20 January 2014

QUEENSLAND
TREASURY
CORPORATION

Mr Michael Blake
Queensland Competition Authority
GPO Box 2257
Brisbane QLD 4001

Dear Mr Blake

The Risk-free Rate and Market Risk Premium Discussion Paper

Queensland Treasury Corporation welcomes the opportunity to provide comments to the Queensland Competition Authority on Associate Professor Martin Lally's report titled "Response to submissions on the risk-free rate and the MRP".

Should you have any queries in relation to our submission please contact Brian Carrick on (07) 3842 4716 or David Johnston on (07) 3842 4782.

Sincerely

[redacted]

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Chief Executive

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The risk-free rate and the market risk premium

SECOND SUBMISSION TO THE QCA – 20 JANUARY 2014

QUEENSLAND TREASURY CORPORATION

Summary of QTC's views

- The QCA's current approach of considering a range of MRP estimates, calculating the median value and rounding this value to the nearest whole per cent has produced cost of equity estimates that move point-for-point with changes in the risk-free rate. These outcomes are likely to continue if the QCA accepts the recommendations in Associate Professor Martin Lally's "Response to submissions on the risk-free rate and the MRP".
- QTC remains of the view that a 10-year risk-free rate is appropriate irrespective of the length of the regulatory period. Equity providers to regulated firms are exposed to risks that extend well beyond the term of the regulatory period. It is appropriate for compensation to be provided for this commitment, and this is more likely to be achieved by using a 10-year risk-free rate in the cost of equity.
- A 5-year risk-free rate cannot be justified by assuming that an equity investment in a regulated firm is the same as a perpetual bond with an interest rate that is reset every 5 years.
- Evidence provided by Incenta Economic Consulting shows that valuation experts and analysts use a 10-year risk-free rate to value infrastructure firms that are subject to a 5-year regulatory cycle. That is, a 10-year risk-free rate is used despite a reset of the regulated cost of equity every 5 years. This supports the use of a 10-year risk-free rate to determine the cash flows for regulated firms.
- The Australian Energy Regulator (AER) and the Independent Pricing and Regulatory Tribunal (IPART) have completed reviews of their approaches for estimating the regulated cost of equity. Both regulators concluded that a 10-year risk-free rate should be used.
- The Strategic Finance Group's (SFG) improved implementation of the dividend discount model (DDM) produces relatively stable estimates of the implied return on the market portfolio. Importantly, SFG's approach does not require an assumption to be made about the long-term growth rate in dividends, which is often a source of disagreement among analysts. SFG's estimates suggest that the expected return on the market portfolio is significantly less volatile than the QCA's estimates. This also supports the use of historical data to directly estimate the expected return on the market portfolio.
- A zero weight should be assigned to the 'Siegel-adjusted' historical MRP. Evidence has not been provided to demonstrate that these MRPs are regularly used in practice by valuation experts or investors. As such, these estimates are unlikely to be reflected in market prices.
- If the QCA is concerned about the impact of historical unexpected inflation, QTC considers that adding current expected inflation to long-term historical average real return on equity is an appropriate approach.

General comments

The QCA's current approach of considering a range of MRP estimates, calculating the median value and rounding this value to the nearest whole per cent has produced cost of equity estimates that move point-for-point with changes in the risk-free rate. These outcomes are likely to continue if the QCA accepts the recommendations in Associate Professor Martin Lally's "Response to submissions on the risk-free rate and the MRP".

To date, the QCA's cost of equity estimates have displayed a perfect positive correlation with the 5-year risk-free rate and have displayed the same level of volatility as the 5-year risk-free rate. QTC is unaware of any empirical evidence that supports this type of time series behaviour in the expected return on risky assets such as equity.

Forward-looking estimates of the expected return on the market portfolio display much less variation than the QCA's estimates. Furthermore, there is evidence that valuation experts do not fully pass through changes in the risk-free rate to their cost of equity estimates. This is especially the case when falling risk-free rates are caused by factors that cannot be expected to cause the required return on risky assets to fall by exactly the same amount, if at all. Adjusting the risk-free rate in this way produces cost of equity estimates that are less volatile than the risk-free rate.

In this submission we have proposed an alternative approach that makes use of historical and forward-looking estimates of the expected return on the market portfolio. A simple unrounded average of these estimates produces an expected return on the market portfolio that is significantly less volatile than the QCA's estimates.

The term of the risk-free rate

In our original submission on the risk-free rate and MRP we stated that using a 5-year risk-free rate to estimate of the cost of equity assumes that the equity providers to a regulated firm are in the same cash flow position as the owner of a 5-year bond. We considered this assumption to be unrealistic as the owner of a 5-year bond has a degree of flexibility at maturity that the equity provider does not have. In particular, the bond holder receives a cash payment at maturity equal to the original investment, and this provides options for re-investment or for alternative investments to be pursued.

We stated that the equity providers are not in this position because there is no cash flow equal to the regulated asset base (RAB) at the end of the regulatory period (ie, the business is not sold). As a consequence, the equity providers are committing funds for a much longer time period, and it would be inappropriate to provide compensation 'as if' the investment was returned in cash after 5 years.

In response, Lally argues that the requirement to match the term of the risk-free with the length of the regulatory period (eg, 5 years) is not based on an implicit or explicit assumption that the business is sold at the end of the regulatory period. That is, there is no assumed cash flow at the end of the regulatory period equal to the RAB.

Lally's recent advice to the AER

Lally recently provided advice to the Australian Energy Regulator (AER) on the appropriate term of the risk-free rate for the cost of equity[1]. As part of the draft Rate of Return Guideline the AER reproduced the following equation from Lally's report:

$$V_0 = \frac{\$5.93m}{1.05} + \frac{\$5.93m}{(1.0525)^2} + \frac{\$5.93m}{(1.055)^3} + \frac{\$5.93m}{(1.0575)^4} + \frac{\$5.93m + \$100m}{(1.06)^5} = \$99.93m$$

In explaining the meaning of the equation, and in particular the $100m figure, the AER stated:

> *'In Lally's calculation above, the cash flow in each year is the allowed revenue net of opex and capex, except in the final year, where the closing value of the regulatory asset base (RAB) is included in the cash flow.* ***That is, the assumption is that the investor receives a cash payment equal to the RAB in the final year of the regulatory control period.'*** [2] *[emphasis added]*

The AER's interpretation of the advice provided to it by Lally suggests that the argument for using a 5-year risk-free rate does rely on the assumption that the business is sold at the end of the regulatory period, with proceeds equal to the RAB reflected as a cash flow in the final year.

Regulated equity as a perpetual rate bond with a resetting coupon

The assumption that the equity providers receive a cash flow equal to the RAB at the end of the regulatory period can be avoided if an equity investment in a regulated firm is assumed to be similar to a perpetual or very long-term bond with an interest rate that is reset at the start of each regulatory period. In Lally's equation the $100m figure could be viewed as the face value of the bond, which is automatically 'rolled over' at the end of each rate reset period, thus producing no net cash flow.

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[1] M. Lally, *The risk-free rate and the present value principle*, August 2012.
[2] AER, *Draft Rate of Return Guideline – Explanatory Statement*, August 2013, p. 183.

This appears to be the position taken by Lally more recently.

In his response to the submissions on the risk-free rate and MRP Lally presents a simple example where the asset life is two years, the regulatory cycle is annual and the only source of risk is interest rate risk[3]. In this example the risk-free rate for the first year is the current 1-year risk-free rate. To satisfy the NPV=0 principle Lally shows that the risk-free rate in the second year should be the prevailing 1-year risk-free in one year's time.

Lally considers the underlying calculations in this example to be 'conceptually identical' to the pricing and valuation of a floating rate bond[4]. However, it does not follow that using a 1-year risk-free rate will provide correct compensation when the asset life is very long, as is the case for regulated infrastructure. Under this more realistic scenario, using the prevailing 1-year risk free rate at the start of each year requires an additional assumption that investors are indifferent between investing in a 1-year risk-free bond or a perpetual risk-free bond with an interest rate that is reset annually. That is, investors do not require additional compensation relative to the 1-year risk-free rate to invest in the perpetual bond.

In QTC's view, this assumption is implausible as the owner of a 1-year bond has a degree of flexibility at maturity that the owner of the perpetual bond does not have. Specifically, the owner of a 1-year bond receives a cash payment at maturity equal to the original investment, and this provides options for re-investment or for alternative investments to be pursued. A rational investor would require compensation (ie, an additional yield margin) to give up this flexibility by committing funds for a much longer period of time.

The owner of the perpetual bond is not in the same cash flow position at the end of each year, because the owner cannot assume that their investment can be redeemed at its initial value. In addition, any decision to divest will involve costs that are not faced by the owner of a 1-year bond. There is an expectation that the funds will be committed for a much longer period of time, and this commitment should be compensated by a total interest rate that is higher than the 1-year risk-free rate.

The assumption of a zero yield margin is also implausible from the perspective of the risk-free borrower. By definition, a perpetual borrowing has no refinancing risk. As a consequence, if the interest rate on the perpetual borrowing is reset annually, the borrower would be willing to pay a yield margin above the prevailing 1-year risk-free rate to secure funding forever. A zero yield margin would imply that refinancing risk can be reduced to zero at no additional cost, which is clearly implausible.

Similar arguments were made in a report by the Competition Economists Group (CEG) for the South East Queensland water businesses[5].

> *'… in the real world, a three year bond differs materially from a perpetual bond which has its interest rate reset every three years. The price of the latter today will depend on market perceptions about the ability to sell the asset in the future – not just within the next three years, but in perpetuity.* ***This means that any investor in such a bond must worry about very long term risks. These risks relate to the future efficiency and liquidity of***

[3] M. Lally, *Response to submissions on the risk-free rate and the MRP*, October 2013.
[4] Lally (October 2013), p. 48.
[5] CEG, *WACC estimation – a report for South East Queensland water businesses*, February 2011, pp. 17-21.

> ***capital markets and also the very long run credit worthiness of the issuer of the bond (in this example the Australian Government).'*** *[emphasis added]*
>
> *'… the long lived nature of the individual assets, their integrated use with assets of different vintages and their need for continual rolling replacement, gives equity investment in water utilities a characteristic that is, in fact, perpetual. Investors are exposed to future liquidity risk as well as regulatory regime change risk.* ***For these reasons, adopting a ten year risk free rate can be viewed as a conservative reflection of the closer to perpetual nature of the time horizon that equity investors are exposed to risks for.'*** [6] *[emphasis added]*

In responding to CEG's arguments, Lally did not agree that a 10-year risk-free rate should be used to compensate for the additional risks associated with a perpetual investment that has a resettable interest rate. However, Lally did state that any concerns relating to the risks identified by CEG:

> *'would support premiums for these particular issues rather than use of the ten year risk free rate (which will sometimes be less than the three year rate and therefore could not compensate for these issues).'* [7]

Estimating the yield margin

As there are no perpetual risk-free bonds with resettable coupons on issue, it is not possible to directly observe the yield margin. As a consequence, practical issues must be considered to determine how such an asset would be priced in the market.

It must be emphasised that although the yield margin cannot be observed, there can be no doubt that the margin should be positive. It follows that using a 5-year risk-free rate, which is the QCA's current approach, will under-estimate the cost of equity (on average).

Practical considerations regarding the term of the risk-free rate

Incenta Economic Consulting prepared a report for the Energy Networks Association (ENA), which considered the theoretical arguments and practical issues that are relevant to the term of the risk-free rate for the cost of equity[8].

After considering the theoretical arguments for a term that matches the regulatory period and a 10-year term, Incenta concluded that an unambiguous guide to the correct term is not provided by finance theory. Because of this limitation, Incenta stated that a key issue is to consider how investors actually value regulated and non-regulated infrastructure firms[9].

Incenta conducted a series of structured interviews with 2 independent valuation experts and 12 investment bank analysts who have a significant role in valuing infrastructure assets. The participants were asked the following questions regarding the term of the risk-free rate[10]:

- What assumption do you apply for the term of the risk free rate in a CAPM valuation of regulated infrastructure assets with a 5 year regulatory cycle, and why?
- Do you (or would you) apply a different assumption to value a non-regulated infrastructure asset that was not subject to a 5 year regulatory reset?

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[6] CEG (February 2011), p. 20.
[7] M. Lally, *Comments on submissions relating to the QCA's proposed WACC for the SEQ entities*, March 2011, p. 8.
[8] Incenta, *Term of the risk free rate for the cost of equity*, June 2013.
[9] Incenta (June 2013), p. 7.
[10] Incenta (June 2013), p. 26.

- What risk factors does the risk free rate assumption compensate for?
- What impact do you expect a regulatory policy shift from a 10 year to a 5 year risk free rate to have on the valuation of regulated network businesses?

Summary of Incenta's findings

In regards to the term of the risk-free rate Incenta found 'complete unanimity' among the valuation experts and analysts in the use of a 10-year risk-free rate to value regulated infrastructure firms that are on a 5-year regulatory cycle.

In regards to the term of the risk-free rate used to value non-regulated infrastructure firms[11]:

> *'The answer to this question was unequivocally that analysts treat regulated assets (i.e. those regulated on a 5 year cycle) no differently to unregulated infrastructure with respect to the assumption made about the term of the risk free rate. To capture the differential risks associated with unregulated infrastructure, analysts apply a different value to the systematic risk (asset beta) of these assets (for instance, due to greater demand volatility) relative to regulated infrastructure businesses.'*

The quote above suggests any differential between the required rate of return for regulated and non-regulated infrastructure firms should be attributable to the equity beta and not the length of the regulatory period. This view differs from Lally's view on the impact of regulation on the cost of capital:

> *'the cost of capital reflects risk, regulation affects the risk of regulated firms, and therefore the cost of capital for a regulated business may differ from that of an otherwise identical unregulated firm in a competitive market.'* [12]

In regards to the risk factors that are compensated by the risk-free rate:

> *'… it was noted that the identification of specific future risks is not the point. If the market prices are set by investors who consider long term risks and factor these into their required returns for assets regulated on a 5 year cycle, then long term risks drive market valuations, and should also be applied in regulatory cost of capital estimates. Market based beta estimates are relied on by regulators, and the market's use of long term risk free rates should also be applied, or else value will be destroyed and there will be a threat to continued investment.'* [13]

> *'As stated by more than one of the respondents,* ***the fundamental point is that a long term risk free rate estimate is applied by market practitioners when valuing infrastructure assets, regulated or otherwise.'*** [14] *[emphasis added]*

In regards to the implications of regulatory policy shift from a 10-year to a 5-year risk free rate the valuation experts and analysts stated that their valuations would fall because they would continue to use a 10-year risk-free rate in their discount rate. Setting regulatory revenues based on a 5-year risk free-rate was also identified as a potential threat to continued investment[15].

[11] Incenta (June 2013), p. 28.
[12] Lally (October 2013), p. 22.
[13] Incenta (June 2013), p. 29.
[14] Incenta (June 2013), p. 9.
[15] Incenta (June 2013), p. 44.

Incenta's conclusion on the term of the risk-free rate

After taking into account the way investment professionals actually value regulated and non-regulated infrastructure firms, Incenta concluded that a 10-year term should be used to calculate the cost of equity for regulated firms:

> *'We recommend using a 10 year risk free rate for estimating the cost of equity, and for this rate to be applied consistently to estimate the market risk premium. However, this recommendation is not based squarely on theory, which we view as largely indeterminate given the shortcomings of the CAPM.* ***Rather, our view is based on achieving consistency with the practice of valuation professionals, for whom the use of a 10 year term for the risk free rate is widespread, and consistency with our observations of how investors actually value regulated infrastructure assets.'*** [16] *[emphasis added]*

Incenta also concluded that a 5-year term for the risk-free rate will[17]:

- produce a more volatile cost of equity compared to a 10-year risk-free rate
- increase the risk of the cost of equity being under-estimated during periods where the prevailing rate is significantly below the longer-term average (eg, during 'flight to quality' and/or 'flight to liquidity' periods), and
- exacerbate the impact of the known downward bias in the expected returns produced by the CAPM for assets with a beta of less than 1.

Relevance to the QCA's cost of capital review

Incenta's findings show that market practitioners use a 10-year risk-free rate to value non-regulated *and* regulated infrastructure firms. Regulated firms must raise capital in competition with other long-lived assets including non-regulated infrastructure and property, which both provide appropriate long-term returns for long-term investment. Using a 5-year risk-free rate to determine regulated revenues will place regulated firms at a disadvantage relative to these asset classes and this may constrain the ability of these firms to attract and retain the capital required to maintain efficient investment levels. This is consistent with Incenta's conclusion that:

> *'… since the market applies a 10 year risk free rate and a risk premium and prices assets in this way, it drives valuation, and regulators should not be out-of-step with the market, or they will risk under-investment.'* [18]

As explained previously, any differential between the require rate of return for regulated and non-regulated infrastructure firms should be attributable to the equity beta and not the length of the regulatory period.

Even if the cash flow profile of regulated equity is considered to be the same as a perpetual bond with an interest rate that is reset every 5 years, correct compensation will not be provided if a 5-year risk-free rate is used. As the market applies a 10-year risk-free rate to value these cash flows, a regulator should use the same rate to determine the level of the cash flows.

[16] Incenta (June 2013), p. 43.
[17] Incenta (June 2013), pp. 41-42.
[18] Incenta (June 2013), p. 9.

A 5-year risk-free rate cannot be justified on the assumption that an equity investment in a regulated firm is the same as an investment in a perpetual bond with an interest rate that is reset every 5 years.

The results from Incenta's structured interviews show that valuation experts and analysts use a 10-year risk-free rate to value infrastructure firms that are subject to a 5-year regulatory cycle. That is, a 10-year risk-free rate is used despite a reset of the regulated cost of equity every 5 years. This supports the use of a 10-year risk-free rate to determine the cash flows for a regulated firm.

Based on these considerations, QTC remains of the view that the most appropriate term for the risk-free rate in the cost of equity is 10-years, regardless of the length of the regulatory period.

Cost of capital review by the AER

Recent changes to the National Electricity Rules (NER) and National Gas Rules (NGR) require the Australian Energy Regulator (AER) to consider a broader range of estimation methods, financial models and data sources when estimating the cost of equity. The cost of equity must be estimated such that it contributes to the achievement of the allowed rate of return objective[19].

The allowed rate of return objective requires the cost of equity to be commensurate with the efficient financing costs of a benchmark efficient entity with the same degree of risk that applies to the service provider. The NER and NGR also require the AER to have regard to the prevailing conditions in the market for equity funds[20].

The AER recently released the final Rate of Return Guideline, which outlines the AER's approach for estimating the cost of equity. In deciding between a 5- and 10-year term for the risk-free rate the AER referred to a number of practical considerations that are relevant to achieving the allowed rate of return objective.

In particular, the AER referred to Incenta's finding that valuation experts and analysts use a 10-year risk-free rate to value infrastructure firms that are on a 5-year regulatory cycle. The AER also referred to Incenta's observation that a 5-year risk-free rate will produce a more volatile cost of equity compared to a 10-year risk-free rate[21].

The AER concluded that a 10-year risk-free rate should be used to calculate the cost of equity.

Cost of capital review by IPART

The Independent Pricing and Regulatory Tribunal (IPART) also recently concluded a review of its WACC calculation methodology[22]. Similar to the AER, IPART's objective is to produce an estimate of the efficient cost of equity for the benchmark firm:

> *'We consider that setting the WACC to reflect the efficient cost of capital for a benchmark firm that operates in a competitive market and faces similar risks to the regulated business is a more appropriate objective. It allows us to take account of how an efficient firm, in practice, would finance*

[19] AER, *Better Regulation – Rate of Return Guideline*, December 2013, p. 11.
[20] AER (December 2013), p. 11.
[21] AER, (August 2013), p. 184.
[22] IPART, *Review of WACC methodology – Final Report*, December 2013.

its operations in a competitive product market. Further, the cost of capital for such a benchmark firm is more readily observable and independent of any specific form of regulation chosen by the regulator.' [23]

IPART also had regard to practical considerations that are relevant to producing an estimate of the cost of equity that is consistent with market practice:

'Having regard to market practice of how investors form their expectations, we consider that the efficient cost of capital for the benchmark entity is likely to reflect a mix of current market rates and long-term averages. We will approximate current market rates using 40-day averages and long-term averages using 10-year averages.' [24]

IPART concluded that a 10-year risk free rate should be used to calculate the cost equity[25].

The AER and IPART have recently completed reviews of their approaches for estimating the regulated cost of equity. Both regulators have concluded that a 10-year risk-free rate should be used.

In reaching this conclusion both regulators had regard to a range of practical considerations relating to way investors actually determine the required return on equity. This is an explicit acknowledgement that theoretical considerations alone cannot be used to determine the appropriate term for the risk-free rate.

In QTC's view, the conclusions reached by the AER and IPART regarding the appropriate term for the risk-free rate are relevant to the QCA's cost of capital review.

The dividend discount model

Conceptually, the implied cost of equity produced by the dividend discount model (DDM) is the most appropriate estimate of the forward-looking expected return on the market portfolio.

In practice, implementing the DDM requires a number of assumptions to be made about key inputs such as the long-term growth rate in dividends and how long it takes for a firm or the market to transition from short-term to long-term growth. As different analysts typically have different views on these inputs, a wide range of outputs from the DDM are commonly observed.

The Strategic Finance Group (SFG) has proposed an implementation of the DDM that aims to overcome some of these problems[26]. Although a full description of SFG's approach is beyond the scope of this submission, some of the main features are as follows:

- Cost of equity estimates were made at the individual firm level over non-overlapping 6-month periods between the second half of 2002 and the first half of 2013. On average, there were 220 firms in each 6-month period.
- Analyst price targets are used rather than share prices as there is more likely to be a relationship between the analyst's dividend forecast and their price target rather the share

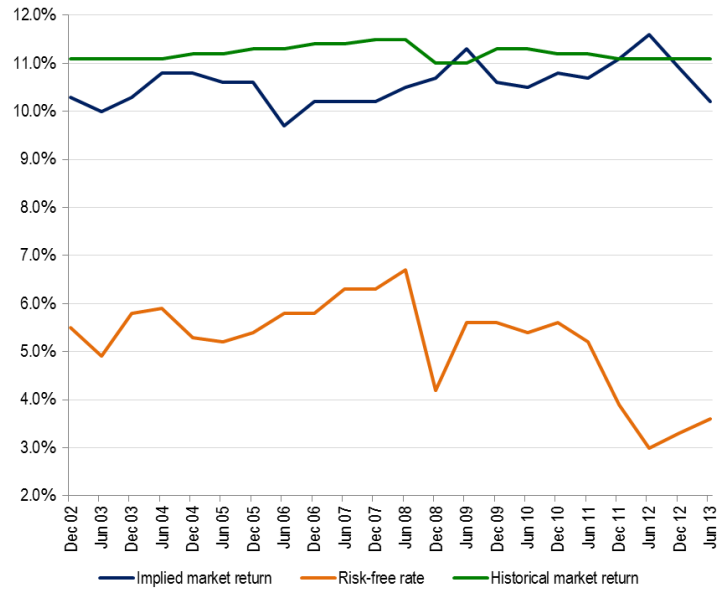
[23] IPART (December 2013), p. 10.
[24] IPART (December 2013), p. 9.
[25] IPART (December 2013), p. 19.
[26] SFG, *Cost of equity estimates implied by analyst forecasts and the dividend discount model*, October 2013.

price at a point in time. This approach reduces variation in the implied cost of equity because analyst's dividend forecasts do not change as frequently as share prices.

- No prior assumption is made about the long-term dividend growth rate. Rather, SFG's approach jointly estimates the long-term growth rate and the cost of equity.

Figure 1 displays the implied market cost of equity from SFG's implementation of the DDM between 2002 and 2012[27]. The 10-year risk-free rate and the average historical return on the equity are also shown[28]:

FIGURE 1: IMPLIED MARKET COST OF EQUITY (SFG)



The standard deviation of the implied return on the market portfolio and the 10-year risk-free rate is 0.4 and 1.0 per cent respectively. The correlation between the two series is **-0.5**.

Conceptually, the implied cost of equity produced by the DDM is the most appropriate estimate of the forward-looking expected return on the market portfolio. In practice, different assumptions about the inputs in the DDM, especially the long-term dividend growth rate, often result in a wide range of outputs from the DDM.

SFG's implementation of the DDM seeks to address this issue by allowing the long-term dividend growth rate and the cost of equity to be jointly estimated. As the long-term dividend growth rate is not an input, it is likely that the resulting estimates will be less contentious among different analysts.

The low level of variation in SFG's estimates also support the use of historical data to directly estimate the expected return on the market portfolio.

[27] SFG, (October 2013), p. 27 (Table 4). The implied market cost of equity equals the market capitalisation-weighted average of the average implied cost of equity each firm during the relevant 6 month period. The estimates exclude any benefits of dividend imputation.

[28] The average historical real return has been calculated on a cumulative basis from 1883 up to relevant estimation date. Expected inflation of 2.5 per cent has been used to convert the average real return into a nominal return.

Siegel historical averaging

The purpose of Siegel historical averaging is to adjust the historical MRP to account for the impact of unexpected inflation. The adjustment is based on the premise that unexpected inflation artificially reduced the historical real yield, but not the historical real return on equity, thereby creating an upward bias in the historical MRP. It should be noted that the real yields used to reach this conclusion are not true real yields (ie, the observed yields on an inflation-linked bond). Rather, they represent the nominal 10-year yield net of actual inflation.

There are two approaches for dealing with the effects of unexpected inflation on the MRP:

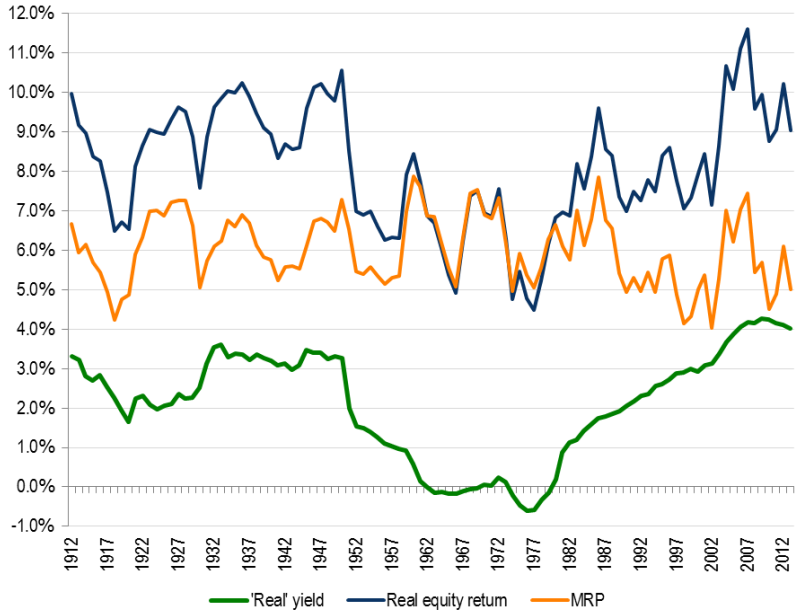
1. Add the average historical 'real' yield to the historical MRP and then deduct an improved estimate of the average historical real yield (ie, the yield on an inflation-linked bond).
2. Add current inflation expectations to the historical real return on equity and deduct the prevailing nominal risk-free rate.

Lally considers the first approach to be more appropriate because the historical MRP has a lower standard deviation than the historical real return on equity[29]. Using rolling 30-year averages Lally calculates standard deviations of 0.9 per cent and 1.5 per cent for the MRP and real return on equity respectively, and concludes:

> *'… the estimated MRP series is much more stable than the average real market return series and therefore supports estimating the MRP rather than the real market cost of equity from historical data.'* [30]

QTC has replicated Lally's calculations using data up to December 2013 (Figure 2)

FIGURE 2: ROLLING 30-YEAR AVERAGES FROM LALLY (2013, FIGURE 1)



Lally notes that the period between 1940 and 1990 was characterised by abnormally high inflation of 6.6 per cent per annum. The dampening effect of the higher realised inflation on

[29] Lally (October 2013), p. 13.
[30] M. Lally, *Review of the AER's methodology for the risk free rate and the market risk premium*, March 2013, p. 13.

the 'real' yields is evident in Figure 2 with the 30-year rolling average becoming negative on several occasions around the middle of the sample period.

The average 'real' yield between 1883 and 2013 is 2.4 per cent. Lally proposes an improved long-term real yield estimate of 3.6 per cent based on historical data from 1883 to 1939 (3.5 per cent) and the average 10-year Commonwealth Government inflation-linked bond yield from 1986 to the present (3.7 per cent)[31]. The net effect of the adjustment is a reduction in the average historical MRP of 1.2 per cent (3.6 per cent minus 2.4 per cent).

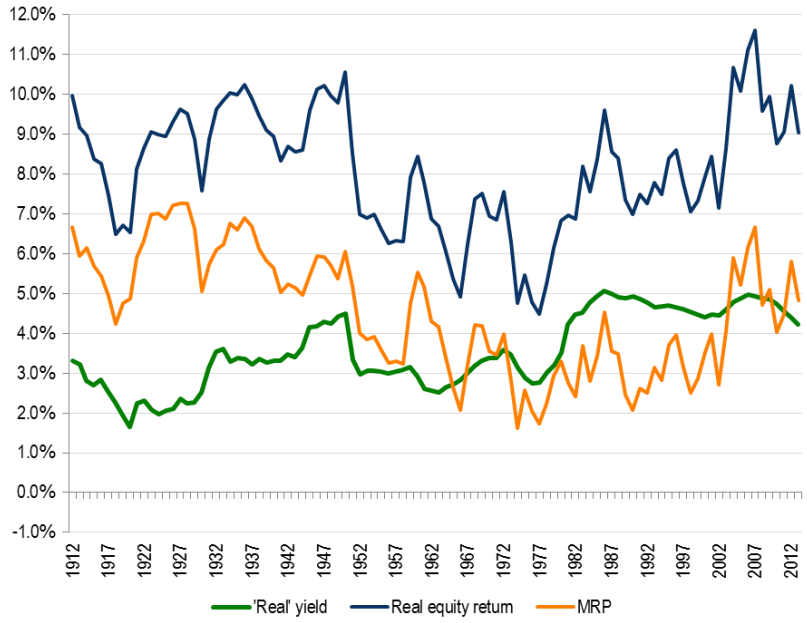
Time series implications of adjusting the MRP

As the effects of unexpected inflation are concentrated in the 1940–1990 period, it is not appropriate to simply increase each 'real' yield in the 1883–2013 sample period by 1.2 per cent (and thereby reducing the MRP by 1.2 per cent). The correct approach is to:

- use the observed yields on 10-year Commonwealth Government inflation-linked bonds from 1986 to 2013, and
- increase each 'real' yield between 1940 and 1985 by an amount that produces an average real yield over the entire sample period of 3.6 per cent to match Lally's proposed long-term estimate[32].

These adjustments result in a significant change in the time series properties of the historical real yield and MRP, as shown in Figure 3.

FIGURE 3: ROLLING 30-YEAR AVERAGES AFTER ADJUSTING HISTORICAL REAL YIELDS FOR UNEXPECTED INFLATION



Increasing the yields between 1940 and 1985 to offset the effects of unexpected inflation and using the true real yields from 1986 to 2013 increases the standard deviation of the adjusted MRP to 1.5 per cent, which is the same as the standard deviation of the real return on equity[33].

[31] Lally (October 2013), p. 30.
[32] To produce an average real yield of 3.6 per cent across the entire sample period requires increasing each real yield from 1940 to 1985 by 3.34 percentage points.
[33] The average real return on equity is 8.4 per cent, which is larger than the Siegel-adjusted average MRP of 4.8 per cent. In relative terms the standard deviation of the adjusted MRP series is significantly higher than the real return on equity.

The process of adjusting the historical MRP for unexpected inflation negates the reason for favouring this approach over the alternative of adding current expected inflation to the historical average real return on equity. As the alternative approach requires fewer assumptions to be made and produces a direct estimate of a relevant CAPM input, it should be used if the QCA is concerned about the effects of historical unexpected inflation.

In our original submission we proposed making a direct estimate of the expected return on the market portfolio by adding current expected inflation to the average historical real return on equity. We also suggested that the QCA should not use the Siegel-adjusted MRP when determining the MRP to be used in the CAPM. In response, Lally claims that it is inconsistent for QTC to argue against the QCA's implementation of the Siegel adjustment (ie, reducing the historical MRP by 1.2 per cent) whilst simultaneously recommending a variant of it[34].

There is no inconsistency and we do not consider our proposal to be a Siegel 'variant' even though it is a way of solving the problem identified by Siegel. Our reasons for proposing this approach had nothing to do with this problem. We proposed this approach because:

- The QCA has regard to historical estimates of the MRP, but does not use historical data to directly estimate the expected return on the market portfolio, which is a required input in the CAPM.
- There is no evidence to suggest that the expected return on the market portfolio moves point-for-point with changes in the nominal risk-free rate (up or down). Using historical data to make a direct estimate of the expected return on the market portfolio addresses this issue.
- A relatively stable estimate of the expected return on the market portfolio reduces the risk of the cost of equity being under-estimated during 'flight to quality' and 'flight to liquidity' periods. It also reduces the risk of the cost of equity being over-estimated during periods where rising risk-free rates are not accompanied by increased inflation expectations.

The low level of variation in the implied cost of equity estimates produced by SFG's implementation of the DDM suggests that the expected return on the market portfolio is relatively stable. This provides further support for using historical data to directly estimate the expected return on the market portfolio.

QTC's proposed approach is valid even in the absence of the problem identified by Siegel and is therefore too broad to be considered a Siegel 'variant'.

Lally's recommendation

Lally recommends the QCA give equal weight to the historical Ibbotson MRP estimate of 6.2 per cent and Siegel-adjusted historical MRP of 5.0 per cent (6.2 per cent + 2.4 per cent – 3.6 per cent)[35]. QTC does not agree with this recommendation.

Evidence has not been provided to demonstrate that Siegel-adjusted MRPs are regularly used by investors or valuation experts. KPMG's 2013 Valuation Practices Survey reports:

> *'Survey participants overwhelmingly are using an equity (market) risk premium (EMRP) for Australia of 6 percent, with some bias towards 7 percent.'* [36]

[34] Lally (October 2013), p. 23
[35] Lally (October 2013), p. 30
[36] KPMG, *Valuation Practices Survey 2013*, p. 16. It should be noted that the survey also reports that only 52 per cent of survey participants use the spot 10-year risk-free rate in the CAPM.

Furthermore, none of the independent valuation experts considered in Ernst & Young's 2012 report used an MRP of less than 6.0 per cent[37]. This suggests that Siegel-adjusted MRPs are not being used in practice (at least by practitioners), and therefore are unlikely to be reflected in market prices and expected returns.

If the QCA is concerned about the impact of historical unexpected inflation, an appropriate approach is to directly estimate the expected return on the market portfolio by adding current expected inflation to the long-term average real return on equity. This approach requires fewer assumptions (eg, an estimate of the true average real yield since 1883 is not required) and produces estimates that are consistent with forward-looking approaches such as SFG's implementation of the DDM.

QTC remains of the view that the QCA should assign a zero weight to the Siegel-adjusted historical MRP when determining the cost of equity.

Independent valuation expert reports

Lally suggests that valuation experts use a risk-free rate that is higher than the prevailing 10-year risk-free rate is because their task is to value a series of perpetual cash flows. When the observable term structure is relatively steep the valuation expert would need to speculate on rest of the term structure in order to discount the longer-term cash flows[38]. Consequently, the single discount rate that is applied to the perpetual cash flows will reflect a risk-free rate that is higher than the prevailing 10-year risk-free rate. Lally presents a hypothetical example that produces a long-term discount rate of 4.6 per cent compared to a 10-year rate of 3.5 per cent.

There are a number of problems with Lally's hypothetical example and the conclusions drawn from it.

Firstly, a relatively steep risk-free yield curve out to 10 years can be explained by the risk premium required by investors to compensate for the higher interest rate risk (ie, duration) associated with 10-year bonds. The risk premium will tend to be high when the expected interest rate volatility is high. However, higher expected interest rate volatility has a dampening effect on very long-term interest rates due to the higher convexity of very long-term bonds. As a result, the term structure beyond 10 years can be flat or even downward sloping for long maturities even if interest rates are expected to rise[39]. This is particularly relevant given the high level of implied interest rate volatility during 2012 as shown in Figure 4[40].

[37] Ernst & Young, *Market evidence on the cost of equity. Victorian gas access arrangement review 2013-2017*, November 2012, p. 23

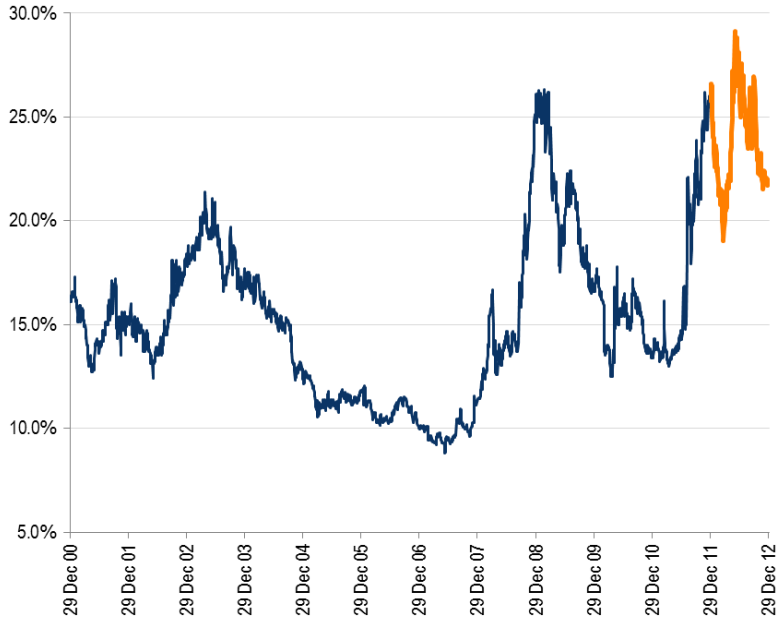
[38] Lally (October 2013), pp.24-25.

[39] For a more detailed discussion of the convexity effect see:

i. A. Ilmanen, *Convexity Bias and the Yield Curve*, September 1995.
ii. M. Fisher, *Forces That Shape the Yield Curve: Parts 1 and 2*, March 2001, pp. 29-30.
iii. R. Litterman, J. Scheinkman & L. Weiss, *Volatility and the Yield Curve*, The Journal of Fixed Income.

[40] The average implied 1-year swaption volatility on a 10-year swap between 2000 and 2011 was 15.3 per cent compared to an average of 23.8 per cent during 2012.

FIGURE 4: IMPLIED 1-YEAR / 10-YEAR SWAPTION VOLATILITY



Source: Bloomberg

Secondly, Lally does not explain his choice of parameters used in the example, or why those parameters were likely to have been used by the valuation experts. Furthermore, the risk-free rates produced in the example do not account for the convexity effect described above.

Thirdly, it is inconsistent of Lally to use a theory of the term structure that he considers to be incorrect to produce the long-term discount rates that form the basis of his final conclusion. Lally states that the expectations hypothesis is only used to 'simplify the example and not in the belief that it is correct.'[41] However, the long-term risk-free rate of 4.6 per cent in his example depends on the expectations hypothesis being correct.

Finally, Lally does not consider alternative explanations that are based on observable market data and do not require assumptions to be made about interest rate expectations.

In QTC's view it is more likely that the valuation experts adjusted their risk-free rates upwards during 2012 because the factors that led to low risk-free rates could not have been expected to simultaneously lower the cost of equity by the same amount.

Extracts from independent expert valuation reports

The following extracts from various independent expert valuation reports suggest that risk-based factors, rather than an adjustment for the assumed term structure beyond 10 years, are more likely to explain the use of a higher 10-year risk-free rate:

Lonergan Edwards expert report for Stanmore Coal Limited

> *'The currently prevailing 10 year Commonwealth Government bond rate is well below historical levels and reflects, inter-alia, the weak outlook for global economic growth (and its impact on the outlook for the Australian economy) and the effect of quantitative easing measures by major overseas central banks. At the same time credit spreads have generally increased to offset the impact of the lower risk-free rate. Accordingly, in our view the application of current (low) government bond yields and long-term average market risk premiums is inappropriate in the context of determining long-*

[41] Lally (October 2013), p. 25.

term required equity rates of return (discount rates). ***As it is difficult to reliably measure short-term movements in the market risk premium we have therefore increased the risk-free rate for the purpose of estimating required equity rates of return only.'*** [42]

In the same report Lonergan Edwards stated that it would be appropriate to adopt a correspondingly higher market risk premium if a higher risk-free rate not been adopted[43].

Ernst & Young expert report for MacMahon Holdings

'The ten-year government bond market is the most widely adopted proxy for the risk free rate. Where the term of the cash flow forecast period to which the WACC is applied either exceeds ten years or is less than 10 years, the 10-year yield is still broadly accepted in practice as an appropriate substitute due to the depth of the market.

We believe that the current risk free rate (usually estimated with reference to the 10 year Government bond rate) is at historically low levels. Most market observers regard this as inconsistent with current share prices, the observed volatility in markets and general economic uncertainty. ***In response, many valuers have either used a normalised risk free rate, increased their estimates of the market risk premium or have included an additional risk factor in their calculations of the cost of equity. Our preference is to normalise the risk free rate to best reflect the longer term position.'*** [44] *[emphasis added]*

Some experts used longer-term averages rather than prevailing rates to estimate the risk-free rate. It is unlikely that this practice was motivated by an assumption about the shape of the risk-free yield curve beyond 10 years.

Grant Thornton expert report for oOh!media Group Limited

'Given the current volatility in the global economy due to the uncertainty associated with European debt markets, we have observed the yield on the 10 year Australian Commonwealth Government Bond over a longer period. Based on the average yield for the period 1 January 2011 to 12 December 2011, we have adopted risk free rate of 5%.' [45]

Grant Thornton adopted the same approach in its independent expert report for Nexbis Limited. Again citing uncertainty with European debt markets, a risk-free rate of 4.5 per cent was used based on the average 10-year Commonwealth Government bond yield between 1 April 2011 and 2 April 2012[46].

Finally, the valuation experts and analysts interviewed by Incenta are currently using an average value for the 10-year risk-free rate of 5.0 per cent, which is higher than the current spot rate to accommodate a 'through the cycle' approach for estimating the cost of equity[47]. This approach is similar to using a longer-term average of the 10-year risk-free rate.

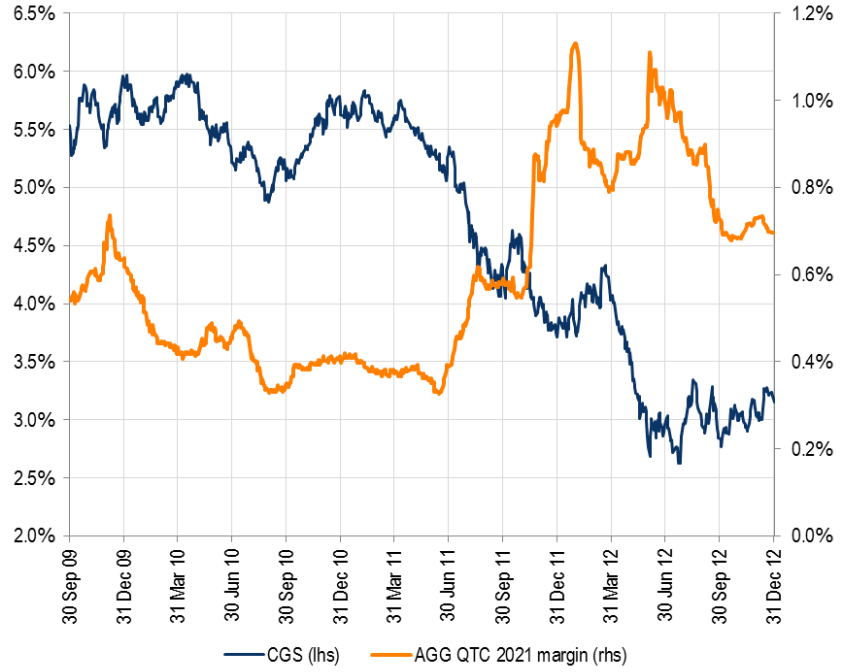
[42] Lonergan Edwards, *Independent expert report for Stanmore Coal Limited*, October 2012, p. 46.
[43] Lonergan Edwards (October 2012), p. 46
[44] Ernst & Young, *Independent expert report for MacMahon Holdings*, January 2013, p. 56.
[45] Grant Thornton, *Independent expert report for oOh!media Group Limited*, January 2012, p. 147.
[46] Grant Thornton, *Independent expert report for Nexbis Limited*, May 2012, p. 74.
[47] Incenta (June 2013), p. 27.

Factors that affect the risk-free rate but not the cost of equity

Adjusting the risk-free rate used in the CAPM is appropriate if the prevailing risk-free rate is being affected by factors that cannot be expected to have the same effect on the required returns on risky/less liquid assets. These adjustments are not based on an expectation of where interest rates are expected to be in the future, or the shape of the yield curve beyond 10 years.

Figure 5 displays the margin between the QTC 14 June 2021 ('QTC 2021 bond') bond yield and the interpolated Commonwealth Government Security (CGS) yield for the same maturity date. As the principal and interest payments on the QTC 2021 bond are explicitly guaranteed by the Commonwealth Government and the State Government of Queensland, the yield margin cannot be attributable to credit risk or expected losses due to default[48]. Therefore, the yield margin is a clean market-based measure of the liquidity premium that investors place on CGS relative to the QTC 2021 bond. Expressed differently, the yield margin represents the value of the superior liquidity of CGS.

FIGURE 5: CGS YIELD VS. YIELD MARGIN BETWEEN THE COMMONWEALTH AND STATE GOVERNMENT GUARANTEED QTC 2021 BOND AND CGS



Source: QTC data

The average yield margin in 2012 was 0.9 per cent, which is significantly higher than the average margin of 0.5 per cent between September 2009 and December 2011. This suggests that events during 2012, such as European sovereign debt crisis, had a significant impact on the liquidity premium that investors placed on CGS relative to other assets, including those with exactly the same level of credit risk.

The increase in the yield margin during 2012 coincided with a sharp fall in CGS yields. This suggests that the fall in CGS yields was not being matched by a point-for-point reduction in the required returns on risky/less liquid assets. To account for this effect the valuation experts adopted a range of approaches, but the ultimate objective was to not fully pass through the fall in CGS yields to their estimates of the expected return on the market portfolio.

[48] Like CGS, the QTC 2021 bond can be held by financial institutions to meet the Liquidity Coverage Ratio (LCR) under the Basel III capital requirements.

QTC considers these outcomes to be relevant to any application of the CAPM.

It is reasonable for a valuation expert to conclude that the fall in risk-free rates during 2012 was not caused by factors that would be expected to cause the required return on risky assets such as equity to fall by exactly the same amount, if at all. As some valuation experts referred to the difficulty of estimating the MRP during these periods, a pragmatic solution was to use a higher risk-free rate in the CAPM. However, these adjustments are based on risk factors rather than an assumption about the shape of the yield curve beyond 10 years.

Proposed way forward

In QTC's view, the QCA current practice of estimating the MRP and then rounding the final value to the nearest whole per cent has created unnecessary volatility in the cost of equity for regulated businesses. This volatility arises because a 6.0 per cent MRP has been consistently added to the prevailing 5-year risk-free rate.

To address this issue, QTC considers that a small number of unrounded estimates of the expected return on the market portfolio can be used to produce cost of equity estimates with the same longer-term average value as the QCA's current approach and significantly less variation over time. The estimates used are as follows:

- The implied return on the market portfolio from SFG's implementation of the DDM[49]
- The long-term historical average real return on equity converted into nominal values based on current expected inflation, and
- The long-term historical average MRP plus the prevailing 10-year risk-free rate[50].

The alternative estimate of the expected return on the market portfolio is a simple unrounded average of the above estimates.

The results from this approach between December 2002 and June 2013 are presented in Table 1. The long-term average real return and MRP have been calculated on a cumulative basis from 1883 up to the relevant date. Expected inflation of 2.5 per cent has been used to convert the historical real return on equity into nominal values. The expected returns on the market portfolio exclude any benefits of dividend imputation.

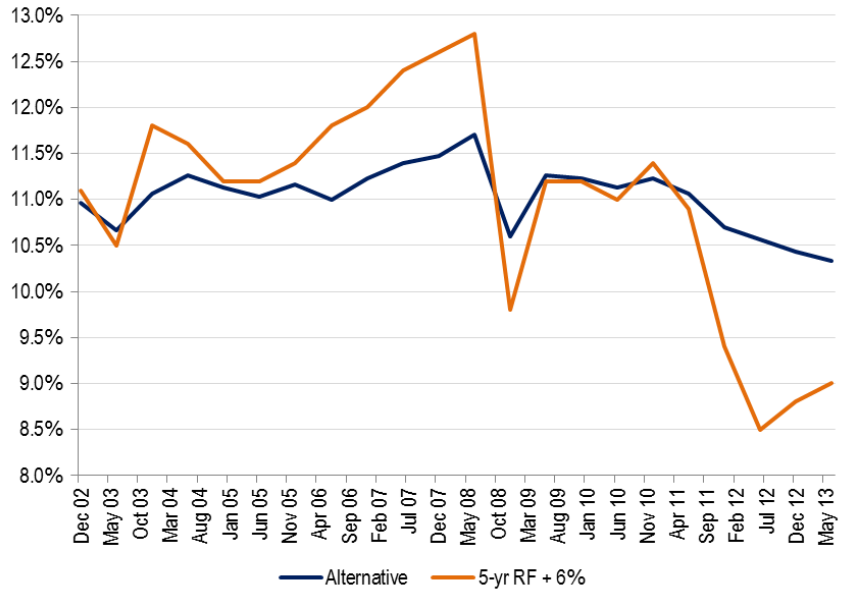
[49] SFG, *Cost of equity estimates implied by analyst forecasts and the dividend discount model*, October 2013, p. 27 (Table 4).
[50] The risk-free rates are based on 20 day averages.

TABLE 1: ALTERNATIVE APPROACH FOR ESTIMATING THE EXPECTED RETURN ON THE MARKET PORTFOLIO TO BE USED IN THE CAPM

Date	5-yr RF	10-yr RF	DDM (SFG)	Historical real return (CPI= 2.5%)	Historical MRP plus 10-yr RF	E(Rm) Alternative	E(Rm) 5-yr RF + 6%
Dec 02	5.1%	5.5%	10.3%	11.1%	11.5%	**11.0%**	**11.1%**
Jun 03	4.5%	4.9%	10.0%	11.1%	10.9%	**10.7%**	**10.5%**
Dec 03	5.8%	5.8%	10.3%	11.1%	11.8%	**11.1%**	**11.8%**
Jun 04	5.6%	5.9%	10.8%	11.1%	11.9%	**11.3%**	**11.6%**
Dec 04	5.2%	5.3%	10.8%	11.2%	11.4%	**11.1%**	**11.2%**
Jun 05	5.2%	5.2%	10.6%	11.2%	11.3%	**11.0%**	**11.2%**
Dec 05	5.4%	5.4%	10.6%	11.3%	11.6%	**11.2%**	**11.4%**
Jun 06	5.8%	5.8%	9.7%	11.3%	12.0%	**11.0%**	**11.8%**
Dec 06	6.0%	5.8%	10.2%	11.4%	12.1%	**11.2%**	**12.0%**
Jun 07	6.4%	6.3%	10.2%	11.4%	12.6%	**11.4%**	**12.4%**
Dec 07	6.6%	6.3%	10.2%	11.5%	12.7%	**11.5%**	**12.6%**
Jun 08	6.8%	6.7%	10.5%	11.5%	13.1%	**11.7%**	**12.8%**
Dec 08	3.8%	4.2%	10.7%	11.0%	10.1%	**10.6%**	**9.8%**
Jun 09	5.2%	5.6%	11.3%	11.0%	11.5%	**11.3%**	**11.2%**
Dec 09	5.2%	5.6%	10.6%	11.3%	11.8%	**11.2%**	**11.2%**
Jun 10	5.0%	5.4%	10.5%	11.3%	11.6%	**11.1%**	**11.0%**
Dec 10	5.4%	5.6%	10.8%	11.2%	11.7%	**11.2%**	**11.4%**
Jun 11	4.9%	5.2%	10.7%	11.2%	11.3%	**11.1%**	**10.9%**
Dec 11	3.4%	3.9%	11.1%	11.1%	9.9%	**10.7%**	**9.4%**
Jun 12	2.5%	3.0%	11.6%	11.1%	9.0%	**10.6%**	**8.5%**
Dec 12	2.8%	3.3%	10.9%	11.1%	9.3%	**10.4%**	**8.8%**
Jun 13	3.0%	3.6%	10.2%	11.1%	9.7%	**10.3%**	**9.0%**
Average	5.0%	5.2%	10.6%	11.2%	11.3%	***11.0%***	***11.0%***
Standard deviation	1.2%	1.0%	0.4%	0.1%	1.1%	***0.3%***	***1.2%***

Although the average expected return on the market portfolio is the same for both approaches, the alternative approach displays significantly less variation over time (Figure 6). The standard deviation of the estimates produced by the alternative approach is 0.3 per cent compared to 1.2 per cent for the QCA's current approach.

FIGURE 6: EXPECTED RETURN ON THE MARKET PORTFOLIO – ALTERNATIVE VERSUS CURRENT APPROACH



In QTC's view, further consideration of this type of approach may benefit the QCA's cost of capital review.