

Managing Interest Rate Risk

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Executive Summary

- Interest rate risk can manifest itself in several different ways.
- It is best managed within the context of the firm and a risk framework.
- Proper evaluation or measurement is key.
- Selection of a good key performance indicator is essential.
- A typical response to interest rate risk is a transfer of risk to another party.
- Many risk transfer tools are available, of which interest rate swaps are the most popular.
- The risk is usually transformed rather than eliminated.

Introduction

Almost all firms are exposed to interest rate risk, but it can manifest itself in different ways. A proper response to this risk can only come following a full understanding of the context of the firm and its strategy, along with a full evaluation of the risk. Firms should generate a well thought out key performance indicator (KPI) and then apply one or more of the many tools available in the market to transfer interest rate risk.

Major Ways That a Firm Can Be Affected

Interest rate risk is the exposure of the firm to changing interest rates. It has four main dimensions:

Changing Cost of Interest Expense or Income

Companies with debt charged at variable rates (for example, based on Libor, and also called floating rates) will be exposed to increases in interest rates, whereas companies whose borrowing costs are totally or partly fixed will be exposed to falls in interest rates. The reverse is obviously true for companies with cash term deposits. This is usually the key risk that firms consider.

Impact on Business Performance by a Changing Business Environment

Changes in interest rates also affect businesses indirectly, through their effect on the overall business environment. In normal times, for example, construction firms enjoy a rise in business activity when interest rates fall, as investors build more when the cost of projects is lower. Conversely, some firms may benefit from high levels of activity that prompt a high interest rate response by central banks. So some firms may have a form of natural hedge against the other forms of interest rate risk, although for any one firm the effect may lead or lag actual changes in rates.

Impact on Pension Schemes Sponsored by the Firm

Pension schemes that carry liability and investment risk for the sponsor have interest rate risk in that liabilities act in a similar way to bonds, rising in value as interest rates fall and vice versa.

Changing Market Values of Any Debt Outstanding

Although a nonfinancial firm will usually report its bonds on issue in financial statements, at substantially their face value, early redemptions must be done at the market value. This may be significantly different, as interest rates will change the value of fixed-rate debt. This risk is not commonly considered by most nonfinancial firms.

Interest Rate Risk in the Context of the Firm

Investors do expect firms to take risks, especially with regard to their core business competencies. It may be that investors expect the firm to take interest rate risk. On the other hand, investors would probably not expect a firm to breach a financial covenant because of rising interest rates.

Risk Management Framework

A risk management framework includes the following key stages:

- Identification and assessment of risks;
- Detailed evaluation of the highest risks;
- Creation of a response to each risk;
- Reporting and feedback on risks.

Evaluation is crucial to the management of interest rate risk and will discover exactly how a firm might be affected, thus guiding the response to the risk. Evaluation techniques include: sensitivity analysis, modeling changes in a variable against its effect; and value at risk (VaR) analysis, based on volatilities to calculate the chances of certain outcomes.

Let us look at a simple firm with earnings before interest and tax (EBIT) of 100, borrowings of 400 (all on a floating rate), an interest rate of 6% (as a base case), and a tax rate of 30%, and apply some of these techniques.

Evaluation 1: Sensitivity Analysis

A 1% move in interest rates has an effect of 4 (1% of 400) on the annual interest charge. This is not very helpful because there is no context for the effect.

Evaluation 2: Sensitivity Analysis

A table can be constructed to show the effect on earnings and interest cover (Table 1). In the table items in bold represent the base case, whereas other columns represent the sensitivities to this base case. Earnings are earnings after interest and tax.

Table 1. The effect of interest rate changes on earnings and interest cover

Interest rate	4.5%	5.0%	5.5%	6.0%	6.5%	7.0%	7.5%
EBIT	100.0 (18.0)	100.0 (20.0)	100.0 (22.0)	100.0 (24.0)	100.0 (26.0)	100.0 (28.0)	100.0 (30.0)
Interest Tax	<i>(24.6)</i> 57.4	<i>(24.0)</i> 56.0	<i>(23.4)</i> 54.6	(22.8) 53.2	<i>(22.2)</i> 51.8	<i>(21.6)</i> 50.4	<i>(21.0)</i> 49.0
Earnings	5.56	5.00	4.55	4.17	3.85	3.57	3.33
Interest cover							

This is much more helpful, showing the effect on both earnings and interest cover. If the firm has an interest cover covenant of, say, 3.75, then the table shows a high risk of a breach, depending on how likely a rise in rates might be.

Evaluation 3: Sensitivity Analysis

Suppose now that EBIT displays volatility. We can construct a further table (Table 2) showing interest cover under variations in EBIT and the interest rate. Italic numerals indicate a covenant breach, and the number in bold is the base case described in Table 1.

Table 2. Interest cover under variations in EBIT and interest rate

Interest rate	4.5%	5.0%	5.5%	6.0%	6.5%	7.0%	7.5%
EBIT							
80 85 90	4.44 4.72	4.00 4.25	3.64 3.86	3.33 3.54	3.08 3.27	2.86 3.04	2.67 2.83
95 100 105	5.00 5.28	4.50 4.75	4.09 4.32	3.75 3.96	3.46 3.65	3.21 3.39	3.00 3.17
110 115	5.56 5.83	5.00 5.25	4.55 4.77	4.17 4.38	3.85 4.04	3.57 3.75	3.33 3.50
120	6.11 6.39	5.50 5.75	5.00 5.23	4.58 4.79	4.23 4.42	3.93 4.11	3.67 3.83
	6.67	6.00	5.45	5.00	4.62	4.29	4.00

A drop of 5 in EBIT and a rise of 0.5% in interest rates will cause a breach, a clear risk factor for the firm. If a relationship between EBIT and interest rates can be established, then further conclusions could be drawn.

Sensitivity analysis does not show the probability of these changes, but if they are available—for example from a study of market volatility—a probability distribution for a covenant breach can easily be obtained.

Evaluation 4: VaR

Suppose that investigation of the assets and liabilities in the firm's pension scheme shows that the scheme has a deficit of 50. As an illustration, VaR might tell us that, based on the volatility of the long-term interest rates used to calculate liabilities, and taking into account that the scheme has some bond investments (in which value moves are opposite to liabilities), there is a 1 in 20 chance that the deficit will increase in the next year, because of interest rate changes alone, by 15 or more.

Interest rate risk inside a pension scheme (or other scheme for future employee benefits) often dwarfs interest rate risk inside the firm.

Evaluation should reveal where a firm is sensitive to interest rates. It could be:

- Earnings, perhaps where earnings per share (EPS) is an important issue.
- Cash flow.
- Interest cover ratios, perhaps because of financial covenants.
- Other ratios, such as those used by credit rating agencies.

Establishing a KPI and Response to the Risk

Evaluation should lead the firm to establish a key performance indicator (KPI) for interest rate risk. A good example of a KPI would be: *Interest cover to be greater than 3.75, on a 99% confidence basis, over an 18-month period.* This is better than using a simple interest cover ratio or a fixed/floating ratio as a KPI, because it speaks specifically about the risk to the firm.

The KPI should guide the response to the risk. Possible responses include:

- Avoid: It is hard to avoid interest rate risk.
- Accept: Simply accept the risk and take no further action. This may be suitable if there are no significant issues such as proximate financial covenants.
- Accept and reduce: It may be possible to reduce the risk through internal actions, such as reducing cash balances as far as possible to repay debt.
- Accept and transfer: Many market products are available that enable a firm to change the character of interest payments. This process is called hedging.

Establishing a Policy

The factors we have seen should be formalized in a policy, as should approaches to all risks. The policy should set out:

- The overall direction of the policy.
- How the risk is to be measured.

- Who has responsibility for the risk management.
- What procedures should be in place to control the risk.
- A framework for decision-making.
- The key performance indicator.
- A reporting mechanism to view the performance of the policy.

Tools Available to Transfer Interest Rate Risk

There are a large number of tools available for the transfer of interest rate risk (Table 3).

Table 3. Tools that can be used to transfer interest rate risk

Tool	Description	Comment
Forward rate agreement (FRA)	An FRA is a tool for fixing future interest rates (or unfixing them) over shorter periods, up to say 1-2 years	A 3v6 FRA allows a firm to fix the three-month Libor (or other reference) rate in three months time. It is dealt over the counter (with banks)
Future	Futures have the same function as FRAs.	Futures are traded on an exchange, and thus have less flexibility.
Cap	A cap is an option instrument. The buyer of a cap pays a maximum interest rate over the life of the cap but enjoys lower rates as they come down. Caps have a premium.	Caps are usually dealt over the counter by firms, and the classic use is for a borrower to buy a cap that is higher than current interest rates, thus providing insurance for the borrower.
Floor	A floor is an option instrument. The buyer of a floor receives a minimum interest rate over the life of the floor but enjoys higher rates as they increase. Floors have a premium.	Floors are usually dealt over the counter by firms, and the classic use is for a depositor to buy a floor that is lower than current interest rates, thus providing insurance for the depositor.
Collar	A collar is a combination of a cap and a floor, thus providing a firm with a corridor of possible interest rates between a maximum and a minimum.	A borrower would buy a cap and sell a floor, usually over the counter, thus creating a "collar," or corridor, of rates.
Interest rate swap	An interest rate swap is probably the most widely used and popular risk transfer instrument in the field of interest rate risk. It changes the nature of a stream of interest payments from floating to fixed or vice versa.	Swaps (as they are usually called) are dealt over the counter and the market is large and (usually) deep. Terms of 5 to 7 years are common with nonfinancial firms, although terms of 30 or more years are often used by pension schemes, reflecting their different maturity horizon.
Swaption	A swaption is an instrument where the buyer of a swaption has the right to enter into an interest rate swap at a particular rate, thus protecting the buyer against adverse movements in long-term	Swaptions are not very popular with nonfinancial firms but might be used near the time of bond issues, for example.

rates, while allowing him to benefit from favorable moves.

Interest Rate Swap

This key instrument deserves a little more explanation. It is an instrument that, in its usual form, transforms one kind of interest stream to another, such as floating to fixed or fixed to floating. Each swap has two counterparties, and therefore in each swap one party pays fixed and receives floating, while the other party receives fixed and pays floating.

There are two classic uses of swaps by nonfinancial firms:

- *A floating-rate borrower converts to a fixed rate.* In this case a borrower has floating-rate bank debt and carries out a pay-fixed swap, converting the debt to a fixed rate. This is shown diagrammatically in Figure 1. The two floating-rate streams cancel each other out for the borrower, leaving it to pay only a fixed-rate stream.

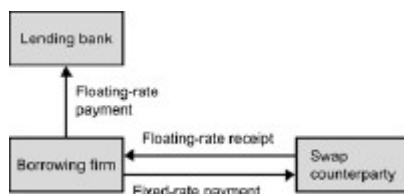


Figure 1. Floating-rate borrower uses swap to convert to a fixed rate

- *A fixed-rate borrower converts to a floating rate.* In this case a borrower has fixed-rate bond debt and undertakes a receive-fixed swap, converting the debt to a floating rate (Figure 2). The two fixed-rate streams cancel each other out for the borrower, leaving it to pay only a floating-rate stream.

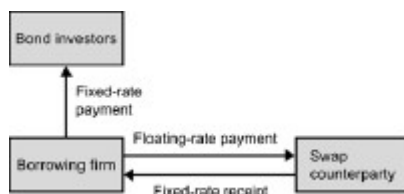


Figure 2. Fixed-rate borrower uses swap to convert to a floating rate

Let's suppose that our firm from above has responded to the risk of covenant breach by deciding to enter into a pay-fixed swap for 75% of its borrowing. It will pay 6% on the fixed-rate leg of the swap. The interest cover table we considered in Table 2 is now as shown in Table 4.

Table 4. Interest cover under variations in EBIT and interest rate for firm that pays fixed swap (see text for details)

Interest rate							
	4.5%	5.0%	5.5%	6.0%	6.5%	7.0%	7.5%
EBIT							
80 85 90	3.56 3.78	<i>3.48 3.70</i>	3.40 3.62	3.33 3.54	3.27 3.47	3.20 3.40	3.14 3.33
95 100 105	4.00 4.22	3.91 4.13	3.83 4.04	3.75 3.96	3.67 3.88	3.60 3.80	3.53 3.73
110 115	4.44 4.67	4.35 4.57	4.26 4.47	4.17 4.38	4.08 4.29	4.00 4.20	3.92 4.12
120	4.89 5.11	4.78 5.00	4.68 4.89	4.58 4.79	4.49 4.69	4.40 4.60	4.31 4.51
	5.33	5.22	5.11	5.00	4.90	4.80	4.71

The italicized cells (covenant breach) now cover the width of the table but are less deep. Our firm has a lower risk of a breach from interest rates alone but has increased the risk from a falling EBIT. As interest rates are believed to be more volatile than EBIT, the overall risk to our firm has been reduced through the transfer of risk.

Fixing Products versus Options

There is a key difference between interest-rate-fixing products (such as swaps) and options. A fixing instrument binds its user to the rate that is set when it is transacted. An option allows the buyer to walk away. So a firm taking out a pay-fixed swap, following which rates decline, is left paying the higher rates. The risk is thus transformed, rather than transferred. Exposure to rising rates has become an exposure to falling rates. Firms must be clear about this when establishing their response to risk.

Accordingly, option products may seem to be an ideal product to deal with interest rate risk, and for those prepared to pay, they can be. However, costs rise with two main factors:

- Time: The longer an option has until expiry, the higher the premium.
- Volatility: The higher the volatility in the underlying risk being hedged, the higher the premium.

Both these factors tend to deter firms from using options, and for the longer-term risk transfer-response interest rate swaps are usually the instrument of choice.

Conclusion

The effects of changes in interest rates on a firm can be complex, but techniques are available to evaluate and respond to any risks this presents. A clear reference back to business and financial strategy will put interest rate risk in its context, allow a suitable response, and help the firm to achieve its goals.

Making It Happen

- Assess how the firm is affected by changes in interest rates.
- Evaluate the risk according to the firm's strategy, using tools such as sensitivity analysis or VaR.
- Establish a key performance indicator for the risk.
- Choose whether to avoid or to accept the risk.
- If the choice is to accept, either:
 - accept and reduce; or
 - accept and transfer, such as with interest rate swaps or options.
- Make frequent reports to give feedback on the risk.

More Info

Books:

- Buckley, Adrian. *Multinational Finance*. 5th ed. Harlow, UK: Pearson Education, 2004.
- Chapman, Robert J. *Simple Tools and Techniques for Enterprise Risk Management*. Chichester, UK: Wiley, 2006.

Websites:

- Association for Finance Professional (AFP): www.afponline.org
- Association of Corporate Treasurers (ACT): www.treasurers.org
- National Association of Corporate Treasurers (NACT): www.nact.org

See Also

Best Practice

- [Dangers of Corporate Derivative Transactions](#)
- [A Total Balance Sheet Approach to Financial Risk](#)
- [Using Structured Products to Manage Liabilities](#)

Checklists

- Hedging Interest Rate Risk—Case Study and Strategies
- Swaps, Options, and Futures: What They Are and Their Function
- Understanding and Using Interest Coverage Ratios
- Understanding and Using Interest Rate Swaps
- Understanding Asset–Liability Management (Full Balance Sheet Approach)
- Understanding Key Performance Indicators

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