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## Return and Risk Profiles for Investments

Prepared by

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For Clean Energy Finance Corporation

November 2014

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## Background

1. This opinion has been prepared jointly by Dr Steven Bishop and Professor Robert Officer.
2. Dr Steven Bishop is an Executive Director of Education and Management Consulting Services Pty Ltd, a business that specialises in business valuations and cost of capital estimation for regulatory and business purposes. A brief Curriculum Vita is attached.
3. Professor Robert Officer is a Professor Emeritus of the University of Melbourne and has been closely involved in company tax policy and the effect of changes in company tax systems since the early 1980's. He is a board member of a number of fund managers. He has written extensively on cost of capital matters. A brief Curriculum Vita is attached.

## Terms of Reference

4. We have been asked for an independent view of the likely risk profile of an investment portfolio that would be expected to earn a benchmark rate of return in the order of CPI plus 650 basis points. The 650 basis points comprises a benchmark of 450 basis points plus the cost of operating a fund estimated at 200 basis points. If we take the Reserve Bank of Australia's target range for the CPI of 200 – 300 basis points then the overall benchmark rate of return is in the order of 850 to 950 basis points.

## Summary of Opinion

5. A basic tenet in finance is that long term returns are a function of risk. For the CEFC to achieve a higher benchmark return than the current benchmark would necessitate moving from its current 90% debt-based portfolio towards equities and hence taking a higher risk profile.
6. In our opinion the risk profile of a portfolio that was expected to earn 650 basis above the CPI would be similar to the average risk of a listed equity portfolio. Such a portfolio could be formed from a mix of different asset classes, some with higher and some with lower than the average market risk, a number of which are understood as not falling within the available CEFC investment universe which is limited under its Act to Australia-only investments and only financial assets (e.g. not property).
7. Our view is informed by a number of data points. One was from estimating the risk return trade-off as implied by the Capital Asset Pricing Model. Given the current (relatively historically low) risk free rate using the yield on Commonwealth Government Securities as a proxy and the widely used market risk premium of 6%, the expected return on a

portfolio of securities of average risk is circa 930 basis points. This is within the range of the foreshadowed benchmark rate of return.

8. We have examined the historical spread of listed Australian and Corporate Bond yields over the CPI by rating. If history is a guide to the future then the CEFC would need to move to sub-investment grade debt if its portfolio was restricted to debt securities. Alternatively it would need to lever up a portfolio of investment grade debt to earn the required yield to meet the proposed new benchmark. This increases risk but is not, to our understanding, permitted under the CEFC Act.
9. The final data point was to examine the portfolio mix of the Future Fund which has been set a similar target return. While we have not quantified the risk characteristics of the asset classes, we note that there is a substantial investment in classes with higher risk than investment grade debt, particularly Australian and Global equities.

## Basis for Opinion

10. Our view that the proposed benchmark is most likely to be achieved with an increase in the risk profile of the portfolio to one reflecting the average risk of equities is informed by:
  - the messages from the Capital Asset Pricing Model ["CAPM"] which is the current paradigm in the finance discipline. This model is widely used in the business and regulatory processes in Australia;
  - using the CAPM to assess the likely risk profile of a portfolio of investments that can be expected to meet the proposed revised benchmark;
  - examining the historical record of yields on investment grade bonds over and above the CPI to establish whether a portfolio of such bonds would meet the proposed revised benchmark; and
  - examining the nature of investments (asset classes) undertaken by the Future Fund which has been subject to a similar benchmark return rate. We understand that the proposed revised benchmark for the CEFC mirrors that of the Future Fund.

## Framework

11. A basic tenet of finance theory is that investors act as if they require a reward for bearing risk – the higher the risk, the higher the required reward. The required reward is usually expressed in terms of a positive premium over a "risk free" rate of return.
12. The Capital Asset Pricing Model ["CAPM"] is the current paradigm in Finance. It reflects this basic tenet by expressing an expected rate of return on an asset as a linear function of risk with the risk premium applying above the risk free rate.
13. The CAPM describes the pricing of assets in the following way.

$$E(r_i) = r_f + E(\text{MRP}) \beta_i \quad (1)$$

Where:

$E(r_i)$  is the expected rate of return from investing in the asset;

$r_f$  is the risk free rate;

$E(\text{MRP})$  is the expected market risk premium and it is positive. It is defined as the expected return on the market  $E(r_m)$  less the risk free rate ( $r_f$ )

- $\beta$  is the beta or risk of the asset relative to the market (It reflects the relative contribution of the asset to the risk of a well 'diversified portfolio' e.g. the market portfolio).
14. The model is widely used for estimating the required rate of return for investments in both 'real' and financial assets. By way of illustration, all Australian regulators use the CAPM for estimating the cost of equity in the building block approach to pricing the use of transmission and distribution assets in the utility sector. The regulators include ACCC, Australia Energy Regulator, ESCOSA (SA), Economic Regulation Authority (WA), IPART (NSW), Queensland Competition Authority (Qld). The regulated sectors include electricity, gas, water, telecommunications, ports and rail. Surveys of the private sector find the CAPM to be the most widely used approach to estimating the cost of equity. For example Kester et al (1999)<sup>1</sup> found that 73% of respondents used the CAPM for estimating the cost of equity. Truong, Partington and Peat (2005)<sup>2</sup> found 72% of respondents in their Australian Survey used the CAPM. Bishop (2009)<sup>3</sup> found 87% of respondents to the Australian survey used the CAPM for this purpose.
  15. Typically the risk free rate used is the yield on a 10 year Commonwealth Government Security. This rate has also been used when estimating the market risk premium and it is essential that there be consistency in the term of the risk free rate used in both parts of the CAPM equation – the risk free rate and the market risk premium.
  16. In theory the CAPM can be used to assess an expected return for all financial assets e.g. both debt and equity. In practice, however the required yield on debt / bonds can be directly observed for traded debt. The risk profile is usually assessed from some form of rating process.

## Risk Return Profile

17. In this section we examine the current and historical risk return trade-off for equity and debt securities. From this we can infer the risk profile necessary to provide an expected return of 850 to 950 basis points under current capital market conditions.

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<sup>1</sup> Kester, G., Chang, R., Echanis, E., Haikal, S., Isa, M., Skully, M., Kai-Chong, T. & Chi-Jeng, W., "Capital budgeting practices in the Asia-Pacific Region: Australia, Hong Kong, Indonesia, Malaysia, Philippines, and Singapore, Financial Practice and Education, vol. 9, 1999

<sup>2</sup> Truong G, G Partington & M Peat, "Cost-of-Capital Estimation and Capital-Budgeting Practice in Australia", Australian Journal of Management, Vol. 33, No. 1 June 2008

<sup>3</sup> Bishop, S., "A conservative and consistent approach to WACC estimation by valuers", Value Advisor Associates, 2009.

## CAPM and Equity Risk Return Trade-off

18. The current yield on 10 year Commonwealth Government Securities ["CGS"] is 3.3% (20 Nov 2014). We also note that the yield on Indexed CGS is 1.39%.<sup>4</sup> Using the Fisher equation below implies a market expected inflation rate of 1.8%. This is a market based view of inflation which may or may not coincide with the actual CPI used in the proposed benchmark for CEFC.

$$(1 + \text{Nominal Rate}) = (1 + \text{Real Rate}) (1 + \text{Expected Inflation})$$

19. Adding the market risk premium most commonly used for the CAPM of 6% to the current risk free rate provides an expected return on a market portfolio of equity securities of 930 basis points i.e. from the CAPM.

$$\begin{aligned} \text{Expected Return} &= r_f + E(\text{MRP}) \beta \\ &= 3.3 + 6 \times 1 \\ &= 9.3\% \end{aligned}$$

20. The 6% expected market risk premium ["MRP"] has been adopted by most regulatory bodies in Australia for use in estimating the required rate of return on capital when setting prices for the regulated businesses cited above.<sup>5</sup> Further survey evidence of business practice suggests that 6% is the most widely used estimate for the MRP.
21. The estimate is largely derived from the long term average of historical excess returns of the market over the risk free rate. We have reservations about the level and consistent use of this number over time but acknowledge that it is widely used.<sup>6</sup>
22. The expected market return of circa 930 basis points derived from the CAPM is within the benchmark range proposed for the CEFC. Consequently we can assert that the benchmark of 850 to 950 basis points reflects a required rate of return commensurate with the average risk of equity securities i.e. those with a beta of 1.

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<sup>4</sup> RBA website

<sup>5</sup> A detailed discussion of this choice is available in Australian Energy Regulator, "Better Regulation, Explanatory Statement, Rate of Return Guidelines (Appendices) December 2013 pp78 - 113

<sup>6</sup> Bishop, Fitzsimmons, Officer, 'Adjusting the market risk premium to reflect the global financial crisis', The Finsia Journal of Applied Finance, Issue 1, 2011

23. The actual outcome for a stock of portfolio of average risk (beta of 1) will, of course, be different from this. This is the nature of risk. However the probability of the outcome being above or below should be equal.
24. While the actual outcome will have a similar probability of being above or below this estimate, of concern is the downside risk to capital invested in a portfolio of equities with average risk overall. If it is assumed that distribution of possible returns on the market is normally distributed (as is the case in the CAPM), then the profile of possible returns can be derived from the expected return and from the standard deviation of the distribution.
25. Under the assumption that the distribution of possible market returns is log normal<sup>7</sup>, there is a 16% chance that the actual outcome will fall below one standard deviation of the mean (or expected outcome), a 12% chance of the outcome being below 2 standard deviations.
26. While we do not know the standard deviation of the forward view of possible returns on the market we can infer from the historical record. Such an inference is consistent with the assumption that the forward view of the MRP.
27. The standard deviation of annual market returns for the Australian Stock Exchange over the period 1883 to 2013 is 17.5%.<sup>8</sup> For illustrative purposes we assume the distribution of expected returns is currently described by a mean of 9.3% for a single year and a standard deviation of 17.5%.<sup>9</sup>
28. Consequently there is an 18% chance that the actual return will be negative and erode capital.
29. Figure 1 shows the cumulative probability of the distribution of possible returns under an assumption that returns are described by a log normal distribution with a mean return (expected return) of 9.3% and a standard deviation of 17.5%. The area under the curve to the left of zero is the probability of the return being negative i.e. 18% in this case.

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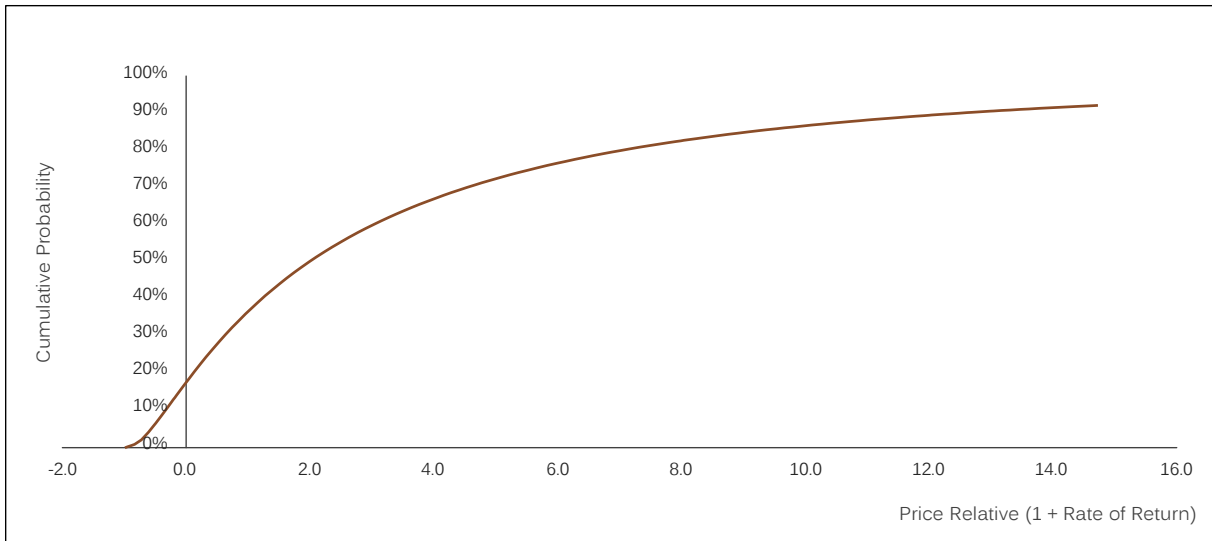
<sup>7</sup> This assumes the log of the price relative ( $1 + \text{rate of return}$ ) is normally distributed. Under a log normal distribution, the maximum loss is 100% of capital which better suits an assumption of limited liability.

<sup>8</sup> Data from Officer see Officer 1989: Officer, R. R. (1989), 'Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective', in Ray Ball, Philip Brown, Frank J. Finn and R. R. Officer(eds.), Share Markets and Portfolio Theory: Readings and Australian Evidence, University of Queensland Press., Bloomberg

<sup>9</sup> The 9.3% uses a 10 year bond rate rather than a one year rate



Figure 1: Cumulative Distribution of Possible Return on an Equity Portfolio of Average Risk



30. Table 1 describes the expected return from a portfolio of average market equity risk over a 1, 3 and 5 year period. It also shows the probability of a negative return and therefore erosion of capital. The multi-year estimates were derived with an assumption that annual expected returns are log normally and independently distributed.

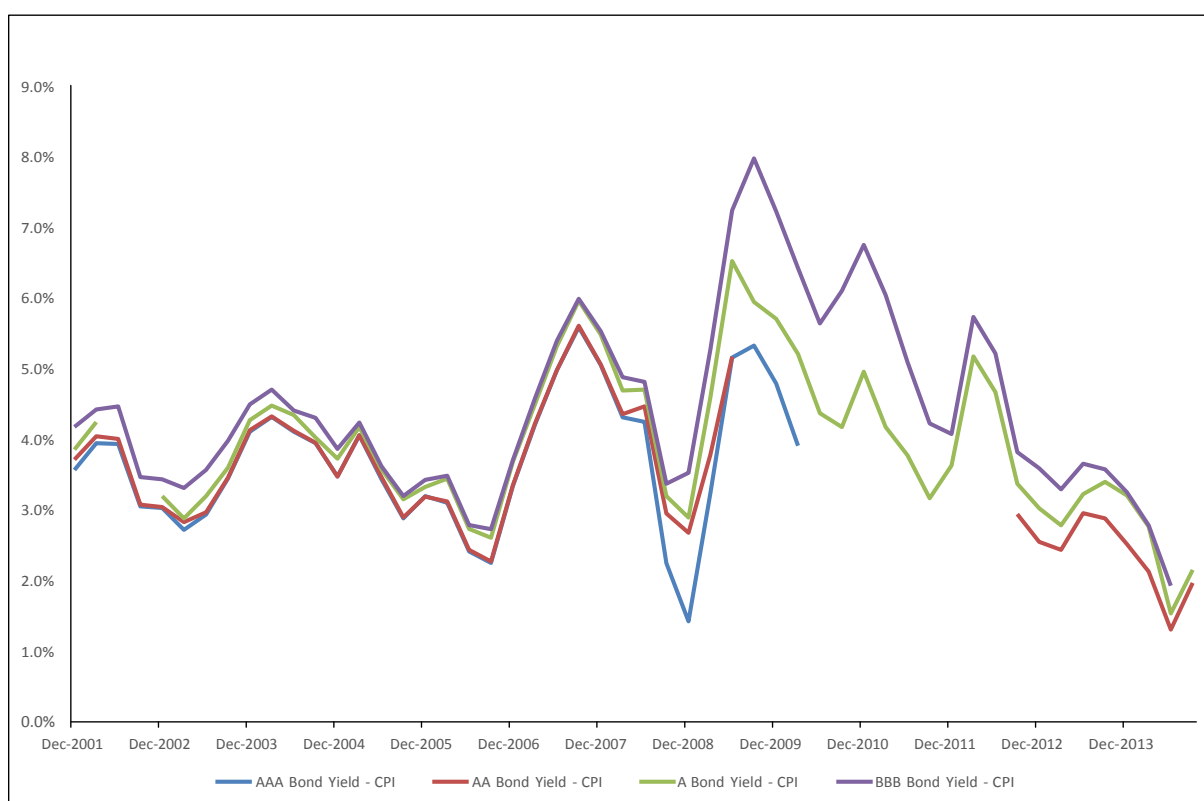
Table 1: Probability of eroding capital over various time periods

	One Year	Three Year	Five Year
Expected return	9.3%	27.9%	46.5%
Standard Deviation	17.5%	30.3%	39.1%
Probability of a Negative Return	17.6%	16.5%	14.6%

## Debt Yields and Risk Return Trade-off

31. We understand that portfolio of investments in the current CEFC portfolio are largely debt securities. A question arises as to whether maintaining a debt portfolio similar to the current mix would yield sufficient returns to meet the proposed revised benchmark.
32. We cannot answer this directly as we don't have a detailed knowledge of the Corporation's 2013-14 and risk profile of the portfolio. Nevertheless we understand from the Corporation's Annual Report that, as at 30 June 2014, the portfolio has met the current benchmark (including costs) once start-up appropriations are removed from the equation. In this regard we can assert that it is unlikely to meet the higher benchmark without increasing the risk profile. As noted in the prior section, this risk profile would need to have similar risk to the average risk of the market for equities.
33. We have examined the historical record of investment yields for investment grade corporate bonds since 2001 to provide some insight into the spread of yields above CPI actually achieved. Figure 2 presents the yield on traded investment grade bonds less the CPI. Table 2 provides summary statistics for the underlying data for 7 year maturing bonds. Of interest is how often a portfolio of the different rated bonds have achieved the 'premium' over the CPI in the past.
34. We recognise that unlisted bonds / debt may provide a liquidity premium over and above the yields on listed corporate bonds. We understand the CEFC debt investment portfolio is unlisted, consequently it may achieve higher returns than the listed counterpart as is necessary to cover the additional risk.
35. It is apparent from Table 2 that the average yield less the CPI for all ratings falls short of the benchmark of 650 basis points. This suggests that if history repeats itself then a portfolio of listed investment grade corporate bonds would not meet the required benchmark return.
36. Nevertheless there were occasions when BBB rated bond, if acquired at the time, would have provided a sufficient spread. This was during the height of the GFC when the risk spread (e.g. yield less CGS yields) were at historical highs. If BBB bonds were acquired prior to the crisis and had to be sold during the GFC then a substantive loss would have been incurred as prices of existing bonds fell to provide the required risk premium.
37. The market for corporate bonds is relatively illiquid consequently there are some quarters when there isn't a yield reported by Bloomberg. This leads to a different number of observations for the rating categories in Table 2 and therefore non contemporaneous data. This explains the average AAA rated spread being higher than the AA rated spread.

Figure 2: Australian Corporate Bond Yields less CPI



Source: Bloomberg, RBA Website

Table 2: Corporate Bond Spread over CPI 2001 to 2014

	AAA Bond Yield less CPI (%)	AA Bond Yield less CPI (%)	A Bond Yield less CPI (%)	BBB Bond Yield less CPI (%)
Average	3.69	3.42	3.93	4.44
Maximum	5.58	5.60	6.52	7.97
Minimum	1.42	1.30	1.53	1.92
No. Observations	34	40	50	51

Source: Bloomberg, RBA

38. The market for rated debt in the USA is more liquid than in Australia and has data across a wider range of ratings. Table 3 summarises the spread of the yield on bonds less the CPI for the prior year captured quarterly. The yield data is derived from a subset of corporate bonds with the indicated rating. As a result there will be a mix of different maturing debt.
39. It is apparent that, if the investment mandate called for investment in corporate debt, it would be necessary to invest in sub investment grade bonds in the USA to earn, on average, the required 650 basis point spread. There is a step jump in risk from investment to sub-

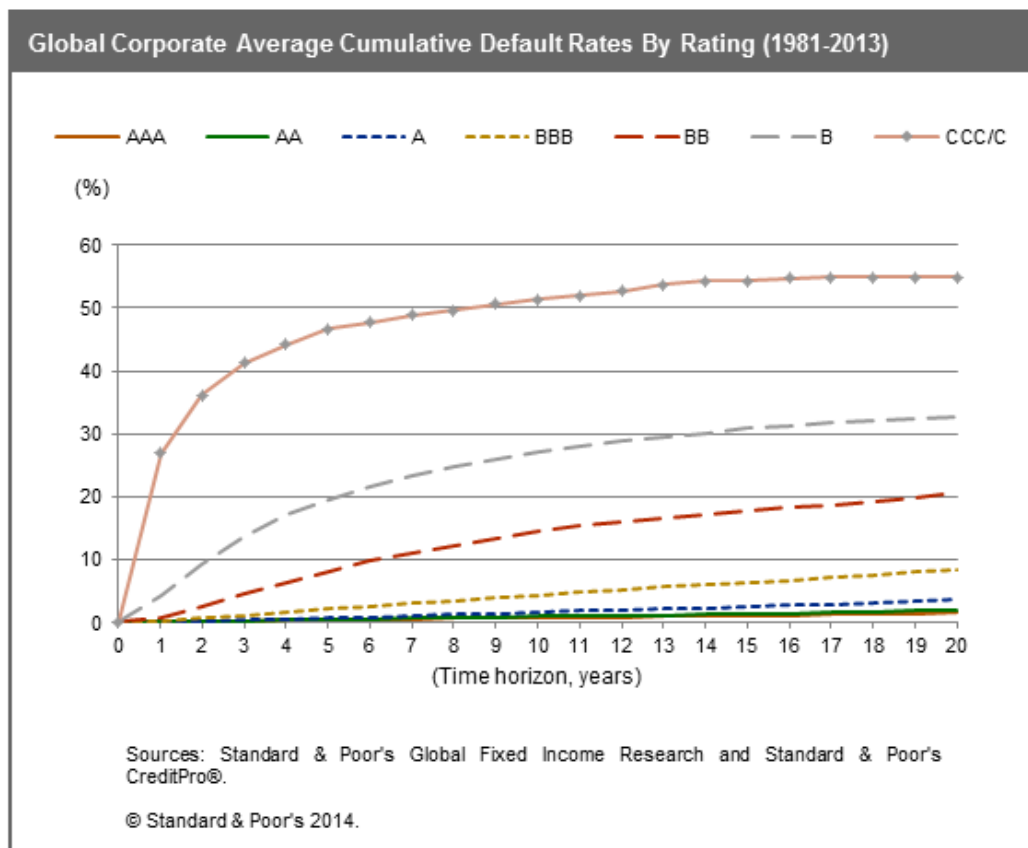
investment grade risk (BBB to lower ratings) as is captured in Figure 3. Figure 3 shows the global cumulative default rates by rating as prepared by Standard & Poors. A question arises as to whether such a step jump is consistent with the CEFC mandate (leaving aside for the moment the legislated requirement that the CEFC's investments be 'solely or mainly Australian based').

Table 3: Bond Spread over CPI 2001 to 2014 - USA Data

	AAA Bond Yield less CPI (%)	AA Bond Yield less CPI (%)	A Bond Yield less CPI (%)	BBB Bond Yield less CPI (%)	BB Bond Yield less CPI (%)	B Bond Yield less CPI (%)	CCC Bond Yield less CPI (%)
Average	1.78	1.93	2.52	3.36	5.18	7.00	12.98
Maximum	5.62	6.93	8.52	10.35	14.81	18.32	33.57
Minimum	-1.12	-0.63	0.01	0.76	2.40	3.53	6.81
No. Observations	53	53	53	53	53	53	53

Source: Federal Reserve Economic Data, (BofA Merrill Lynch US Corporate A Effective Yield)

Figure 3: Standard & Poors Bond Default Rates



Source: Standard & Poors, Default, Transition, and Recovery:2013 Annual Global Corporate Default Study And Rating Transitions™

## Future Fund Portfolio

40. We understand the proposed change in mandate is one similar to that of the Future Fund. “The Future Fund’s mandate is to target a return of at least CPI + 4.5% to 5.5% pa over the long term with acceptable but not excessive risk.”<sup>10</sup> The proposed new CEFC mandate specifies a different requirement – “a portfolio across the spectrum of clean energy technologies that in aggregate must have an acceptable but not excessive level of risk relative to the sector” (emphasis added).
41. The portfolio mix chosen by the Future Fund provides useful guidance as to what a portfolio with acceptable but not excessive risk might look like for a broad-based portfolio of equities designed to meet this target return.
42. Table 4 summarises the asset class mix in the portfolio over the last 5 years. The portfolio is dominated by equity with the debt component decreasing over time.
43. The Future Fund’s performance against the benchmark is captured in Figure 4. This has been extracted from the FY 2014 annual report. It is clear that it is only in recent years that long term cumulative performance has reached the benchmark.

Table 4: Future Fund Portfolio Mix by Asset Class

	30/09/2014	30/06/2013	30/06/2012	30/06/2011	30/06/2010
Australian equities	9.0%	9.7%	10.4%	11.2%	11.8%
Global equities					
Developed Markets	24.4%	23.8%	17.5%	21.3%	21.8%
Emerging Markets	9.7%	7.1%	5.0%	5.1%	3.1%
Private Equity	8.8%	7.3%	6.4%	3.9%	3.0%
Property	5.8%	6.0%	6.4%	6.5%	5.0%
Infrastructure	7.4%	8.1%	6.4%	5.3%	4.5%
Debt Securities	11.3%	15.6%	18.3%	19.4%	21.9%
Alternative Assets	13.8%	16.6%	19.0%	18.6%	15.6%
Cash	9.8%	5.8%	10.6%	8.8%	13.1%

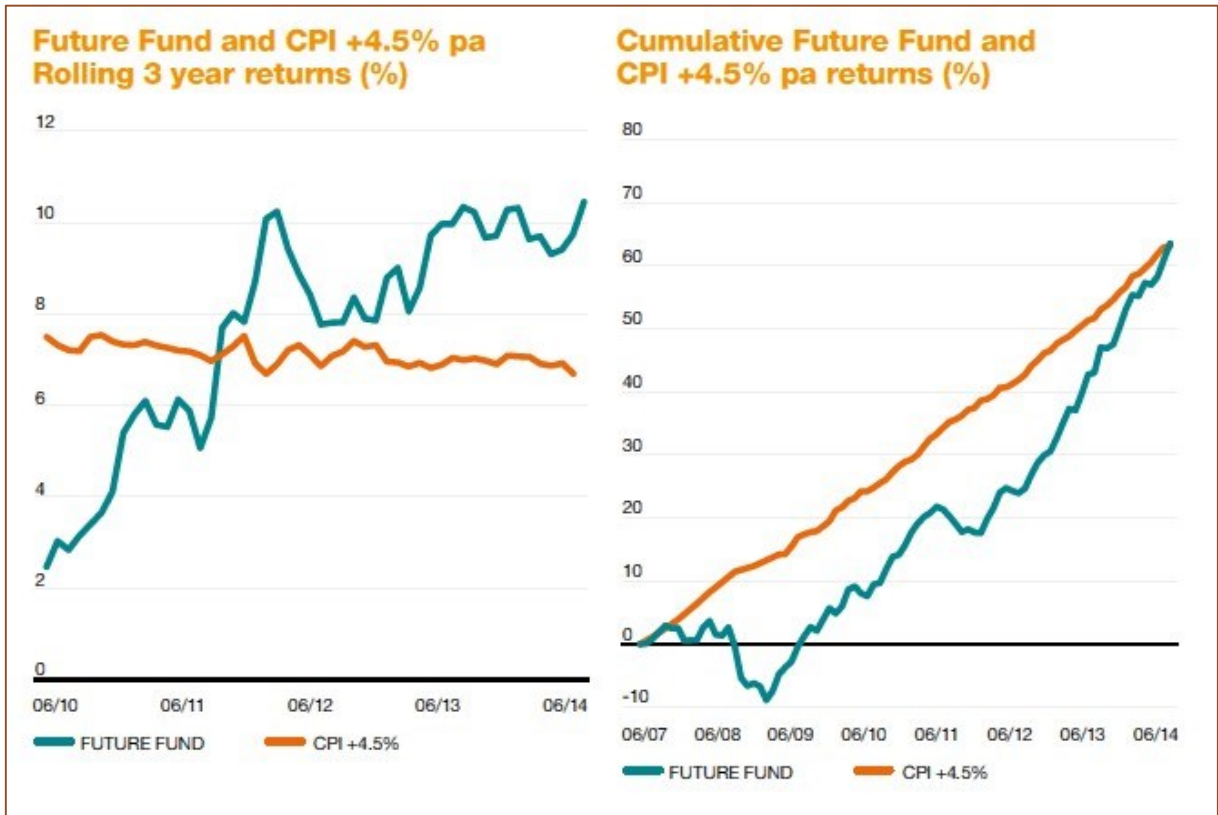
Size AUD M	104,483	88,889	77,012	74,213	63,074
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Annual FY Return FY	14.3%	15.4%	2.1%	2.9%	10.6%
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Source: Future Fund Update Reports on Website

<sup>10</sup> See footnote 3, Future Fund Portfolio Update at 30 September 2014

Figure 4: Future Fund Performance against the benchmark



44. The investment opportunity set for the CEFC is substantially narrower than the Future Fund, an issue not addressed at this stage, however it is apparent from the investment strategy of the Future Fund that it takes a risk profile much higher than a debt portfolio – as evidenced by the large equity component of the portfolio.

## Biographical Notes

### Professor Bob Officer

B AgSc (Melbourne), M AgEc (New England), MBA (Chicago), PhD (Chicago), SF Fin

Bob has primarily focused on academic and consulting work. His expertise and research includes corporate and international finance, capital markets, industrial organisation, takeovers and antitrust.

He has played a substantive role in advising both regulatory bodies and regulated bodies on a whole range of issues associated with regulatory price setting for infrastructure assets. He has an international reputation for his pioneering work on the impact of dividend imputation on valuation

Bob was Chair of Victorian Funds Management Corporation until May 2006 with about \$37 billion under management and he has been integrally involved in the Australian Pension Fund industry for many years. He has held several other appointments including Chairman of both the Victorian and National Commissions of Audit, and has consulted to a large number of public, private and government organisations.

He sits on the Board and Investment committee on a number of Fund Managers Acorn Capital, CP2, JCP Investment Partners. In addition he has held seats on a number of significant government and private sector organisations.

Bob has held Professorial positions in Finance at Monash University, University of Queensland and Melbourne Business School. He has held visiting Professor roles at Stanford Graduate School of Management and the Wharton School. He is Professor Emeritus at University of Melbourne.

### Dr Steven Bishop

B Ec (Monash), MCom (Hons) (UNSW), PhD (AGSM), FCPA

Steve is a valuation and corporate finance consultant. He is a founding director of Education and Management Consulting Services Pty Ltd ["EMCS"].

Steve's primary consulting interest is around the application of valuation insights to business decisions. In particular, he has guided the implementation of value-based management in a number of large and medium sized corporations. In addition, he has prepared a large number of expert opinions on matters relating to the cost of capital and business valuations.

Assignments have included business valuations for compliance, cost of capital estimation, merger and acquisition advice, the development of strategic and business plans, strategy advice, transfer pricing analysis and aspects of price determination in utility regulation.

Steve has worked in a number of industries including Aquaculture, Chemicals, Electricity, Financial Services, Forestry, Gas, Infrastructure, Minerals and Mining, Property, Rail, Retailing, Shipping & Transportation, Telecommunications, Water and Waste-water.

Steven was also a founding Executive Director of Value Adviser Associates, a business valuation and corporate advisory practise with offices in Melbourne, Brisbane and Adelaide. .Prior to VAA, Steve was a partner in L.E.K. Consulting, a world-wide management consultancy business; with Marakon Associates, as a senior manager in the firm that was a foundation consulting business in value based management principles and application; with Andersen Consulting as a Senior Manager in the Strategic Services section.

Prior to joining the consulting sector, Steve worked as an academic for over 15 years. He held academic positions at AGSM, University of NSW, Monash, Melbourne Business School and the Bendigo Institute of Technology. Steven co-authored "Corporate Finance" by Bishop, Faff Oliver and Twite (now in the 5th edition). He continues to teach in the Masters of Applied Finance offered by Macquarie University.