4.1.2 Background to Risk

Unit: Unit 1 – Treasury Strategy

Module: Module 4 – Financial risk

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Summary: A firm must take risk to make a return for investors. This risk can be categorised broadly between business and financial risks, although operational risks also occur. Proper management of risk, including concepts such as tolerance, appetite and budgeting, do require a formal approach, including measurement. A categorisation of risks is also required and we look at classic treasury risks, splitting them between trading and ownership. A proper governance structure is also required and we propose a risk framework for the management of risk.

Keywords: enterprise risk, business risk, financial risk, crossover risk, diversification, correlation, risk tolerance, risk appetite, risk budgeting, pre-transaction risk, transaction risk, economic risk, interest rate risk, translation risk, pensions risk, key risk indicator, key control indicator, silo, risk framework.

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Learning outcomes:

1. Financial risk revolves around currency, interest rate, commodity and pensions risk.
2. There are some different academic views as to what risk is and whether it can be measured
3. Success in business can be viewed as the successful management of risk
4. Enterprise risk can be considered to comprise of business risk and financial risk
5. Some risk can be considered to be both business and financial, so called crossover risks
6. Investors do not expect financial risk to dominate a firm, except perhaps in deliberately levered structures
7. Academically, reduction of risk should lead to higher shareholder value
8. A firm should determine risk management objectives
9. Enterprise Risk Management brings risks together to view them as a whole and also says that risk management is the job of everyone in the firm
10. Diversification reduces overall risk if the risks are not correlated
11. The concepts of risk tolerance, appetite and budgeting are gaining ground in risk management
12. Risk appetite should be investor led
13. Financial risks in trading revolve mainly around foreign exchange and commodity risk and comprise pre-transaction risk, transaction risk and economic risk
14. Financial risks in ownership comprise interest rate, translation and pensions risk
15. Interest rate risk is a complex risk
16. Translation risk is essentially a risk for investors but it can affect credit ratios
17. Pensions risk is very involved
18. It is difficult to see similarities in risk management in any one sector
19. Regulation pushes for ever more responsibility for the board and for ever more disclosure, but there is as yet no disclosure of risk measurement
20. Normally, risk management is delegated to a risk committee and there is often a financial risk committee
21. Key Risk Indicators and Key Control Indicators are a feature of the new risk landscape
22. Delegation risks losing the ERM approach to risk as risks may be ‘siloed’
23. Data management is a key part of risk management
24. A framework for risk management is useful and one model is Identification, Assessment, Evaluation, Response and Reporting

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1 Introduction

According to our decision tree illustrating the decisions of a treasurer, the 'classic' financial risks comprise:

- Currency risk
- Interest rate risk
- Commodity risk
- Pensions risk

It might be worth adding liquidity risk to the list. Liquidity risk is, after all, the biggest single risk facing a firm. Illiquidity, and usually no other cause, is the cause of corporate failure or loss of shareholder value, or failure to generate shareholder value. However, liquidity risk is probably best dealt with as a part of financial strategy, because ultimately financial strategy could be argued to be about liquidity risk. In addition, we protect against liquidity risk by managing other risks.

As a consequence of managing the classic financial risks, the treasurer also needs to consider credit risk (taken by the firm on bank and other counterparties).

This brings us back to our main list of four, a critical identifying feature of which is that, unlike operational risks, prices can actually move in favour of the firm. This feature is also shared with the firm's business risks.

This feature requires some philosophical thought, particularly around the distinction between *risk* and *uncertainty* and we turn to several academic approaches to this:

Frank Knight in *Risk, Uncertainty, and Profit (1921)* established one distinction between risk and uncertainty:

> 'Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated. The term 'risk,' as loosely used in everyday speech and in economic discussion, really covers two things which, functionally at least, in their causal relations to the phenomena of economic organization, are categorically different. ... The essential fact is that 'risk' means in some cases a quantity susceptible of measurement, while at other times it is something distinctly not of this character; and there are far-reaching and crucial differences in the bearings of the phenomenon depending on which of the two is really present and operating. ... It will appear that a measurable uncertainty, or 'risk' proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all. We ... accordingly restrict the term 'uncertainty' to cases of the non-quantitative type.'

Knightian *uncertainty* is thus impossible to calculate whereas Knightian *risk* is measurable.

By contrast, according to Doug Hubbard in *The Failure of Risk Management: Why It's Broken and How to Fix it (2009)* risk is related to uncertainty, but is not quite the same thing. The

difference concerns whether or not there is the possibility of an adverse consequence to us of a possible outcome:

> Uncertainty: exists where there is a lack of complete certainty. Uncertainty may be measured by assigning probabilities to possible outcomes.
>
> Risk: exists where there is a state of uncertainty and one or more of the possible outcomes involves a loss, catastrophe or other undesirable outcome for you or your organization. Risk too may be measured by assigning probabilities to possible outcomes.

Hubbard, incidentally, also wrote a book, called *How to Measure Anything (2007)*.

Taleb has developed the 'Black Swan Theory'[1] where there is no distinction between any different kinds of uncertainty.

It is against these backgrounds that a treasurer must help establish an approach to these four sorts of risk, each of which can equally move in favour of the firm as against it.

It follows that any attempt simply to minimise risk, or to escape risk altogether, will lead either to a sub-optimal decision, or to the least rational decision of all: doing nothing. Corporate development is about striking the balance between the contradictory pressures for greater entrepreneurialism and risk-taking on one hand and the limitation of downside risks on the other. This leads directly to the 'tolerance' for risk within a firm, then 'appetite' for risk and then the conclusion that, effectively, risk should be 'budgeted for'.

Financial risk is the treasurer's 'baby'. If there is one thing at which excellence is expected, it is here.

The concepts of risk tolerance, risk appetite and risk budgeting are useful, and they add to our understanding of risk.

We can distinguish between risks in trading and risks in ownership. The distinction is not about what risks are left to shareholders to manage (of which business risk is the crucial example) but about where the risk lies in the firm. Risks in trading will include those where the cost of goods sold has financial market risk in it, such as commodity risk or foreign exchange risk. This contrasts with translation risk, which arises because the firm 'owns' a business which reports in a currency (or indeed just trades) other than that of the parent. Interest rate risk is also typically an 'ownership' risk because it derives from financial strategy. Commodity risk is invariably a risk of trading, whereas pensions risk is invariably an 'ownership risk'.

[1] A 'Black Swan' event is unexpected and has a major impact. After the fact, the event is rationalized by hindsight. Until they were discovered in Australia, black swans were not thought to exist since all swans observed to date were white. Black swans are widespread in Australia, and in hindsight this seems perfectly natural.

It can, however, also be a useful dimension to consider which risks are those which investors must assume, business risk being the obvious candidate. And some risks can only be borne (and managed) by investors.

2 How did we get here?

It is worth reflecting on how a firm gets itself into a position of having to worry about financial risks.

2.1 Business risk and financial risk

A firm makes money by taking business risk. An entrepreneur has an idea on the success of which he risks personal wealth and how well this business risk is managed will be a large part of success or failure of the firm. Examples of this risk are everywhere:

- Exploration for natural resources
- Development of a new drug
- Introduction of a new product line
- Launching in a new market or country
- Buying a machine to automate processes
- Shifting production
- Outsourcing
- Building infrastructure

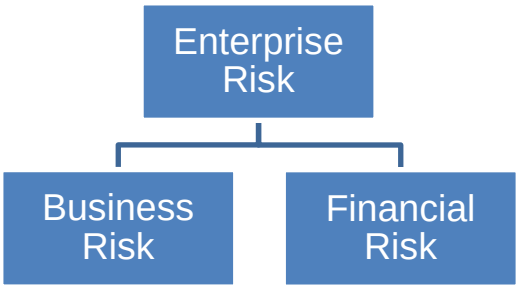
Business abounds with risk and success in managing risk is arguably one thing that will differentiate firms.

- The firm that explores for natural resources in the right place and at the right time (through e.g. good research or being prepared to abandon exploration on reasonable contra indications) will be more efficient.
- A researched product introduction will avoid wastage
- Buying the best value machine will create efficiencies for years

Firms take risks and firms will be rewarded if things go well. In some cases, however, other risks have followed on from taking business risks. By launching in a new country (through a presence or simply by selling there), the firm takes on country and foreign exchange risk. By using a commodity in a product, such as copper in electrical products or fuel in an airline, there is commodity risk. By incentivising staff to work for the firm (or remaining competitive compared to other employers), there is now pension risk. By taking on debt to finance any of these ideas (and obtain an adequate return on equity) there is interest rate risk. So many financial risks follow on from business risk – they are a consequence of business risk. So some of the risks arise from the trading itself, but others arise not from the trading but from the corporate / funding structure (such as interest rate risk).

We thus reach our familiar diagram:

Exhibit 1: Categories of risk



Note: Operational risk excluded from this diagram for emphasis

Note that some risks may be both a business risk and a financial risk, such as a commodity price risk, or a foreign exchange risk in an export, and these can be termed 'crossover risks'. Interest rate risk inside a property firm could be considered in this category because it is almost inevitable that the firm will be heavily debt financed. The management of these might depend on whether they were considered part of the business (hence expected to generate excess returns) or not (hence expected to be managed away).

2.2 Investor expectations around business risk and financial risk

So what do investors expect about these risks? Investors certainly expect that firms should take risks, or else there is no reward, or profit in excess of a risk-free return. But investors probably do not expect firms to take risks beyond their core expertise. Thus a firm which manufactures car parts has skills in manufacture but would not be expected to speculate in foreign exchange. A firm which generates electricity would not be expected to speculate in interest rates. However, the line between speculation and hedging is a fine one.

Example 1: Goldmines SA

Goldmines SA operates gold mines in Africa. The mining operations are at a fixed cost and so profits and cash flows vary according to the market price of gold as well as other factors such as the quality of ore being extracted and the skills of management. Goldmines SA has a policy of not hedging the market price of gold, except over very short periods of time.

Many companies would consider exposure to this type of commodity price to be an extreme risk. In Goldmines SA's case the policy is understood, accepted and welcomed by shareholders. This is because they have actively sought exposure to the gold price by investing in the firm. The shareholders understand that Goldmines SA's share price is likely to fluctuate according to the price of gold, and they accept that the company does not seek to transfer or to avoid this risk. If they wished to insulate themselves from the gold price they could do this with their own risk management policies.

Example 2: Silverdiggers Inc

Silverdiggers Inc operates a silver mine in Costaguana in South America. The mining operations are at fixed costs but the firm is financed heavily by debt and the business model is based on a certain minimum silver price. Because profits and cash flows would otherwise vary according to the market price of silver, Silverdiggers has hedged the market price of silver for a significant period.

Many companies would consider exposure to this type of commodity hedge to be unusual but in Silverdiggers case the policy is understood, accepted and welcomed by shareholders. This is because they have accepted that the equity return comes largely from the financing structure and the quality of management, in which they have faith. In any case, in the long run, there is still some silver price exposure (unless all the output has been sold forward) and investors could speculate independently on the silver price if they wished.

Example 3: Dwell plc

Dwell plc explores, extracts, transports and refines oil and oil products. Its core skills are in these areas. Dwell sells much product (and indeed buys product it cannot source itself) in the oil and derivative markets. It also speculates in these markets, that is, it takes positions over and above those required to meet its trading requirements.

Investors accept this on the basis that Dwell has skills in this area and that the risk taken is modest in comparison with the overall trading risk.

Academic corporate finance tells us that the ultimate objective of a firm means creating value for its shareholders (owners) by maximising the firm's value (reflected in its share price). This is shown in simple form as:

$$\text{Value of investment} = \frac{\text{Expected future cash flows}}{\text{Cost of capital}}$$

Management can enhance the firm's value by either increasing expected future cashflows or reducing the cost of capital. The cost of capital (i.e. investors' required rate of return) will be reduced if the riskiness, or volatility, of the expected future cashflows can be reduced. There is therefore a route available to the treasurer, so that any action which reduces the volatility of cash flows should be the right action.

What we can possibly conclude from this is that investors like firms to take business risks but they only like them to take on financial risk when it is really necessary and even then they prefer action to minimise cash flow volatility. In addition, it is vital to communicate the firm's risks to investors, so that they can assess their required risk-adjusted returns.

So risk management is really about how firms actively seek to select the types and levels of risks that it is appropriate for them to take. Most business decisions (and indeed what business is about) are about investing current resources in the expectation of uncertain future returns. In these terms, *risk management* and *risk taking* are not opposites, but rather risk taking is an inevitable part of risk management. A firm should adopt a particular risk profile to meet the needs of investors, so risk management is thus central to the strategy of a firm. It is no longer sufficient to manage risk at the individual activity level or in functional silos. A co-ordinated, systematic corporate response is required to address risks that present themselves on a number of fronts as well as isolated high level, high-impact risks.

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To that extent a firm can establish some objectives for risk management. Typical risk management objectives include:

- Achieve target returns on capital invested that at least equal the firm's cost of capital.
- Reduce income or cash flow volatility, so that earnings or cash flow progresses smoothly from year to year.
- Reduce potential variation in balance sheet structure so that the ratio of assets to liabilities (including borrowings) remains consistent year on year.
- Reduce exposure to default on covenanted ratios so that sources of borrowing remain available and cost effective.
- Ensure that analysts' expectations are managed so that the share price provides a fair reflection of the firm's value.
- Ensure that budgets are achieved so that the firm's progress continues as planned.

3 Enterprise risk

In Example 2 above, we saw an instance of Enterprise Risk Management (ERM). Silverdiggers Inc had a finite capacity for risk. Cutting to the chase, it could either take on the silver price risk or the risk from high debt financing, but it could not take on both. This is a reflection of the principles of borrowing, of course, when earnings volatility does not mix with high leverage. Lenders take an ERM view automatically.

Another way to look at ERM is to say that since risk management is directed at uncertainty related to future outcomes, all business activity involves some form of risk management. Risk management is everyone's business, since people at all levels in the firm can provide insights into the nature, likelihood and impacts of risk.

So ERM is a route for all firms to take:

> Risk management is the systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues.

Risk should be managed on a firm-wide basis because:

- the sum of individual risks must meet the needs of the firm's investors, and
- although risks can be identified individually, they frequently interact, so understanding their overall effect requires a firm-wide perspective.

3.1 Interaction of risks

Example 4: Interaction of risks

Silverdiggers Inc has financed its operations in USD, taking on significant amounts of debt. It has fixed the majority of its exposure to the silver price for some years and has also taken on some fixed debt. It is thus exposed to a rise in interest rates on the floating rate element of the debt.

It turns out that there is some link between interest rates and the silver price. In normal economic times, an increase in interest rates tends to lead to an increase in the silver price, as it is seen as a hedge against the inflation implied in the high interest rates. In the crisis times of the early 2010s a different effect has been noticed in which the silver price rises despite low interest rates. This is because investors fear inflation.

Silverdiggers considers this interaction as part of its overall ERM approach.

This approach is reminiscent of the hugely important concept in investment theory concerning diversification. The science of investment theory has long been concerned with diversification, and has produced all sorts of complicated mathematics. The concept is that the overall risk in a portfolio (measured by volatility of returns) can be reduced without sacrificing returns by investing in diversified investments. The key to this lies in the correlation between returns. Returns which are highly correlated obviously do not reduce risk but if investments can be found which are negatively correlated (returns move in opposite directions) then risk can be significantly reduced[2]. This is also the principle behind Value at Risk and its concepts can be applied to ERM. They can be applied mathematically or conceptually.

However, the financial crisis has taught us all a lesson in that this strict mathematical approach has its limitations. The heavily used models did not really deal properly with what happened at the extremes of the distributions, the so called 'fat tails', where the actual occurrence of more extreme results is greater than theory suggests. Some assumptions also clearly did not work. Some of the movements in asset prices or market rates represented standard deviations of around 5 or 6 from the mean, events that should happen only once every several thousand years, and yet they were happening frequently. In addition, correlations changed, and in fact almost all non government assets moved together (i.e. all correlations converged to 1), again in contrast to the data in the models.

Example 5: Market movements

[2] Note that a portfolio in itself need not reduce risk. Individual assets may be positively correlated, and even when negatively correlated, certain combinations of assets may be riskier than others, yet generate the same return.

How often did daily changes in Sterling 3m LIBOR behave in 2008 if one had calibrated models to 3 years of historical data?

Daily change in number of standard deviations from the mean daily change	Events in 2008	Theoretical frequency	Actual compared to Theoretical – a measure of the 'fatness' of the tail
1x	85	80 a year	~1x
2x	50	12 a year	~4x
3x	24	1 every 18 months	~36x
4x	15	1 every 60 years	~900x
5x	7	1 every 7,000 years	~49,000x
6x	3	1 every 2 million years	~6 million x

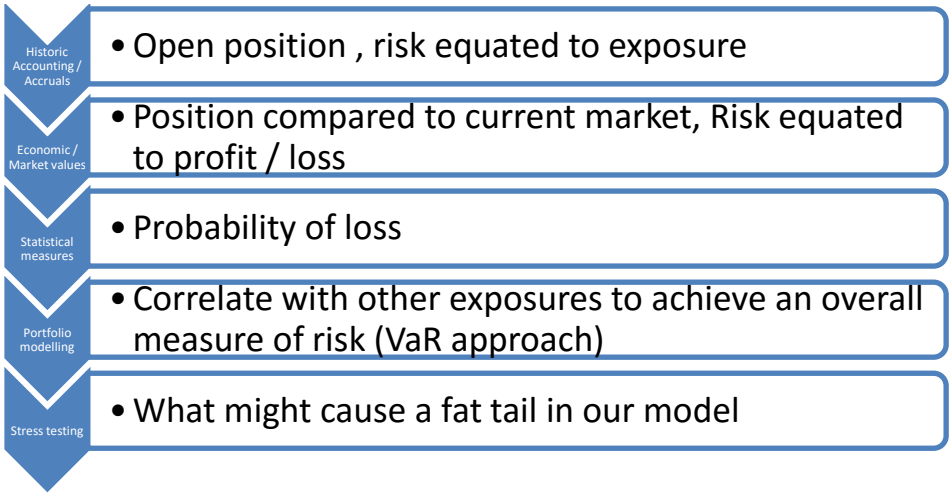
Source: Nomura

The table illustrates the importance of 'fat tails'. The actual occurrence was up to 6 million times 'fatter' than the models predicted.

3.2 Approach to risks

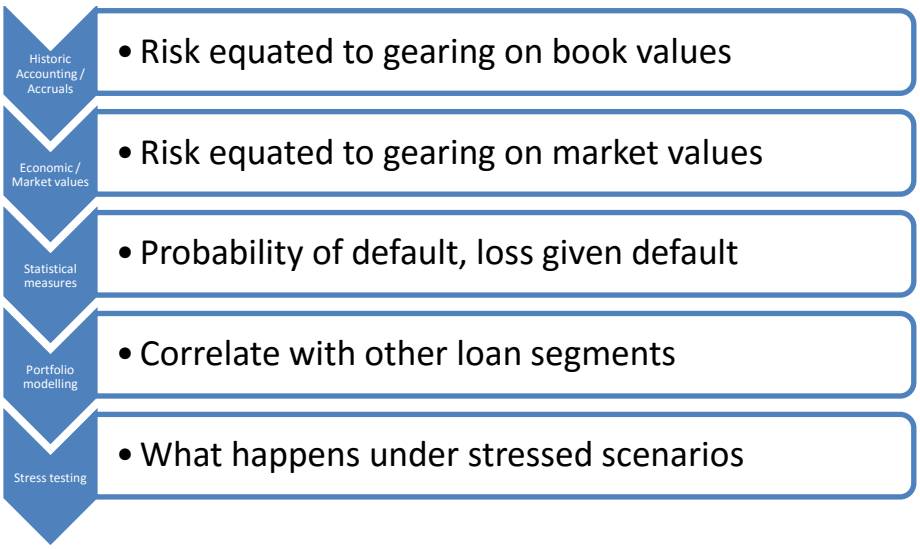
The failure of risk measurement as seen in the financial crisis has led to a further evolution in ERM. Exhibit 2 shows the evolution in the approach to risk measurement in exposure to a market traded instrument, such as foreign exchange. From simple risk measurement as the open position, we move through VaR to a stress testing type of approach, an extension of scenario planning perhaps, and which can be extended to ask the 'reverse stress test' question – what can break us?

Exhibit 2: Evolution of metrics underpinning financial risk management



This is also reflected in a similar approach to risk around credit, showing the stress testing approach in loan portfolios.

Exhibit 3: Evolution of metrics underpinning credit risk management



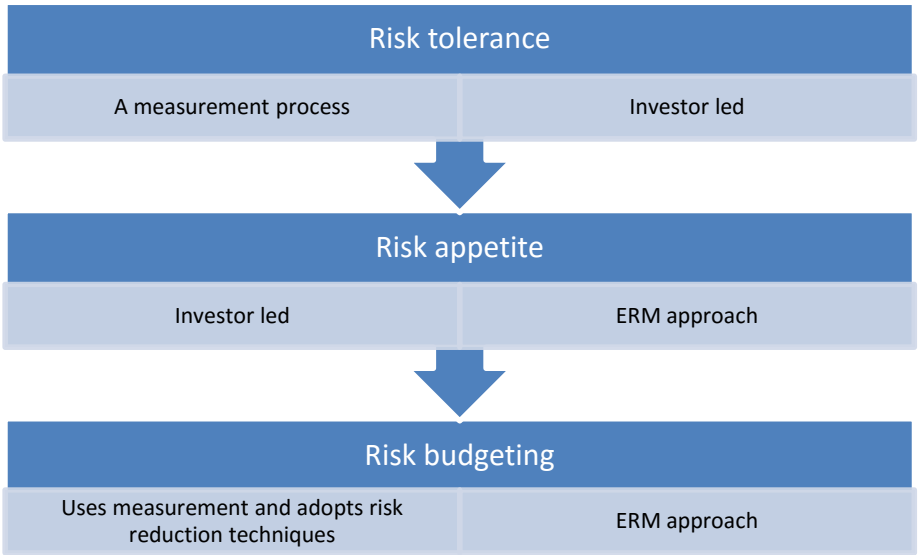
Another way to think about this is around optimisation – an important context for the theory of investment. Portfolios are generally optimised for the expected risk / return reward (as calculated by the copious mathematics available) but with not much regard for what happens at the extremes. There is deepening realisation that risk management is not just about optimisation in managing expected statistical risk but the need to deal with uncertainty. Nassim Taleb in a recent interview, 'Living with Black Swans', commented:

> 'The map into this terrain is quite difficult to follow. You have to avoid having things fail too late. You have to avoid debt because debt makes the system more fragile. You have to increase redundancies in some spaces. You have to avoid optimization. That is quite critical for someone who is doing finance to understand because it goes counter to everything you learn in portfolio theory.... I have always been very sceptical of any form of optimization. In the black swan world, optimization isn't possible. The best you can achieve is a reduction in fragility and greater robustness. You may have heuristics, but not an optimization rule. I hope the message will finally get across because I haven't succeeded yet. People talk about black swans but they don't talk about robustness, which is the real lesson of the black swans.'

3.3 Tolerance, appetite and budgeting

A recent innovation, in language at least, is to talk about risk tolerance, appetite and budgeting. Risk budgeting has been used in the language of pensions risk for several years, as the presentation of risks inside schemes has become more sophisticated, but the concepts of tolerance and appetite are fairly new. Exhibit 4 shows how one leads to another.

Exhibit 4: Risk tolerance, appetite and budgeting



Establishing risk tolerance is all about understanding the view that investors take of the firm. Debt investors have a fairly clear view of the credit capacity of a firm, given its business model. Equity investors, largely sector driven, probably also have a view as to how much risk they want and this leads to the theories of cost of capital in the Capital Asset Pricing Model. Either way, there has to be some methodology to measure investors' risk tolerance.

Risk appetite is again very much a choice for investors. Debt investors enter into a formal contract, where the terms and conditions are all about control of risk in the borrower, by the lender. A highly geared firm is heavily controlled so that, for example (and with limited exceptions), it cannot gear up any more, make acquisitions, make disposals, make large capital expenditure and so on. This is all about risk appetite. Similarly, equity investors will want to understand how much risk their firm is taking, although in the case of equity there is almost always no formal contract. Equity appetite for risk tends to be driven very much by history for more stable firms (blue chips are traditionally seen as less risky) but is considered very carefully in a new or private equity financed firm.

Risk budgeting is the obvious consequence of an exercise in setting risk appetite. It requires measurement of risk but can take into account actions which might be taken to reduce risk.

Exhibit 1: Risk appetite and budgeting

Activity	Risk measure	Risk reduction	Risk budgeted
Business risk	7		7
Foreign exchange risk	4	(2)	2
Interest rate risk	3	(2)	1
Total risk taken	**14**		**10**

In Exhibit 1, a firm, in conjunction with investors, decides its maximum risk appetite is 10, according to some measure. Its total risks amount to 14 and so it takes action to reduce foreign exchange and interest rate risk so that it can meet its risk budget. This might seem a little too simplistic and of course measurement is difficult, but the intention is clear.

In this case, we see risk management as both an enabler and a limiter. The intention in this case is to enable the taking of business risk but limit financial risk.

This highlights the need for some sort of risk measure and suggestions in risk appetite could be around an amount of capital allocated to a process, or an earnings variance, or a liquidity level, or a balance sheet ratio, or a simple monetary amount or change in shareholder value, for example.

To conclude on ERM, firms which are more risk aware have for a long time known that actively managing risk and opportunity provides them with a decisive competitive advantage. Taking and managing risk is the essence of business survival and growth. Firms must:

- understand the risks they take, including how they can compound or reduce them through interaction
- accept and retain the right risks
- choose rationally among risk-taking courses of action.

ERM is thus an approach which (ideally) manages risk on a firm-wide and integrated basis, and is led by *causes* of risk, not its symptoms. A risk management framework can be adapted to each firm's individual needs, including:

- Develop a group level view: what risks do our investors expect us to take?
- Assign group level responsibilities: who is managing which risks?
- Articulate a unifying goal: what is the objective of the risk management process?

4 Risks of trading

We saw earlier how many financial risks follow on from business risk and arise from the trading itself. Other risks arise not from the trading but from the corporate / funding structure (such as interest rate risk in one of its forms). We will first consider the risks of trading.

The financial market risks arising in trading come about because there is a mismatch between input and output costs in some way. Thus goods bought in Euro, valued added in some process and then sold in sterling, creates a risk. Fuel bought in US Dollars and sold as part of the costs of an airline ticket creates risk from either or both of commodity risk (fuel) and foreign exchange risk (if tickets are not sold in US Dollars). These risks also occur if goods are not denominated in the original currency but say, in a sterling price converted on a spot basis from euro, or through a supplier who does the foreign exchange. Risk extends throughout the supply chain and understanding the original composition of goods, labour and other costs through the supply chain can be very useful.

Example 6: A foreign exchange risk that doesn't look like a foreign exchange risk

- The price of petrol in European countries is made up from:
- Cost of the fuel (originally denominated in US Dollars) and converted into domestic currency
- Cost of refining, delivery and retail stations
- Profit of all involved

Despite this, we see the price in our domestic currency. However, retailers change the petrol price according to prevailing rates, so we, the public, are exposed to foreign exchange risk despite never paying any foreign currency to our suppliers.

We can extend the 'classic' types of foreign exchange risk to the general case of trading risks, which could include FX, commodity prices, labour rates, rent, energy, indirect costs and so on, i.e.:

Exhibit 2: Types of trading risk

Type	Definition	Description
Pre-transaction	This is where a price is committed to by a member of a supply chain before commitment by its counterparty	This arises in price lists, tenders and even informal discussions in the supply chain. In some situations previous prices will limit future prices because of psychological limits
Transaction	This is where all elements of the contract are committed and cash flows known.	This is the case for all contracted cash flows, not just those that are invoiced. This is essentially a trivial problem and amounts to adding up contracted items. Note however that it is not trivial in practice – knowing everything that has been agreed is very difficult as it may not be recorded, or if recorded, easy to find.
Economic	The competitiveness of the firm, essentially describing its business model compared to others in the market	This arises where costs bases are different between suppliers. It can be viewed as the risk on the next piece of business to be quoted.

Another sort of risk is not so easy to categorise. Say an airline operating in Europe buys aircraft priced in US Dollars. The price at which it procures the US Dollars is crucial to its competitiveness in the market over the life of these aircraft. The amortisation of this cost (whether in initial conversion, interest costs, lease costs or otherwise) is large in relation to the cost of delivery of seats on services.

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5 Risks of ownership

The financial market risks of ownership broadly comprise:

- interest rate risk
- translation risk
- pensions risk

5.1 Interest rate risk

Interest rate risk is classically the risk that if interest rates rise the interest charge will increase. There are some complications to this rather simple approach, however, and these make interest rate risk more problematical than it first appears.

The first issue is that many firms issue debt in bond markets, where debt is usually issued on a fixed rate basis. If interest rates rise any bonds in issue will not cost more, of course, but new issues will cost more or will raise less in proceeds at the same coupon rate. A more pertinent issue in this case, though, is that bonds in issue will change in price, creating mark to market risk (which also has to be accounted for) and causing redemption of any bonds to change in price. Thus a fall in interest rates will increase the price of bonds and their cost of redemption.

A second issue is that the business itself may perform differently under different interest rate scenarios. A business might do well when economic activity generally rises and interest rates rise. Similarly, when interest rates fall, the business might already be suffering. In those cases, any fixing (or at least high fixing) of interest rates would probably be a poor decision. We thus need to look through the interest rate risk to credit ratios such as interest cover. Some businesses, construction being an obvious one (at least in normal times) do poorly when interest rates are high. This concept, of the duration of business (after the concept in bonds), is not easy to research as so many factors affect business performance and there is the extra complication that the effect on the business may lead or lag the change in interest rates. There may also be regional variations in this, in the euro zone and the United States for example, where one currency spans many different regions and economies.

Thirdly, the yield curve can shift in many different ways. We classically consider a parallel yield curve shift but in fact this is quite rare, and modelling the alternatives can be a challenge. Indeed, with the mix of reset dates on existing debt and its rollovers, there is no exact science here.

Fourthly, the classic response to the perceived riskiness of floating rates is to undertake some fixings, so that some debt is fixed in nature. This merely changes the risk, from exposure to a rise to exposure to a fall in rates, thus risking lack of competitiveness.
Fifthly, interest rate risk also arises in pension schemes, although exposure is typically to longer term rates than to the short term rates affecting normally financed firms.

Finally, the issue of interest rates is most critical to highly leveraged firms, such as infrastructure projects, property companies, project finance and private equity ventures, where in many cases carrying substantial debt is critical to the project. Fixing is often necessary in

these cases, simply on grounds of risk reduction and to anchor at least some parts of the business model. This risk could be considered a risk in trading.

The issue of margin risk should also be mentioned here. Many treasurers have grown up with interest rates of say 5% and margins of say 1% (in order of magnitude). In the 2010s, interest rates are closer to 1% (in the 6-12 month range) and margins are say 2-3%. Margins have reduced in the mid-2010s but that actually serves to increase the risk of them going higher again. The risk in the margin is greater than the risk in the underlying rate and treasurers are not familiar with the tools capable of managing this risk.

5.2 Translation risk

This is another classic ownership risk, where foreign currency denominated profits (or losses) and debt (or cash, or indeed all assets and liabilities) is translated for accounting purposes at average or closing rates respectively. This can cause volatility in reported profits and balance sheet construction, even if the underlying business has no volatility at all. In the case of earnings, it can be argued that this is a simple risk of doing business overseas so that lucrative markets can be tapped; and the immediate cash effect is minimal. So one response is to do nothing and merely report current profits against prior profits with the movement in exchange rates factored out and reported. This is a classic case of a risk being passed to shareholders. A different response, common in the US, is to hedge overseas earnings, often with quite complicated instruments.

Perhaps more importantly these changes in rates can affect credit ratios. A change in the mix of earnings - compared to changes in the value or the cost of debt - can change important credit ratios such as interest cover, net debt / EBITDA and classic gearing ratios. This can become important if covenants are tight.

There are fairly typical responses to this risk, such as managing the currency composition of debt, but they can sometimes be blunt tools in this difficult to model area.

5.3 Pensions risk

This risk is mainly about what have become essentially legacy Defined Benefit (DB) pension schemes, set up for employees in the years after the Second World War, although their history can be traced back to the Great Depression and ensuing high tax rates on income. Although very few new hires now enrol in DB schemes, firms (in this context referred to as ‘sponsors’ of the scheme) still have to provide for those already within them - deferred members and pensioners.

Defined Contribution (DC) schemes also carry risk but nowhere near the same levels as DB schemes. DB schemes are found in the predominantly Anglo Saxon economies of the UK, US, Canada, Australia, New Zealand etc, but also exist in similar forms in some other countries, notably Japan and some European countries. There is no chance to centralise these issues and treasurers (or pension managers) of multinationals find themselves maintaining relationships with actuaries and investment advisers across the globe.

DB schemes are usually managed as an entity separate from the firm and usually have assets set aside to fund pension payments (although state schemes are often an exception to this).

The firm carries the risk that any investments will not provide sufficient cash to fund pensions (i.e. so that the firm then has to make up the shortfall) and the risks are traditionally broken down into:

Exhibit 3: Pensions risk in DB schemes

Risk	Description
Interest rate risk, real and nominal	Future cash flow liabilities (pensions in payment) are discounted back to the present for the purposes of valuation, so a fall in interest rates increases the PV of liabilities. The falls in interest rates in the last decade have increased liabilities dramatically. Pensions are made up of a mix of nominal (inflated) and real-terms cash flows so the exposure is to both real and nominal rates. (Note though that US plans have no COLI (Cost of Living Increase))
Longevity	Pensions are paid for life, so the longer the life, the greater the pension. Increased longevity has caused stress to DB schemes
Investment risk	The assets of these schemes are invested to meet liabilities and where there is no complete match for cash flows, there is investment risk.

Exhibit 4: Longevity risk illustrated

The American civil war ended in 1865, but when was the last payment from an American civil war pension? 1914, 1944, 1974 or 2004?

The correct answer is 2004[3].

William Jasper Martin, despite being on the losing Confederate side, survived the civil war and received his veteran's pension of $50 per month. When he was 81 years old he married Alberta, then 18 years old, and she then lived until 2004, dying at the age of 97. Throughout this period of time she continued to receive her husband's pension benefit as she was entitled to.

Note that the interest rate risk in a pension fund is rather different from the interest rate risk inside the sponsoring firm. There is exposure to real rates in the pension scheme and the liabilities are paid out over 50 years or more (duration (a measure of average maturity) in a typical scheme being 12-20 years) so it is long term rates that matter. There is some overlap between the risks in the scheme and in the sponsor, however.

While there has been a trend for pension fund assets to be invested as more accurate hedges for the cash flows (i.e. investment in bonds and index linked bonds or synthesising their equivalent using swaps), the historical heavy investment in equities still weighs down many funds. This has led to huge asset volatility and deficits remain common.

[3] A Google search will actually reveal a later date.

There is a trend for these schemes to be outsourced and the liabilities taken over in some way by insurance companies, but the regulatory background is tighter for the insurance companies and to achieve this, liabilities are valued much higher than is normally the case for accounting purposes or indeed for pension management purposes. The more relaxed nature of regulation for corporate sponsors leaves many schemes still running off, with volatile deficits and they will remain that way for many years.

The size of some schemes can be large in relation to the firm, by several measures such as volatility of the deficit in relation to overall profitability, liabilities to market capitalisation and so on.

In many jurisdictions, especially the UK, there is a trustee structure which separates the sponsor from the scheme and conflicts of interest can arise if a person sits on both sides of the fence. Despite this, treasurers have useful skills in this area and should not hesitate to use them.

6 Sectoral approach to risk

The financial strategy of firms in similar sectors tends to group together. For example, property companies tend to be financed in a similar way with similar approaches to leverage and similar measures of leverage. Technology companies, similarly, tend to avoid leverage because of the volatility of earnings and the need for financial flexibility. It can be a similar story in the approach to risk where it might be expected that firms in one sector might show a very common approach to risk. Executives tend to move between firms in the same sector so that ideas learnt in one firm will be passed on to the next one, or ideas simply copied as they emerge into the public domain.

It is extraordinarily difficult to research risk and how it is approached in different companies. It is very easy to measure leverage as either classic gearing or as interest cover etc. but very difficult to measure risk. Even the most informative annual reports fail to include any measures of risk at all. Example 9 (on Rolls Royce) below is very discursive on procedures but says nothing on how risky Rolls Royce is compared to its competitors. To that extent and following the conclusion that risk management without measures are useless, then mere disclosure of process is similarly useless.

However, it is the management of risk that will probably actually make the difference between success and failure and the firm successful or not.

Example 7: Differences in approach to risk
Bangers GmbH is a German car manufacturer and its current products are fairly old. It decides to launch two new products at once, both of which are significant design leaps from the existing range. It believes that its marketing skill will mean that launching both products at the same time will show the forward looking nature of the company. The two new cars are also technologically advanced.

Vroom AB is a Swedish car manufacturer and it has a policy of updating its products only gradually, to show that it is a producer of reliable and long lasting cars which will not go out of fashion. It updates only one model at a time.
Bangers clearly has a greater appetite for risk than Vroom but the appetite is clearly heavily connected with the whole nature of either company and its approach to the market.

In Example 7 both firms are in the same sector and so both face roughly the same risks, although they will differ if, for example, they operate in one part of the market, say small cars compared to luxury cars. It is how the two firms manage the risks that will differentiate them.

6.1 Financial risks of trading by sector

Where there is a financial risk in a trading situation we can expect behaviour to group together within one sector.

Example 8: Differences in approach to financial risk in trading
Three airlines operate in the low cost market for vacation flights in East Asia. Competition between the three is based almost entirely on price although there is some brand loyalty. Fuel is clearly a significant cost of operations and the difference in fuel cost can be a major reason for different pricing. It is possible to hedge the cost of fuel some way in advance and in this way gain a price advantage over competitors. However, as soon as one airline hedges fuel cost, it will have a different outcome on costs to the other two. If two airlines hedge fuel cost, then the third will have a different outcome on costs. Accordingly, the behaviour tends to group together with a similar policy from each airline.

6.2 Financial risks of ownership by sector

In general, there is no reason why the treatment of risks such as translation risk, interest rate risk and pensions risk should be similar by sector. The views of individual CFOs or treasurers and their boards are likely to dominate any influences from the peer group. Indeed, the peer group may be multinational and other influences will start to appear. However, we can notice, for example, that utilities tend to group together with their treatment of interest rate risk, although there may be regulatory influence which is dominant in such cases together with commonality in financing techniques, which itself drives financial strategy.

7 Governance and culture

Risk, return and shareholder value are inextricably linked, and because of this, risk management policy and control has to begin at the top. The Board of the firm is the representative of shareholders; it has the ultimate responsibility for risk management and it should have the expertise and experience necessary to execute its responsibility.

However, the Board cannot conduct risk management on its own. It must decide what it must reserve for itself and what it must delegate. Remember that risk management is about enabling risk taking as much as about limiting risk. Typically, the Board sets strategic targets for the firm and ensures, via strict controls, that any delegated goals are actually achieved within the centrally mandated guidelines. However, the pressure is now on management (i.e. Boards) to show what it is doing on risk management. In the UK, the Financial Reporting

Council (FRC) has published the Corporate Governance Code which has the following in the section on the Code on Accountability.

Exhibit 4: UK Corporate Governance Code – Section C – Financial and Business Reporting

Main principles	The board should present a fair, balanced and understandable assessment of the company's position and prospects. The board is responsible for determining the nature and extent of the significant risks it is willing to take in achieving its strategic objectives. The board should maintain sound risk management and internal control systems. The board should establish formal and transparent arrangements for considering how they should apply the corporate reporting and risk management and internal control principles ...
C.1.2	The directors should include in the annual report an explanation of the basis on which the company generates or preserves value over the longer term (the business model) and the strategy for delivering the objectives of the company.
C.2.1	The directors should confirm in the annual report that they have carried out a robust assessment of the principal risks facing the company, including those that would threaten its business model, future performance, solvency or liquidity. The directors should describe those risks and explain how they are being managed or mitigated.

The words 'the significant risks it is willing to take in achieving its strategic objectives' is a push towards the concepts of risk appetite. It may therefore be that boards must retain more control over risk and one model[4] argues that boards should retain control over the following aspects of risk:

- approval
- measurement
- monitoring
- learning

A common model for boards to take is that risk management tasks are delegated to a sub-committee of the Board, usually called the Risk Management Committee (RMC) – or an equivalent name. The RMC is made up of selected Board members together with senior managers; its exact composition will depend on the business and its sector, but typically might include the chief risk officer (if appointed), the chief financial officer, the corporate treasurer, the operations director, a non-executive director, the compliance officer / head of internal audit, and perhaps also the chief executive.

[4] Risk Appetite and Tolerance, Institute of Risk Management, September 2011. This paper is attached as further reading 4.1.2a.

Whether risk management is managed in quite this way will naturally depend upon the business of the organisation, and its size or geographical scope. Financial institutions have committees with similar terms of reference, such as the Asset and Liability Committee or the Capital Adequacy Committee. Fund managers may have equivalent units called the Investment Advisory Panel or some similar name.

The role of an RMC is to establish an overall risk management direction, a clear vision for risk management which is supported by policies and operating principles.
A risk management policy guides employees by:

- Describing the risk management process.
- Establishing roles and responsibilities.
- Providing methods for managing risk.
- Establishing how both the objectives and results of risk management practices are to be evaluated.

The RMC must strike a balance in its approach to risk between risk taking and risk aversion. Where it is risk hungry it might allow empowerment, with significant delegation and reporting by exception, whereas in areas of risk aversion, it will require significant sign offs and regular reporting. This highlights the issue where a firm may have different risk appetites for different risks. It may, for example, be aggressive on pushing new commercial products but risk averse on foreign exchange risk.

Risk management policy is becoming increasingly important for all firms. As well as the Corporate Governance Code (applying to UK quoted firms and their foreign equivalents), where regulation requires firms to disclose more information about their risks and the actions being taken to control them, accounting standards are also pushing at this door. For instance, International Accounting Standards 32 and 39, together with International Financial Reporting Standard 7 require accounting for and disclosure of risk issues.

Increased volatility within traditional treasury areas (e.g. commodity prices, interest rates or exchange rates) has led to a greater profile for treasury in risk management. Functions such as insurance, pensions and business continuity have been reallocated to treasury from other functions because of treasury's established expertise in risk management.

Because risk is about potential upside as well as downside, risk management encompasses both:

- strategic elements which will be set by the Board (e.g. what markets to enter, whether to grow the business organically or by acquisition, what financing profile best supports the business); and
- tactical and operational elements which will typically be delegated to the CFO or treasurer (e.g. selection of counterparties, timing of action in the markets, selection of borrowing instruments to support the business).

Risk management is thus both about encouraging the taking of selected risks (empowerment) and about minimising other risks (limiting power); but in either case it is also about control.

Measurement will be a key feature of the new risk world because without it, it would be almost impossible to make meaningful statements about risks. This is a challenging area but some principles are emerging. Notably, to add to the familiar Key Performance Indicators (KPIs), is the emergence of:

- Key Risk Indicators (KRIs)
- Key Control Indicators (KCIs)

These new indicators are seen as very much working at the tactical or operational level but no doubt they will be seen at a more strategic level in the same way that KPIs have rather been hi-jacked to become standard reporting measures.

7.1 Delegation

The RMC should meet periodically to review the state of the organisation's exposures or to consider new situations that need senior management attention or decisions. On a more day to day basis (or week to week), the monitoring and maintenance roles can be delegated to more specialist committees, addressing different functional areas of risk management.

Therefore, as far as financial risk is concerned, there may be a foreign exchange committee and an interest rate committee, and there may well be others. For instance, the foreign exchange committee might comprise the CFO, representatives from the major business units, the treasurer, and senior staff from treasury's currency and analysis areas. Primary reporting of exposures and action taken should be to the specialist committees from the corporate treasurer.

Example 9 shows how risk management works at Rolls Royce. We have yet to see how risk is measured but you can see that many important aspects of risk management have been adopted - and note the existence of a financial risk committee. Note that this is not the latest comment on risk from Rolls Royce but the more recent ones are, if anything, less illuminating.

Example 9: Risk management at Rolls Royce

Specific committees have accountability for reviewing certain categories of risk. The financial risk committee reviews credit, market or liquidity risks. The ethics committee reviews those risks with a significant ethical dimension.

The risk committee has developed a risk policy which states that risk management is a part of every manager's responsibility and is to be embedded within the day-to-day activity.

Risks, including those to the Group's reputation, are considered under four broad headings:

- business environment risks;
- strategic risks;
- financial risks; and

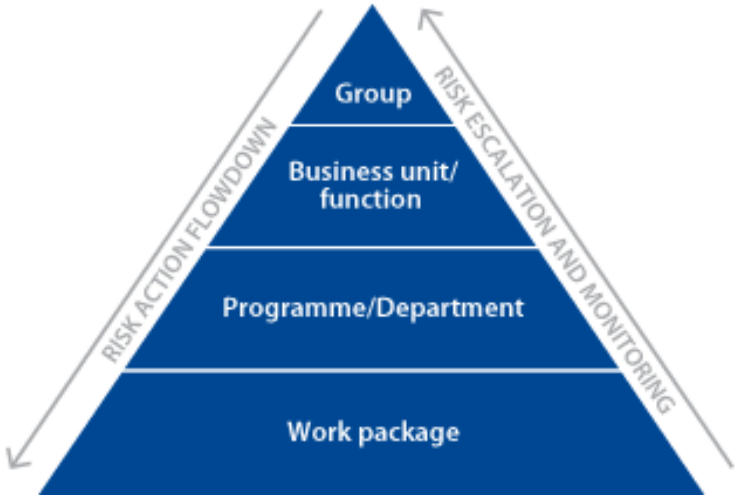
- operational risks.

RISK MANAGEMENT PROCESS

Rolls-Royce takes a proactive approach to the management of risk and recognises the risk management process as fundamental in achieving its business objectives. Throughout the Group, risks are identified, assessed and managed through an established structured approach. The Board has reviewed the risk management process and confirms that ongoing processes and systems ensure that Rolls-Royce continues to be compliant with the Turnbull guidance as contained in 'Internal Control: Guidance for Directors on the Combined Code'.

THE RISK MANAGEMENT PROCESS

THE RISK ESCALATION STRUCTURE



Risks are defined as threats to the achievement of business objectives or to the continuing reputation of the Group. As part of the business cycle, each part of the Group is required to identify and record key risks together with appropriate treatment activities. Risks are documented in a framework of risk registers and are regularly reviewed and updated by management.

The process provides methods for escalation and aggregation at every level of the business; delegation to the appropriate levels within the organisation ensures that risk and treatment actions are owned, defined, resourced and effective. The top-level corporate risk register is an aggregation of lower-level risk registers from where risks are escalated to be reviewed by the Board. The Board also considers these risks in the context of the Group's business strategy.

This ongoing process has been in place during 2010, up to and including the date of approval of this Annual report contained within it.

Management has continued to perform comprehensive risk reviews for all major programmes, including business change plans. Independent gated reviews are conducted where key risks and mitigating actions are identified and reported to management for incorporation into programme plans. The risk management process places significant emphasis on learning from and sharing prior experience.
Rolls Royce plc, Annual Report 2010

There is a danger with a committee structure of the type described here that risks become isolated and 'siloed'. So by establishing a financial risk committee to look at interest rate risk, for example, then the link between interest rates and business performance may be broken. It is quite possible for enterprise risk to increase in these cases. For example, the financial risk committee may make interest rate decisions completely on the basis of the yield curve or the amount of debt held, ignoring the performance of the business itself under different interest rate scenarios. If the two are in fact linked in any way, then overall risk may well increase.

7.2 Informational requirements

Making decisions requires information, from both the external economic and market environment and the organisation's internal resources. Indeed the Institute of Risk Management put *data architecture* and *data governance* squarely as a key element of measurement.

External information

External assessments and forecasts are required to inform decisions, for example about economic indicators or aspects of financial markets priced into current asset and derivative pricing. However, treasurers should beware of forecasts of such prices when making risk decisions. Forecasts may follow the consensus; they may simply replicate the then current forward rates; or they may attempt to grab headlines by going out on a limb and eventually being the only one to call correctly an unexpected market move. Many a poor decision has been made on the back of 'sure fire' or 'certain' forecasts.

Few organisations are of the size to maintain specialist economic staff of their own. Instead they will rely on external market analysis and media sources. This means that they are reliant on the views of others. There are dangers implicit in either maintaining specialist economic staff, or in employing externally sourced advisors. In either case the 'herd effect' can arise, where the advisor follows the consensus view, rather than doing their own research. External advisors' advice may be coloured by the trading positions of their organisation, or the culture

of their firm. Internal advisors' advice may be coloured by, for example, their firm's culture (particularly if it is a 'good news' culture), or their relationship with their superiors.

Internal information

The deliberations of the RMC and its specialist committees have to be informed by adequate and timely information flows. This requires an adequate internal reporting environment in conjunction with software sufficient for the intended functions such as treasury and risk management systems.

It should always be remembered that information flows are two way, from the top down and from the bottom up. Senior staff have to know what their line staff are doing and junior staff should have clear guidelines as to what is required, and training on how to do it. Trouble sometimes arises when junior staff have too little involvement with their management, and are then reluctant or fearful to report mistakes or misunderstandings. It is vital that the outcome from all treasury activity is identified and reported, however unfavourable, so that the adverse results can be dealt with before they become disastrous.

Example 10: Committees must be effective

In late 2003, National Australia Bank was reported to have lost an estimated AUD360 million in unauthorised foreign exchange derivatives dealing. According to the official post mortem report by PricewaterhouseCoopers, a group of four options and futures traders in the Melbourne and London dealing rooms had been
concealing losses for some time (two or more years) via such devices as incorrectly reporting genuine transactions, entering false transactions, and using incorrect revaluation rates.

In September 2003, the bank paid them AUD790,000 in bonuses.
All this took place in spite of no less than five risk management committees. Three of these were at executive level, and two at Board level (a Board risk committee and the audit committee). So what went wrong?

Partly it was a matter of bad systems. An instance was that the traders were evidently allowed access to the valuation pricing models used by middle office for the FX options, which amongst other things resulted in over-pricing of out of the money options. In this respect, the basic tenet of operational risk – segregation of duties – was ignored.

Partly it was not sticking rigorously to accepted rules, such as prolonged trading limit excesses.

But mostly it was a matter of not paying attention to a series of signals. The most egregious of these was an early adverse report by the Australian Prudential Regulation Authority (APRA), which was actually passed to the audit committee. Other missed signals included some critical internal audit committee reports, unreconciled position reports, and counterparty expressions of concern at large and unusual trading.

In their report, PwC drew attention to a preoccupation with process rather than substance, which suggests that too much formalism can distract from understanding. Reading between the lines, there seems also to have been a 'good news culture', which suppressed the

reporting of bad news. Once again, this demonstrated the need to ensure that staff incentives are correctly aligned with the welfare of the institution as whole.

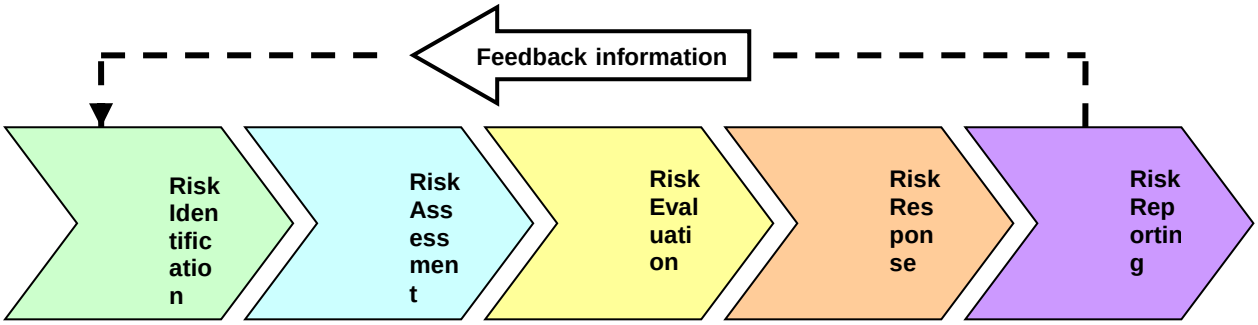
8 The risk framework

Risk management is: 'the systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues'. Therefore:

> A Risk Management Framework provides an organisation with a mechanism to develop an overall approach to manage risks by creating the means to discuss, compare, evaluate and control substantially different risks.

A risk management framework can be seen as a series of phases, each of which progresses on from the previous phase.

Exhibit 2: A risk management framework



Risk Identification — This is the definition, identification and classification of a firm's risk exposures and their sources. The risk identification phase includes a thorough analysis of the business in the context of its strategy (this can be described as a separate phase 'Business Analysis', but is include here as part of risk identification). Risks may arise from external influences (such as changing demand for the firm's products or volatile foreign exchange rates) or from internal influences (such as plant failure). Although we are primarily concerned with the financial consequences, the source of these financial consequences may be from almost any other (financial or non-financial) activity within the firm. Once identified, risks are logged in a risk register.

Risk Assessment — This is an initial assessment of the likelihood of each risk occurring and of its potential impact. A useful way of quantifying the assessment is to plot each risk on a matrix according to its likelihood and potential impact. This enables risks to be prioritised, so that those risks with most potential to damage the firm are tackled first.

Risk Evaluation — In this phase, risks are evaluated or quantified in more depth in priority order to establish the probability of potential loss and the materiality (financial cost). Evaluation techniques such as scenario analysis, stress testing, reverse stress testing, sensitivity analysis and value-at-risk are used to evaluate probabilities and potential impacts both for single risks, and groups of risks combined.

Risk Response — Once risks have been evaluated, the responses to them can be planned and implemented. At the top level, risks can either be avoided or accepted. A risk can only be genuinely avoided by not entering into business that generates that risk. Avoiding a risk is an appropriate response if the cost of controlling that risk is more than the expected return from accepting it. The risks that are accepted can be retained, reduced or transferred. The firm is expected to take core business risks, so these risks are retained and monitored but perhaps limited in some way. Risks peripheral to the core business risks can be reduced (through internal methods of diversification, control or business tactics), or transferred to external parties (through the use of derivatives (as in hedging), insurance or subcontractors). The response to a particular risk will vary depending on the chosen strategies of the firm.

Risk Reporting — This phase helps ensure that risks are being managed as agreed, e.g. that methods and instruments are being properly applied and to check that the responses are having the desired effect. Deviations between targets and actual performance are analysed to identify the causes and information is fed back in to the risk management process.

Firms may vary these basic phases and supporting tasks to suit the requirements of the firm, but any framework for managing risk should be a focused, systematic and integrated approach that recognises that *all* decisions involve management of risk, whether in routine operations or for major initiatives involving significant resources. And having a consistent approach to risk management within the firm helps bring information together in order to deal with risk issues at the overall corporate level.

The feedback loop – the reviewing of risk management outcomes compared to plan – is vital within the risk management framework so that risk management practice evolves to keep pace with developments in the business and in the outside world. This is a fundamentally important step because, as risks are managed and acted upon, then the profile of risk can change; the management of one risk can create a different risk. A good example to look out for concerns currency risks in the balance sheet of an international business and in the income statement of that business. If for example it is decided that one way to manage a currency imbalance is to raise debt in that currency so that revenues can be used for servicing and repayment; then the feedback loop would raise the issue that there is now a currency debt on the balance sheet which can expose the company to a new form of risk.

There is a danger with a risk framework similar to that seen under the committee structure. By treating risks individually, or isolated and ‘siloed’, we move away from an ERM approach and

tend to ignore interactions between risks. There should be some way of bringing them together which is easy to operate.

Note how this framework fits in with the approach taken in the UK Corporate Governance Code (the UK Code) and by the IRM's Paper on Risk Appetite and Tolerance:

- Approval (IRM) and 'the significant risks it is willing to take in achieving its strategic objectives' (UK Code) corresponds broadly with the 'Identify' phase
- Measurement (IRM) corresponds broadly with the Assess and Evaluate phases
- Monitoring (IRM) corresponds broadly with the Response phase
- Learning (IRM) corresponds broadly with the Feedback step.