  |  |  |
|   Sales tax |  |  |  |
| – Interest |  |  |  |
| – Dividends |  |  |  |
| – Debt retirement |  |  |  |
| – All other |  |  |  |
| **TOTAL DISBURSEMENTS** |  |  |  |
| **Cash at end-of-day** |  |  |  |

### ■ Example 3

In this case, we can estimate the funds clearing on each day of the week based on cheques issued. From an analysis of past distributions, we can establish the average percentage of cheques cleared each business day. The average value of cleared items may differ somewhat depending on the day of the week (% effect). The extent of this effect can be identified through the analysis of past distributions.

If the company issues EUR100,000 worth of pay-cheques on Wednesday, 1 May, this analysis can be used to estimate the value of cheques likely to be debited to the account as shown in Example 3b (on the following page).

This can be a simple and effective method of looking at the disbursement side of the cash forecast (some companies use the same technique to forecast the value they will receive from cheque collections) and could be used in combination with other methods to build up a forecasting model based on past experience.

### Medium-term forecasting

Medium-term forecasting may also be called 'tactical forecasting' and will be used for periods of one-to-12 months. Either long or short-term methods may be used or a combination of these methods. Most companies tend to use short-term methods and the 'receipts and disbursement' method tends to be widely used. Results may then be reconciled to a projected balance sheet and profit and loss statement. One month rolling forecasts out for 12 months are often seen.

### Long-term forecasting

The pro forma statement method, often referred to as 'strategic forecasting', may cover periods of one-to-five years and is based on projected income statements and balance sheets. It is normally derived from the corporate budgeting and planning system, usually looking ahead at expected sales increases. The ratio of all the other main working capital items (cash, accounts receivable, stocks, accounts payable, etc) and balance sheet items is calculated at the start of the period and this ratio is maintained for each period going forward.

To start the process, a sales forecast is generated and the profit and loss account (P&L) and balance sheet items that appear to be a constant percentage of sales are identified. Where better quality information is available that will change the ratio, this is substituted. After projecting the new P&L account and balance sheet, the 'assets' will not equal the 'liabilities' (plus equity). If the assets are less than the liabilities, the company has a cash surplus. If the assets are more than the liabilities, the company has a cash deficit to finance.

In Example 4 (below), we have an end-of-year position, a P&L account summary and simplified balance sheet.

Analysis of the previous year (and possibly other earlier years) identifies that the cost of goods sold, selling, administration expenses, payables (creditors) and current assets are a constant percentage of sales. Depreciation will be EUR 75 million and we know that the long-term loans will reduce to EUR 200 million at the beginning of the year as a repayment is due to be made. During the early part of

the year a dividend of EUR 36 million is due to be paid. The task is to produce forecasts for the end of the current year (i.e. 12 months ahead) and to identify the overall cash position.

Calculating the balance sheet is straightforward. Only the equity needs explanation.

| | | |
|---|---|---|
| equity equals | 900 | carried forward |
| | + 246 | retained income |
| | − 36 | dividend paid |
| | 1,110 | |

The assets are 102.5 less than the liabilities, therefore, in theory, we are predicting a surplus of cash and could perhaps reduce the loans further (to 97.5) to balance the situation.

## Other types of forecasting

As they strive for improved forecasting accuracy, other methods are available to companies.

### ■ Moving averages

This method calculates an average of the most recent amounts with a view to estimating future amounts. With moving averages, there is no weighting used; all figures count

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### ■ Example 3a : Analysis

| Business day since cheques issued | % of value expected to clear | Day effect Day | Day effect % effect |
|---|---|---|---|
| 1 | 13 | Monday | −2 |
| 2 | 38 | Tuesday | 0 |
| 3 | 28 | Wednesday | 2 |
| 4 | 13 | Thursday | 1 |
| 5 | 8 | Friday | −1 |

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### ■ Example 3b : Distribution forecast model usage

| Date | Business days after issue | Day of week | % clearing | Forecast (EUR) |
|---|---|---|---|---|
| 2 May | 1 | Thursday | 13 + 1 = 14% | 14,000 |
| 3 May | 2 | Friday | 38 − 1 = 37% | 37,000 |
| 6 May | 3 | Monday | 28 − 2 = 26% | 26,000 |
| 7 May | 4 | Tuesday | 13 + 0 = 13% | 13,000 |
| 8 May | 5 | Wednesday | 8 + 2 = 10% | 10,000 |

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### ■ Example 4 : Pro forma statement method (start position)

| Profit/loss account | | | EUR (million) | |
|---|---|---|---|---|
| Sales | | | 3,000 | |
| Cost of goods sold | | | (2,250) | |
| Selling/admin costs | | | (300) | |
| Depreciation | | | (150) | |
| Interest expense | | | (57) | |
| Income before tax | | | 243 | |
| Less tax @ 34% | | | (83) | |
| Net income | | | 160 | |
| **Balance sheet** | | | **EUR (million)** | |
| Cash | 150 | Creditors (payables) | 75 | |
| Receivables (debtors) | 450 | Equity | 900 | |
| Stocks | 300 | Long-term loans | 300 | (10% interest rate) |
| Net fixed assets | 600 | Preference shares | 225 | (12% interest rate) |
| **TOTAL ASSETS** | **1,500** | | **1,500** | |

equally. However, the forecast can be adjusted to trends by using more observations to calculate the average.

Using a five week multiplier would result in a forecast adjusting to trends better than a multiplier of, say, 12. With this method, the forecast will always be based on past trends rather than current or expected trends. For businesses that have fairly constant trading patterns this may work well. This would not be the case for seasonal businesses or those with uneven sales patterns.

### ■ Exponential smoothing

Exponential smoothing takes simple moving averages and normally weights them so that more recent observations are given greater weight in the calculation.

This, in effect, recognises recent forecast errors, and seeks to correct them. The exponential smoothing equation is:

$$F_{t+1} = F_t + a\,(x_t - F_t)$$

where:

$F_t + 1$ = cash forecast for the period $(t +1)$;
$F_t$ = cash forecast for the period $t$ (i.e. period before);

### ■ Example 5 : Projected profit and loss account

|  |  | EUR (million) |
|---|---|---|
| (I) | Sales | 3,300 |
| (ii) | Cost of goods sold | (2,475) |
| (iii) | Selling/admin costs | (330) |
| (iv) | Depreciation | (75) |
| (v) | Interest expense | (47) |
| (vi) | Net income before tax | 373 |
| (vii) | Tax @ 34% | (127) |
| (viii) | Net income | **246** |

(i) From our sales forecast we have estimated that sales will increase by 10% to EUR 3,300 million
(ii) As the cost of goods sold is 75% of the sales figure, this gives us (EUR 2,475 million)
(iii) Selling and administration costs are 10% of sales (i.e. [EUR 330 million])
(iv) Depreciation is EUR 75 million as given
(v) Interest expense will be 10% on the reduced loan level of EUR 200 million and 12% on the preference shares (EUR 47 million)
(vi) This gives a net income before tax of EUR 373 million
(vii) Tax at 34% equals (EUR 127 million)
(viii) This gives an after tax profit of EUR 246 million

$a$ = smoothing constant (between 0 and 1); and
$x_t$ = actual cashflow for period $t$.

Therefore the forecast, using exponential smoothing for the next period, is equal to the last period forecast plus a correction 'a' multiplied by the $(x_t - F_t)$ on the most recent error.

A smoothing constant of 1.0 means that the forecast for the next period will be the same as the actual cashflow for the current period.

Again, this statistical approach will not suit all types of business.

### ■ Regression analysis

Regression analysis is another computer-based technique, which establishes linear relationships between variables and predicts them forward.

Statistical methods tend to be used mainly by the more sophisticated multinational groups, and are particularly popular with some of the larger US groups.

### How useful is cash forecasting?

In summary, cash forecasting is an essential tool to the cash manager if the forecasts are well prepared using reliable base data; produced using time horizons appropriate to the company concerned; updated regularly to reflect changes experienced, or known future events and checked against actuals and refined over time to improve accuracy.

Unfortunately, many companies make poor use of cash forecasting and as a result the whole process falls into disrepute.

*This article has been adapted from a section of the manual of the ACT's International Cash Management Certificate, also written by Tony de Caux. Tony de Caux is a fellow of the ACT, a fellow of the Institute of Financial Services; he also holds the Certificate of International Cash Management from the ACT and is a Certified Treasury Professional from the Association of Financial Professionals (USA). He was until recently a member of the Cert ICM exam board and is currently a visiting professor at Vrije University Amsterdam.*

### *For further reading around this subject see:*

www.treasurers.org/technical/resources.cfm

**and select Money management: Cashflow forecasting**

### ■ Example 6 : Projected balance sheet (EUR million)

| | | | | | |
|---|---|---|---|---|---|
| Cash | 165 | (5% of sales) | Creditors | 82.5 | (c 2.5% of sales) |
| Receivables | 495 | (15% of sales) | Long-term loans | 200.0 | |
| Stock | 330 | (10% of sales) | Preference shares | 225.0 | |
| Net fixed assets | 525 | (600.75 depreciation) | Equity | 1,110.0 | |
| **Total assets** | **1,515** | | **Total liabilities** | **1,617.5** | |