STAFF PAPER

12 October 2011

Capital Markets Advisory Committee Meeting

Paper topic	**Risk-free rate of return**

Purpose of this paper

1. With the lowering of the credit standing of some governments around the world, some are concerned about how the concept of a 'risk-free rate' applies in the valuation of assets and liabilities.

2. We thought it would be interesting to get CMAC members' views on how recent events might affect the Board's selection of discount rates in the future, or cause it to reconsider where risk-free rates are currently used.

3. This paper:

   (a) gives an overview of what the risk-free rate represents in theory, and gives some alternatives that have been suggested; and

   (b) shows where risk-free rates are used in IFRSs.

4. The attachment to this paper is a recent report from Morningstar on a methodology for calculating an international cost of capital. Although the report takes the perspective of a US investor, the principles in the report arguably would apply to investors in any country with highly-rated government debt.

What is the risk-free rate?

5. The risk-free rate in theory reflects inflation expectations plus an investment return on guaranteed principal. That is, it reflects the time value of money with no risk of non-payment. Generally, the debt of countries with highly-rated government debt (eg the US or the UK) have been considered to be 'risk free'.

The reason is that governments can print money and raise taxes to cover their debt payments.

6. Risk-free rates are used in valuations in various ways:

   (a) It might be the rate used to discount future cash flows when there is no uncertainty about the timing or amount of those cash flows. Similarly, it might be used as an input in an option pricing model because it is assumed that price movements in the underlying asset can be hedged, so price volatility is known and constant (ie there is no risk).

   (b) It might be the benchmark rate used to discount future cash flows, but is adjusted to reflect risk (eg credit risk for a debt instrument). A common example in equity valuation is the Capital Asset Pricing Model (CAPM), which starts with a risk-free rate and adds to it a market risk premium to take into account non-diversifiable risk.

Are there alternatives?

7. Some have suggested alternatives to using government securities as the risk-free rate. Others wonder whether there is a need to change it—"isn't a highly-rated government security 'close enough'?"

8. Changing the risk-free rate benchmark would require a fundamental rethink of finance theory, such as developing a new CAPM.

9. Some of the alternatives suggested include:

Suggested alternative	Disadvantages
Yields on other government debt	Different underlying inflation assumptions would require conversion to foreign currency
Yields on highly rated corporate bonds	• Relatively smaller market size than government bonds • Market for corporate debt is often less liquid than the market for government debt • Corporates cannot print money • Term for corporate bonds is usually shorter than for government bonds
Adjust yield on government bonds for portion of yield attributable to credit risk (eg with CDS spread, using yield differentials observed on corporate bonds)	• CDS are less liquid than government debt • Some countries might not have CDS markets • Need to adjust for differences between government and corporate debt markets
Other methodologies 'used by market participants'	• Basis for discount rate and cash flows need to be consistent, requiring new empirical studies • Lack of comparability between companies, industries or over time

Use of risk-free rates in IFRSs

10. The term 'risk free' is used in several IFRSs:[1]

IFRS	Context	Does it specify benchmark?
IFRS 2 *Share-based Payment*	Used as an input in option pricing models for valuing share-based payment transactions.	Yes, but allows use of a substitute if government securities are not available or appropriate.
IFRS 13 *Fair Value Measurement*	A component of the discount rate used in a present value technique.	No, it states that the risk-free interest rate poses neither uncertainty in timing nor risk of default to the holder.
IAS 36 *Impairment of Assets*	A component of the discount rate used in measuring value in use for impairment testing.	No, it states that the risk-free interest rate reflects the time value of money. However, the Basis for Conclusions states that risk-free investments might be a government bond.
IAS 39 *Financial Instruments: Recognition and Measurement* (excluding the measurement guidance that has moved to IFRS 13)	• Whether changes in risk-free rates are indicators of impairment • Determining what is a separately identifiable component of a financial instrument for hedge accounting	No

11. The Appendix to this paper details where risk-free rates are used in each of these standards.

[1] Other IFRSs refer to risk-free rates or risk-free assets. However, those uses are not in the context of measurement, which is the focus of this paper.

Questions for discussion

1. Given the way IFRSs refer to risk-free rates for the valuation of assets and liabilities, do you have any concerns about the IASB specifying that risk free rates should be derived from government securities?

2. Should it be more open than that to allow companies to use a rate that market participants would use?

3. If so, would you be concerned about comparability? What would you like to see disclosed (eg the rate used and why, the benchmark used for determining that rate)?

Appendix – Use of risk-free rates in IFRSs

IFRS 2 Share-based Payment

47 If the entity has measured the fair value of goods or services received as consideration for equity instruments of the entity indirectly, by reference to the fair value of the equity instruments granted, to give effect to the principle in paragraph 46, the entity shall disclose at least the following:

(a) for share options granted during the period, the weighted average fair value of those options at the measurement date and information on how that fair value was measured, including:

(i) the option pricing model used and the inputs to that model, including the weighted average share price, exercise price, expected volatility, option life, expected dividends, the risk-free interest rate and any other inputs to the model, including the method used and the assumptions made to incorporate the effects of expected early exercise;

B6 All option pricing models take into account, as a minimum, the following factors:

(a) the exercise price of the option;

(b) the life of the option;

(c) the current price of the underlying shares;

(d) the expected volatility of the share price;

(e) the dividends expected on the shares (if appropriate); and

(f) the risk-free interest rate for the life of the option.

Risk-free interest rate

B37 Typically, the risk-free interest rate is the implied yield currently available on zero-coupon government issues of the country in whose currency the exercise price is expressed, with a remaining term equal to the expected term of the option being valued (based on the option's remaining contractual life and taking into account the effects of expected early exercise). It may be necessary to use an appropriate substitute, if no such government issues exist or circumstances indicate that the implied yield on zero-coupon government issues is not representative of the risk-free interest rate (for example, in high inflation economies). Also, an appropriate substitute should be used if market participants would typically determine the risk-free interest rate by using that substitute, rather than the implied yield of zero-coupon government issues, when estimating the fair value of an option with a life equal to the expected term of the option being valued.

Illustrative disclosures

IG23 …

The estimated fair value of each share option granted in the general employee share option plan is CU23.60. This was calculated by applying a binomial option pricing model. The model inputs were the share price at grant date of CU50, exercise price of CU50, expected volatility of 30 per cent, no expected dividends, contractual life of ten years, and a risk-free interest rate of 5 per cent. To allow for the effects of early exercise, it was assumed that the employees would exercise the options after vesting date when the share price was twice the exercise price. Historical volatility was 40 per cent, which includes the early years of the Company's life; the Company expects the volatility of its share price to reduce as it matures.

IFRS 13 Fair Value Measurement

B13 Present value (ie an application of the income approach) is a tool used to link future amounts (eg cash flows or values) to a present amount using a discount rate. A fair value measurement of an asset or a liability using a present value technique captures all the following elements from the perspective of market participants at the measurement date:

(c) the time value of money, represented by the rate on risk-free monetary assets that have maturity dates or durations that coincide with the period covered by the cash flows and pose neither uncertainty in timing nor risk of default to the holder (ie a risk-free interest rate).

B14 Present value techniques differ in how they capture the elements in paragraph B13. However, all the following general principles govern the application of any present value technique used to measure fair value:

(d) Assumptions about cash flows and discount rates should be internally consistent. For example, nominal cash flows, which include the effect of inflation, should be discounted at a rate that includes the effect of inflation. The nominal risk-free interest rate includes the effect of inflation. Real cash flows, which exclude the effect of inflation, should be discounted at a rate that excludes the effect of inflation. Similarly, after-tax cash flows should be discounted using an after-tax discount rate. Pre-tax cash flows should be discounted at a rate consistent with those cash flows.

B17 Present value techniques differ in how they adjust for risk and in the type of cash flows they use. For example:

(a) Method 1 of the expected present value technique (see paragraph B25) uses risk-adjusted expected cash flows and a risk-free rate.

B19 The discount rate adjustment technique requires an analysis of market data for comparable assets or liabilities. Comparability is established by considering the nature of the cash flows (eg whether the cash flows are contractual or non-contractual and are likely to respond similarly to changes in economic conditions), as well as other factors (eg credit standing, collateral, duration, restrictive covenants and liquidity). Alternatively, if a single comparable asset or liability does not fairly reflect the risk inherent in the cash flows of the asset or

liability being measured, it may be possible to derive a discount rate using data for several comparable assets or liabilities in conjunction with the risk-free yield curve (ie using a 'build-up' approach).

B21 On the basis of the timing of the contractual payments to be received for Asset A relative to the timing for Asset B and Asset C (ie one year for Asset B versus two years for Asset C), Asset B is deemed more comparable to Asset A. Using the contractual payment to be received for Asset A (CU800) and the one-year market rate derived from Asset B (10.8 per cent), the fair value of Asset A is CU722 (CU800/1.108). Alternatively, in the absence of available market information for Asset B, the one-year market rate could be derived from Asset C using the build-up approach. In that case the two-year market rate indicated by Asset C (11.2 per cent) would be adjusted to a one-year market rate using the term structure of the risk-free yield curve. Additional information and analysis might be required to determine whether the risk premiums for one-year and two-year assets are the same. If it is determined that the risk premiums for one-year and two-year assets are not the same, the two-year market rate of return would be further adjusted for that effect.

B25 Method 1 of the expected present value technique adjusts the expected cash flows of an asset for systematic (ie market) risk by subtracting a cash risk premium (ie risk-adjusted expected cash flows). Those risk-adjusted expected cash flows represent a certainty-equivalent cash flow, which is discounted at a risk-free interest rate. A certainty-equivalent cash flow refers to an expected cash flow (as defined), adjusted for risk so that a market participant is indifferent to trading a certain cash flow for an expected cash flow. For example, if a market participant was willing to trade an expected cash flow of CU1,200 for a certain cash flow of CU1,000, the CU1,000 is the certainty equivalent of the CU1,200 (ie the CU200 would represent the cash risk premium). In that case the market participant would be indifferent as to the asset held.

B26 In contrast, Method 2 of the expected present value technique adjusts for systematic (ie market) risk by applying a risk premium to the risk-free interest rate. Accordingly, the expected cash flows are discounted at a rate that corresponds to an expected rate associated with probability-weighted cash flows (ie an expected rate of return). Models used for pricing risky assets, such as the capital asset pricing model, can be used to estimate the expected rate of return. Because the discount rate used in the discount rate adjustment technique is a rate of return relating to conditional cash flows, it is likely to be higher than the discount rate used in Method 2 of the expected present value technique, which is an expected rate of return relating to expected or probability-weighted cash flows.

B27 To illustrate Methods 1 and 2, assume that an asset has expected cash flows of CU780 in one year determined on the basis of the possible cash flows and probabilities shown below. The applicable risk-free interest rate for cash flows with a one-year horizon is 5 per cent, and the systematic risk premium for an asset with the same risk profile is 3 per cent.

B29 In theory, the present value (ie the fair value) of the asset's cash flows is the same whether determined using Method 1 or Method 2, as follows:

(a) Using Method 1, the expected cash flows are adjusted for systematic (ie market) risk. In the absence of market data directly indicating the amount of the risk adjustment, such adjustment could be derived from an asset pricing model using the concept of certainty equivalents. For example, the risk adjustment (ie the cash risk premium of CU22) could be determined using the systematic risk premium of 3 per cent (CU780 – [CU780 × (1.05/1.08)]), which results in risk-adjusted expected cash flows of CU758 (CU780 – CU22). The CU758 is the certainty equivalent of CU780 and is discounted at the risk-free interest rate (5 per cent). The present value (ie the fair value) of the asset is CU722 (CU758/1.05).

(b) Using Method 2, the expected cash flows are not adjusted for systematic (ie market) risk. Rather, the adjustment for that risk is included in the discount rate. Thus, the expected cash flows are discounted at an expected rate of return of 8 per cent (ie the 5 per cent risk-free interest rate plus the 3 per cent systematic risk premium). The present value (ie the fair value) of the asset is CU722 (CU780/1.08).

B30 Examples of Level 3 inputs for particular assets and liabilities include the following:

(d) *Decommissioning liability assumed in a business combination.* A Level 3 input would be a current estimate using the entity's own data about the future cash outflows to be paid to fulfil the obligation (including market participants' expectations about the costs of fulfilling the obligation and the compensation that a market participant would require for taking on the obligation to dismantle the asset) if there is no reasonably available information that indicates that market participants would use different assumptions. That Level 3 input would be used in a present value technique together with other inputs, eg a current risk-free interest rate or a credit-adjusted risk-free rate if the effect of the entity's credit standing on the fair value of the liability is reflected in the discount rate rather than in the estimate of future cash outflows.

IAS 36 Impairment of Assets

Measuring value in use

IN6 The Standard clarifies that the following elements should be reflected in the calculation of an asset's value in use:

(a) an estimate of the future cash flows the entity expects to derive from the asset;

(b) expectations about possible variations in the amount or timing of those future cash flows;

(c) the time value of money, represented by the current market risk-free rate of interest;

(d) the price for bearing the uncertainty inherent in the asset; and

(e) other factors, such as illiquidity, that market participants would reflect in pricing the future cash flows the entity expects to derive from the asset.

Discount rate (paragraphs 55–57 and A15–A21)

BCZ52 The purpose of discounting future cash flows is to reflect the time value of money and the uncertainties attached to those cash flows:

(a) assets that generate cash flows soon are worth more than those generating the same cash flows later. All rational economic transactions will take account of the time value of money. The cost of not receiving a cash inflow until some date in the future is an opportunity cost that can be measured by considering what income has been lost by not investing that money for the period. The time value of money, before consideration of risk, is given by the rate of return on a risk-free investment, such as government bonds of the same duration.

BCZ53 As a consequence IASC decided:

(b) to reject a discount rate based on a risk-free rate, unless the future cash flows have been adjusted for all the risks specific to the asset.

IAS 39 Financial Instruments: Recognition and Measurement

60 The disappearance of an active market because an entity's financial instruments are no longer publicly traded is not evidence of impairment. A downgrade of an entity's credit rating is not, of itself, evidence of impairment, although it may be evidence of impairment when considered with other available information. A decline in the fair value of a financial asset below its cost or amortised cost is not necessarily evidence of impairment (for example, a decline in the fair value of an investment in a debt instrument that results from an increase in the risk-free interest rate).

81 If the hedged item is a financial asset or financial liability, it may be a hedged item with respect to the risks associated with only a portion of its cash flows or fair value (such as one or more selected contractual cash flows or portions of them or a percentage of the fair value) provided that effectiveness can be measured. For example, an identifiable and separately measurable portion of the interest rate exposure of an interest-bearing asset or interest-bearing liability may be designated as the hedged risk (such as a risk-free interest rate or benchmark interest rate component of the total interest rate exposure of a hedged financial instrument).

AG99F To be eligible for hedge accounting, the designated risks and portions must be separately identifiable components of the financial instrument, and changes in the cash flows or fair value of the entire financial instrument arising

from changes in the designated risks and portions must be reliably measurable. For example:

(a) for a fixed rate financial instrument hedged for changes in fair value attributable to changes in a risk-free or benchmark interest rate, the risk-free or benchmark rate is normally regarded as both a separately identifiable component of the financial instrument and reliably measurable.

F.6.2 Hedge accounting considerations when interest rate risk is managed on a net basis

Issue (l) – In the answer to Issue (c) above it was indicated that the hedged item is documented as a group of forecast transactions. Since these transactions will have different terms when they occur, including credit exposures, maturities and option features, how can an entity satisfy the tests in IAS 39.78 and IAS 39.83 requiring the hedged group to have similar risk characteristics?

IAS 39.78 provides for hedging a group of assets, liabilities, firm commitments or forecast transactions with similar risk characteristics. IAS 39.83 provides additional guidance and specifies that portfolio hedging is permitted if two conditions are met, namely: the individual items in the portfolio share the same risk for which they are designated, and the change in the fair value attributable to the hedged risk for each individual item in the group will be expected to be approximately proportional to the overall change in fair value.

When an entity associates a derivative hedging instrument with a gross exposure, the hedged item typically is a group of forecast transactions. For hedges of cash flow exposures relating to a group of forecast transactions, the overall exposure of the forecast transactions and the assets or liabilities that are repriced may have very different risks. The exposure from forecast transactions may differ depending on the terms that are expected as they relate to credit exposures, maturities, options and other features. Although the overall risk exposures may be different for the individual items in the group, a specific risk inherent in each of the items in the group can be designated as being hedged.

The items in the portfolio do not necessarily have to have the same overall exposure to risk, provided they share the same risk for which they are designated as being hedged. A common risk typically shared by a portfolio of financial instruments is exposure to changes in the risk-free or benchmark interest rate or to changes in a specified rate that has a credit exposure equal to the highest credit-rated instrument in the portfolio (ie the instrument with the lowest credit risk). If the instruments that are grouped into a portfolio have different credit exposures, they may be hedged as a group for a portion of the exposure. The risk they have in common that is designated as being hedged is the exposure to interest rate changes from the highest credit rated instrument in the portfolio. This ensures that the change in fair value attributable to the hedged risk for each individual item in the group is expected to be approximately proportional to the overall change in fair value attributable to the hedged risk of the group. It is likely there will be some ineffectiveness if the hedging instrument has a credit quality that is inferior to the credit quality of the highest credit-rated instrument being hedged, since a hedging

relationship is designated for a hedging instrument in its entirety (IAS 39.74). For example, if a portfolio of assets consists of assets rated A, BB and B, and the current market interest rates for these assets are LIBOR+20 basis points, LIBOR+40 basis points and LIBOR+60 basis points, respectively, an entity may use a swap that pays fixed interest rate and for which variable interest payments based on LIBOR are made to hedge the exposure to variable interest rates. If LIBOR is designated as the risk being hedged, credit spreads above LIBOR on the hedged items are excluded from the designated hedge relationship and the assessment of hedge effectiveness.