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25th September 2013

Our Reference: UE.SU.01

Mr Lyndon Rowe
Chairman
Economic Regulation Authority, WA
P.O. Box 8469
PERTH BC WA 6849

BY EMAIL TO: publicsubmissions@erawa.com.au

Dear Mr Rowe,

Guidelines for the Rate of Return for Gas Transmission and Distribution Networks – Submission to Draft Rate of Return Guidelines

Please would you accept a submission by Capital Research which has been prepared in relation to the ERA's draft rate of return guidelines for gas distribution and transmission networks. The submission comments on the analysis by the ERA of considerations surrounding the phenomenon of "flight to quality".

If the ERA has further questions about this submission, then please do not hesitate to contact Jeremy Rothfield, Network Regulation and Compliance Manager, on (03) 8846 9854.

Yours sincerely,

Jeremy Rothfield
Network Regulation and Compliance Manager

Comments on the ERA "Flight to Quality" argument

Neville Hathaway

September 2013

For all correspondence regarding the analyses and examples in this paper please contact

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Executive Summary

- The ERA proposes an analysis that they claim refutes the proposal that a flight to quality has occurred in the Australian bond market after the GFC. They use this argument to suggest that current levels of the risk-free rate are not abnormally low.
- We extract the essential details of their argument from their Draft Statement paper[1].
- We detail the five critical assumptions that they make in their analysis.
- They propose that:

    1. A Flight to Quality is defined as equity investors leaving (Australian) equities in favour of (Australian) bonds.
    2. A day is the appropriate time period over which to measure the evolution of risk events.
    3. The control periods to gauge abnormal correlations are a 10 day prologue period before the day event and a 10 day epilogue period after the event.
    4. A "Flight" is characterised by an Equity "crash" of 5% or more over one day.
    5. Correlations between daily returns on Australian equities and daily changes to Australian bond yields are the metric that captures a Flight to Quality.

- We demonstrate that all of these assumptions are either unsubstantiated or mis-specified.
- We show conclusively that the flight to Australian bonds was not by investors fleeing the Australian equity market – instead, the bond purchases were nearly all by foreign investors, and the bonds were acquired for very logical reasons.
- We demonstrate that the focus on single day events in the ASX market is totally inappropriate and misses the essence of the GFC event.
- We point out how focussing on FLEEING the equity market misses the main point that the ERA is trying to examine, namely a FLIGHT to the bond market.
- We show by means of a constructed example how the measurement of daily correlations of returns fails totally to capture the nature of an extended flight to quality.

[1] ERA (2013a), Explanatory Statement for the Draft Rate of Return Guidelines, Meeting the requirements of the National Gas Rules, Economic Regulation Authority, Western Australia, 6th August 2013.

- We demonstrate that the argument that bond yields are following the RBA cash rate downwards is clearly misleading. In numerous cases, the bond market moves many months ahead of the RBA's actions to set the cash rate. For the past year, the bond yields have essentially moved in the opposite direction to the cash rate, notwithstanding that the short term market is expecting another cash rate reduction in 2014.

- We demonstrate that the argument of the ERA that, when using daily data, there is no relationship between bond yields and the returns to the market is not true when using monthly data. We also point out that the hypothesis of an offsetting relationship between changes in the MRP and changes in yields on bonds is actually supported by the results which the ERA obtain, notwithstanding the conclusion drawn by the ERA that there is no relationship.

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1. Introduction

In the Sharpe-Lintner Capital Asset Pricing Model (SL-CAPM), one adds an equity risk premium (ERP) to the risk free rate. The equity risk premium is estimated by practitioners as the product of their estimates for the equity beta and the Market Risk Premium (MRP). An unspecified part of the SL-CAPM is the period over which the MRP, the beta and the risk free rate should be measured. The SL-CAPM is silent about these periods and it is left to the individual to apply periods that are deemed to be appropriate. The outcome of the application of the method can then be contentious. The MRP is typically measured over many years, especially when we use the historical equity market returns over and above the historical risk free rates in order to estimate the MRP. If we add this long term MRP estimate to a spot risk free rate, then an obvious question arises as to whether the mix of parameters is appropriate. If the current risk free rate is unusually suppressed for any reason then the resulting estimate of expected equity returns from the SL-CAPM will be biased low.

The risk premium is a premium over and above the risk free rate. But what do we mean by the "risk-free rate"? There are so many rates as candidates for this measure that we have to be very careful and logical in what we consider to be a risk free rate. The most common candidates are Government rates as these have (in most cases) no default risk. If held to maturity there will be no capital gain or loss events caused by interest rate changes and the bond holder will achieve the promised yield to maturity (YTM). However, there is a whole plethora of these rates with different maturities ranging from very short-dated paper (bills) to very long dated paper (bonds).

The yield curve is typically, but not always, upward sloping meaning that yields for long maturity bonds are higher than for short maturity cash. Depending on which end of the yield curve one uses to estimate the MRP, we will then get different estimates, with estimates using the short end of the yield curve typically being higher than estimates using the long end. This happens because when using rates at the short end of the yield curve one typically is subtracting a smaller risk free rate from the equity return. However, as long as one is consistent and combines the MRP measured at the long end with long dated risk free rates (and similarly the short end MRP estimate with bill rates) then there will not be a problem. I use the long end of the YTM curve whenever possible for estimating the MRP. That is, I use the YTM on ten year bond portfolios. The reason is a pragmatic one. There is a lot more volatility in the rates at the short end than there is in the YTM at the long end. Hence there is a lot more statistical error in estimating the MRP when using bill rates instead of bond yields.

For regulated businesses, the measurement of the MRP is an important issue. A regulated return on capital typically applies over a fixed coming window of typically five years. Regulated entities are not in a position to adopt the pragmatic position that, in the long run, the average of the measured

values of ex ante returns will even out as the regulator typically will revisit the position in five years and add their then MRP estimate to the then current risk free rate. If the stock market is taking the view that risk free rates are currently low then the expected equity returns will not be given by the SL-CAPM estimate using a current estimate of the risk free rate. Hence the regulated returns using this SL-CAPM approach will not adequately reward the regulated business.

I examine this question in detail below. First I give the essence of the argument as put by the regulator, the Economic Regulation Authority, Western Australia, in its *Explanatory Statement for the Draft Rate of Return Guidelines,* 6 Aug 2013 (hereafter, these terms will be abbreviated to the *ERA* and the *Draft Statement,* respectively). In the Draft Statement, the ERA examines the question of the Flight to Quality which, according to evidence provided to the ERA, has led to currently low levels of the free rate in the aftermath of the Global Financial Crisis (the GFC) of 2007 to 2009. I then extract the logic flow of the ERA and put its assumptions to the test. The ERA concludes that it rejects the notion of a Flight to Quality in the Australian risk free rate.

The ERA Draft has a flaw of logic. Standard logical method says that if proposition A *and* proposition B are true and lead to conclusion C, then if we observe that C is false we can only conclude that *either* A or B is false. The logical flow of the ERA is to assume about five propositions, conduct a test of the hypothesis of Flight to Quality, observe that the regression results do not support that hypothesis (they are either statistically insignificant or have the wrong sign to be consistent with the hypothesis) and then conclude that there was no Flight to Quality. The ERA's approach violates the principles of logic: The ERA can, and should only conclude that one or other or more of their various assumptions are false.

I demonstrate that it is patently false that there has not been a Flight to Quality in Australian risk free rates after the GFC. The ERA analysts preparing the Draft Statement obviously do not understand the Australian Funds Management industry. The Australian bond market is dominated by professional investors (there is very little if any direct retail investment in 10 year government securities) which in practice means the banks and the superannuation businesses. It is pointless conducting indirect tests on returns to test for a Flight to Quality. If the proposition were true then we would look directly at the asset allocations of major investors – there ought to be a major decline in allocations to Australian Equities and a corresponding increase in the amounts apportioned to Australian Bonds under the assumption.

I am on the Investment Committee of an Australian industry superannuation business – *legalsuper,* which manages about $A2 billion on behalf of the legal industry. We have not seen any of this assumed behaviour by the ERA. In fact the reverse has happened. Australian 10 year bonds are now viewed as quite risky precisely because their yields have dropped to historical lows. Australian

government 10 year bonds currently have a duration of over 7 years so that if yields move up by 1% or 100 basis points (bp) then the bond portfolio value moves down 7% or 700 basis points [2]. This risk of capital loss is seen by the superannuation businesses to be quite high. The allocation to Australian government bonds has actually been below historical average proportions, and not above historical averages as the ERA Flight to Quality argument suggests[3]. The allocation out of Australian Commonwealth Government 10 year bonds typically went to "credit assets" (those that paid a credit spread above the risk free rate). In spite of Australian funds management businesses partially leaving the Australian bond sector, the yields on these bonds are still at historically low levels.

Therefore, the movement of funds is not by Australian investors fleeing the Australian equity market into Australian bonds as assumed by the ERA. The Flight to Quality into Australian Commonwealth Government Securities was by foreigners. I will demonstrate below using official data that they dominate the issuance of new bonds by the Australian government after the GFC.

[2] On 11-Sep-13, the Australian Office of Financial Management issued tender #633 which was for $800 million of bonds maturing 21-Apr-23 and paying an annual coupon of 5.50%, paid twice annually. On the day of issue yields closed at 4.1821% pa. On 12-Sep-2013 yields had dropped to 4.0517%. The market value at the close of 11-Sep-2013 was $899.921 million (the coupon rate was above the market yield so the bonds were valued at a premium). If yields had remained unchanged on 12-Sep-2013 the market value would have been $900.023 million (the next coupon of $22 million and all future coupons and principal repayment are one day closer to payment so worth more in present value terms). But yields fell and the value of the bonds rose to $908.759 million at the close on 12-Sep-2013. Investors made a capital gain of $8.736 million compared to the unchanged yield value. This was a 0.971% gain arising from a 0.1304% drop in yields. The modified duration of this issue on 12-Sep-2013 was 7.444 calculated as 0.971%/0.1304%.

[3] Two examples:

a) Perpetual Funds Management, "The Benefits of Active Asset Allocation", Aug 30, 2013. From the discussion of bonds: *The portfolio has had a long standing underweight position to bonds which has been in place since August 2012. This has been anchored by our assessment of the poor valuations present in bond markets driven by low yields both in Australia and overseas. While interest rate cuts by the RBA have been important in determining short term interest rates, like the cash rate, longer term bond yields like those offered by 10 year government bonds have been influenced more by the unprecedented stimulus activity from central banks around the world. This was evident with the cash rate falling 75bps to 2.75%, but Australian 10yr bond yield gaining 72bps to 3.76%.*

b) BT Funds Management, BT Multi-manager Diversified Funds, Strategic Asset Allocation Ranges for Australian Fixed Interest, from 1 July 2013.

Fund	Allocation	Strategic Allocation Range
Conservative	**9%**	**0 - 29%**
Balanced Fund	**5%**	**0 - 25%**
Growth Fund	**1.5%**	**0 - 21%**

Source document:
http://www.bt.com.au/downloads/offerdocs/BT_strategic_asset_allocations.pdf, downloaded on 20th September 2013.

2. ERA argument

The following is the argument put by the ERA in their discussion of Flight to Quality in the Draft Statement. I extract segments of their report and highlight their arguments regarding the Flight to Quality. Most of the analysis that they conduct on this issue is found in their Appendix 13. We also extract the table of the assumed flight events data that the ERA uses to perform its analysis in Appendix 13 – their Table 43, which is found in the *Draft Statement* at page 284.

749. Public submissions from regulated businesses and their consultants, as previously summarised, can be grouped into three key areas as below.

750. First, there is inconsistency in the approach to determining the MRP and the risk free rate of return. Regulated businesses were of the view that the MRP is estimated based on historical data of equity risk premiums whereas a risk free rate is derived using the "on-the-day" approach, being the last 20 trading days period prior to the release of the regulatory decisions.

751. Second, regulated utilities have argued that the risk-free rate of return is at an historical low due to a flight to quality in the Australian financial market.

752. Third, regulated businesses have also considered that it is more appropriate to adopt a constant return on equity in regulatory decisions. They have argued that a constant return on equity is due to a negative correlation between the risk-free rate and the MRP. As such, from their argument, a reduction in the risk-free rate will be offset by a relative increase in the MRP.

755. The key concern raised by regulated businesses is that the MRP and risk free rate of return are negatively correlated. As such, any reduction in the risk free rate of return is offset by an increase in the MRP, leaving the estimate of a return on equity unchanged.

778. The Authority has conducted its own analyses, together with available information and evidence on the issues, in response to the following three criticisms:

779. Inconsistency between the approach of determining the risk-free rate of return and MRP where the former is based on the 'on the day' approach while the latter is based on the historical data.

780. The risk-free rate of return is at an historical low due to a flight to quality in the Australian financial market.

781. A constant as opposed to varying return on equity should be adopted on the basis that reductions in the risk-free rate will be offset by increases in the MRP due to a negative relationship between the two.

783. The following analyses have been conducted by the Authority in response to the issues raised:

784. First, an empirical study on a flight to quality in the Australian financial market. This study aims to capture the so-called "flight to quality" in the context of Australia in which there is a movement of funds from equity markets into the Commonwealth government securities market. The purpose of this study is to provide empirical evidence on the argument that a risk-free rate of return is too low in Australia. This complete study can be found in Appendix 13.

785. Second, a co-integration test between the observed yields of the CGS bonds and the cash rates determined by the RBA. The purpose of this study is to provide empirical evidence to examine whether the currently observed low level of risk-free rate may be explained by another factor, the cash rate determined by the RBA. . The details of this test can be found in Appendix 14.

786. Third, a co-integration test between the observed yields of CGS bonds and the market risk premium which is derived as the difference between the market return and the risk-free rate of return. Regulated business submitted that the rate of return determined in regulatory decisions should be stable over time. The implication of this proposal is that any reduction in the risk free rate will be offset by a relative increase in the MRP, leaving the return on equity unchanged when the Sharpe-Lintner CAPM is adopted. In an econometric sense, this implication means that the risk free rate and the MRP should be co-integrated. In the case of the market returns and the risk free rate in the CAPM, the two series are tested to confirm whether or not they are co-integrated, in the sense that they share a long run stochastic trend. Intuitively, the risk free rate is not expected to rise above the market returns for an extended period of time. Conversely, the market return is not expected to stay below the risk free rate for an extended period of time. One would expect a tendency for correction over the long run where the returns to investing in the market are sufficiently higher than the risk free rate to compensate for the risks inherent in equity investment. The details of this test can be found in Appendix 15.

787. Fourth, an updated empirical study on the Granger Causality test between the market risk premium and the risk-free rate of return. The purpose of this updated study is to investigate whether or not the currently observed low risk-free rate is caused by the market risk premium or vice versa. The Granger causality test assumes that changes in variable X cause changes in variable Y based purely on precedence within a time series. If there is a relationship between changes in X and Y, and X precedes Y then X Granger causes Y based on the assumption that the future cannot predict the past. That is, if event A occurs before event B, it is possible event A causes event B, but not vice versa. A commonly cited example of Granger causality which highlights the downfall of this assumption is that Christmas card sales precede Christmas, therefore Christmas card sales cause Christmas. The details of this empirical study can be found in Appendix 16.

11.3.2.2 Historically low risk free rate

789. Regulated businesses and their consultants claim that a risk-free rate of return is now at a historical low. As such, the currently adopted MRP of 6 per cent is required to be revised upwards to compensate for the low level of the risk free rate.

790. Making an adjustment to the MRP to compensate for a low risk-free rate would violate the integrity of each input in a determination of a required rate of return. All inputs should be independently derived from an objective and robust approach/model.

791. In relation to the current level of a risk-free rate, there are two possibilities: (i) the current level of a risk-free rate is at a historical low; or (ii) the current level of a risk-free rate reflects the mean-reversion of a risk-free rate to a low level from a very high level in the previous decades due to high expected inflation.

792. The Authority agrees with McKenzie and Partington that classifying current interest rates as being abnormally low is a relative statement. McKenzie and Partington considered that a commonly used method is to assess the current interest rate against a long history of data. They then considered the history of yields in the USA, UK and Australia with the view that the lessons provided by the USA and UK are relevant for Australia as they have a greater length of historical data of interest rates. McKenzie and Partington concluded that it is the period of high interest rates in the seventies, eighties and nineties that are the best candidate for being abnormal, rather than the current "low" rates as presented in Figure 19 below.

793. In addition, after reviewing various studies on the long historical interest rates, in both nominal and real terms, in the US, the UK, and Australia, McKenzie and Partington were of the view that the more recent history of interest rates (in the seventies, eighties and nineties) is not truly representative of the long run in this market. They also argued that evidence exists which suggests that bond yields were stable (and possibly even falling) in the long run for the US, UK and Australian markets. They considered that the more recent history is anomalous and the high interest rates observed during this period are clearly not representative of the longer time series. As such, one conclusion that may be drawn is that the current level of interest rate is a return to the 'normal' long run interest rate regime. On the other hand, they also argued that there is a new normal and the most recent global financial crisis represents a true regime shift for global financial markets. However, they acknowledged that it is difficult to determine whether this is the case or not, and that only in the fullness of time will we be able to comment on this with any certainty.

794. In conclusion, the Authority is of the view that it is unclear that the current level of the risk free rate is at an historical low.

11.3.2.3 Flight to quality in the Australian financial market

795. Regulated businesses have raised concerns that the risk-free rate of return has been at a historically low level due to the so-called "flight to quality" in the Australian financial market. The Authority has conducted its own analysis to determine whether or not there is empirical evidence to support the argument that a "flight to quality" has taken place in Australia.

796. A "flight to quality" is the concept that in times of uncertainty in equities markets, investors rebalance their investment portfolios toward greater proportions of assets with lower risk, in particular those found in the fixed-income markets such as Government bonds, as opposed to equities. The most common methodology in the "flight-to-quality" literature is to investigate whether there is a negative relationship between government bond prices and equity returns in order to find evidence of funds moving rapidly from a domestic equity market into domestic Government bonds.

797. Following Gulko's methodology, a crash day is defined as a day where the market index loses five percent or more of its value. The event window is defined as starting two days before this crash day and finishes ten days after this crash day. If another crash occurs between the crash day and day ten after the crash, day ten is reset to occur ten days after the latest crash. The prologue is the period before the event window while the epilogue is the period after the event window.

798. A hypothesis was developed to test the existence of the flight to quality in the Australian financial market. The hypothesis is that, if there is a flight to quality, then the observed yields on the Commonwealth Government Securities (CGSs) and equity returns are negatively correlated between the prologue and the epilogue and positively correlated during the crash window. This means that the equity-bond correlation switches signs from negative to positive during stock market crashes.

799. The All Ordinaries (non-accumulation) price and 10-year Australian Commonwealth Government bond yield indices were sourced from Bloomberg. Each observation represents the last trading day closing observation available. The full set of daily observations covers the period from 30 September 1983 to 25 January 2013.

800. The results from the Authority's study suggest that, in general, there tends to be some positive co-movement between stock prices and Treasury bond yields in Australia in the prologue periods. On the days before a crash, it appears that the co-movement is more direct between the two markets, but this co-movement breaks down during the days surrounding a crash. In the epilogue, similar co-movement between the markets appears to return.

801. The findings from the Authority's study fails to support the 'flight-to-quality' hypothesis as formulated by Gulko for the US market. Further details on this study can be found in Appendix 13.

802. Gulko's analysis was carried out on the US market. The US is perceived as a 'safe haven' thus it may experience net capital inflows from the rest of the world into its safest assets.337 Post 1987, the US Treasury bonds became the safe investment of choice over gold. Conversely, Australia is a very small market without the reputation of the US as a safe haven during times of heightened uncertainty. A possible explanation for the above results is that the 'flight-to quality' effect may see funds leaving the Australian market destined for investment in markets that are perceived as safe, such as the US market. Dungey, McKenzie and Tambakis' 2009 study found this to be the case between emerging equity markets and the US Treasury bond market. This means that there is a flight to quality in the emerging equity markets where funds are leaving these emerging countries' financial markets to the US's Treasury bond markets.

803. The Authority notes that the currently low risk-free rate could be a result of the period of heavy intervention in the cash rate by the Reserve Bank, which is presented in Figure 20 below. Figure 20 indicates that there is a strong correlation between the cash rate level and the risk-free rate of return in the Australian context. This conclusion is confirmed by the findings from the Authority's empirical study on the co-integration between the risk-free rate of return and the RBA's cash rate. Further details on this study can be found in Appendix 14. Figure 20 Correlation between the 5-year Treasury bond and the cash rate Source: RBA and Economic Regulation Authority's analysis.

804. In addition, regulated businesses have also argued that a low risk-free rate is due to a "flight to quality" in the financial market. It means that the level of risk aversion has increased significantly during the "flight to quality" period. As such, they argued that the MRP should have been higher during the economic turmoil. The Authority is of the view that implied volatility observed from call options in the Australian financial market has provided evidence to the contrary. Increased volatility in financial markets is typically associated with an increased level of uncertainty and risk aversion. Volatility measures are widely implied using call option pricing formulas and market data. The volatility measure on 3 month call options has followed a declining trend since late 2008 as presented in Figure 21. This tends to indicate that the level of risk aversion has substantially decreased during the last 3 years. Figure 21 The 3-month call implied volatility Source: Bloomberg and Economic Regulation Authority's analysis

805. In conclusion, the Authority is of the view that there is no empirical evidence to support the view that there is a "flight to quality" in the Australian financial market during periods of economic uncertainty. A low risk-free rate could possibly be a direct result from heavy intervention of the cash rate by the central bank. In addition, the implied volatility on the call options failed to support the view that the level of risk aversion in the Australian financial market has significantly increased in recent years.

The data used by the ERA in their analyses is found in Appendix 13. The designated "flight" events are shown below in Table 1.

Table 1: Australian Equity Market Crash Dates and Descriptions (ERA Table 43)

Date	All Ordinaries Index	10 Year Treasury Bond Yield Index	Market Return	Bond Yield Change	Event
20/10/1987	1549	13.75	-28.76%	4.46%	
23/10/1987	1514	13.3	-7.30%	0.00%	
26/10/1987	1415	13.1	-6.78%	-1.52%	1987 Wall Street Crash
27/10/1987	1317	13.5	-7.20%	3.01%	
29/10/1987	1284	14	-7.82%	2.53%	
4/11/1987	1290	13.65	-5.63%	0.00%	
16/10/1989	1601	14.002	-8.44%	0.00%	United Airlines Leveraged Buy Out Failure
28/10/1997	2299	6.045	-7.45%	4.22%	Asian Financial Crisis
17/04/2000	2920	6.098	-5.85%	-1.51%	'Dot Com' Bubble
22/01/2008	5222	5.872	-7.54%	-2.62%	
8/10/2008	4370	4.931	-5.09%	-2.58%	
10/10/2008	3940	5.139	-8.55%	0.98%	Global Financial Crisis
16/10/2008	3988	5.248	-6.89%	-2.35%	
13/11/2008	3672	4.909	-5.59%	-3.50%	

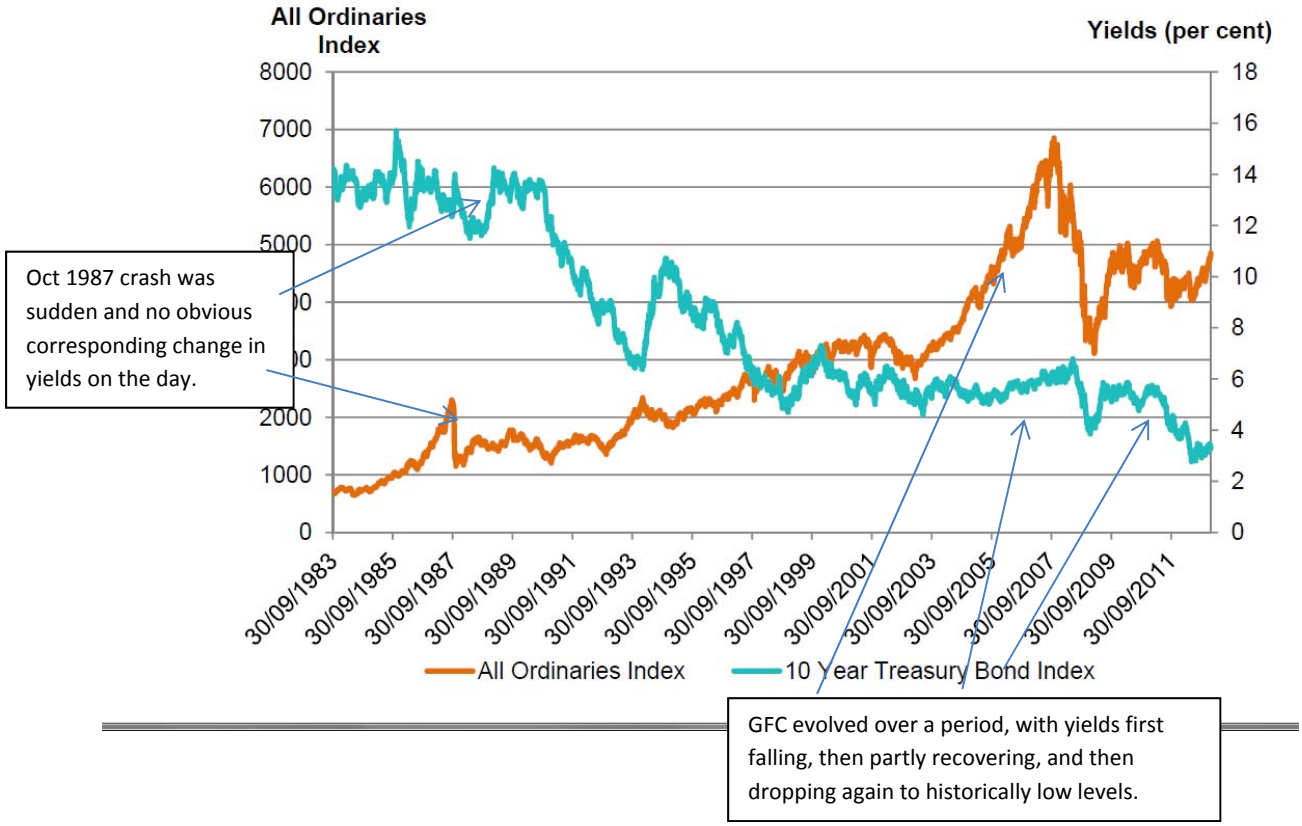
Source: Explanatory Statement for the Draft Rate of Return Guidelines, Economic Regulation Authority, Western Australia 6th August 2013, page 284.

The market data used by the ERA for estimating returns is found in the following diagram to which we have added some labels.

Figure 1: Australian Stock Market and Treasury Bond Index Trends: September 1983 to January 2013 (ERA Figure 29)

Economic Regulation Authority

Figure 29 Australian Stock Market and Treasury Bond Index Trends: September 1983 to January 2013



Source: Explanatory Statement for the Draft Rate of Return Guidelines, Economic Regulation Authority, Western Australia, 6th Aug 2013, page 283.

The previous discussion concludes our extraction of the ERA argument for the Flight to Quality as found in their Draft Statement. We now turn to extracting their logic and then critically examining that logic.

3 ERA logic

The ERA examines five "flight" events – see Table 1 above which essentially reproduces the ERA's Table 43.

The ERA's logic for analysing these events is as follows:

Hypothesis to be tested:

There has been a Flight to Quality in the Australian bond market at various events in the past.

Assumptions:

1. A Flight to Quality is defined as equity investors leaving (Australian) equities in favour of (Australian) bonds.
2. A day is the appropriate time period over which to measure the evolution of risk events.
3. The control periods to gauge abnormal correlations are a 10 day prologue period before the event and a 10 day epilogue period after the event.
4. A "Flight" is characterised by an Equity "crash" of 5% or more over one day.
5. Correlations between daily returns on Australian equities and daily changes in Australian bond yields are the metric that captures a Flight to Quality.

All of these assumptions are highly dubious, if not plainly wrong. We examine each of the assumptions in turn.

Assumption 1: Only Australian investors are relevant to a FTQ event in Australia

The most incorrect part of the ERA analysis relates to an assumption that the only parties affecting Australian bond yields are investors in Australian equities and possibly the RBA through the cash rate. That is most certainly not true. The authors clearly do not understand the Funds Management industry.

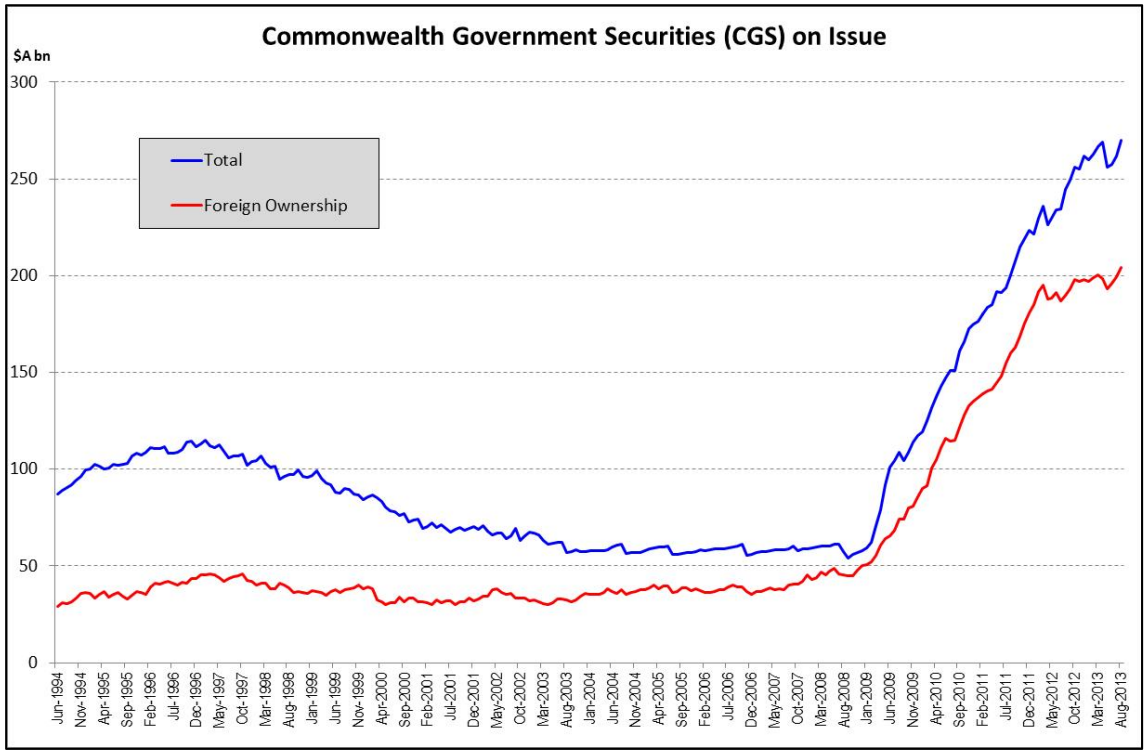
1. The largest group of investors into Australian bonds after the GFC event were not Australians but, rather, were foreign investors. These foreign investors took $A150 billion of the $A182 billion worth of net Commonwealth Government Securities, (CGS), issued between December 2008 and March 2012. This is 82% of the total net issue.
2. The 10 year bond yield is set in the market, and not by the very short end of the yield curve as described by the over-night or cash rate. Obviously there is a relationship between the two rates in that the market adds a term premium, which is a type of risk premium, for committing funds for 10 years, compared with overnight cash. There is also a term structure which underpins the whole interest rate yield curve.
3. The Australian bond market is dominated by professional investors, and there is negligible retail investment in 10 year government securities. In contrast, the equity

market is made up of many investors, which means that retail investors could flee the equity market for other assets, such as term deposits in banks. The evidence for this sort of trend can be seen in the asset allocation history of Self-Managed Super Funds, which are pre-dominantly run by non-professional investors.

The Flight to Quality into Australian Bonds was by foreigners – for evidence, see the evolution of foreign ownership in Figure 2 below. The graph has been constructed from Australian Bureau of Statistics (ABS) data for holdings of CGS issued by the Federal Government. Note that the data from the ABS is reported by the Reserve Bank of Australia in Table E3.

Australian government bond supply has increased significantly from October 2008. This sharp increase in supply was met by an equally sharp increase in foreign demand for Australian government debt. Offshore ownership of CGS is now at record levels.

Figure 2: CGS on issue and Foreign Ownership



Source: www.rba.gov.au/statistics/tables/xls/e03hist.xls

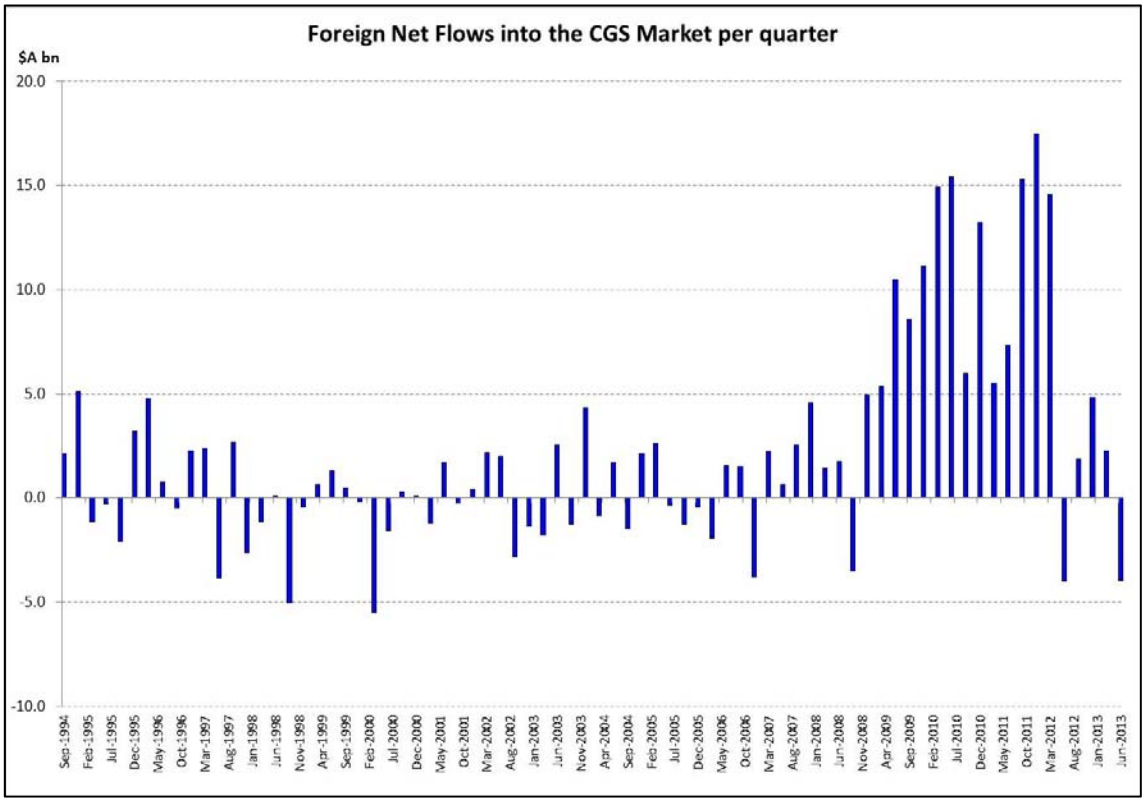
As is apparent from the chart below (see Figure 3), foreign net portfolio inflows into the Commonwealth bond market have risen sharply since 2008. The last net drawdown up to the GFC was in September 2008 (commonly thought to be emergency repatriations of capital) and there was not another net drawdown of foreign allocations until June 2012.

After averaging just $A278m per quarter from June 1994 to September 2008, foreign net inflows into the CGS market jumped to an average of $A10.7 billion per quarter for this period from December 2008 to March 2012.

For 2011, net inflows averaged $A11.4bn per quarter, with a sizeable influx of $A15.3bn in the September quarter 2011, followed by $A17.5bn in the December quarter, 2011.

Based on ABS data, this means that foreign investors purchased almost the entire increase in CGS issuance from December 2008 to March 2012: Net foreign investment of $A150.1bn against net new issuance of $A182.0bn.

Figure 3: Foreign net flows into the CGS market

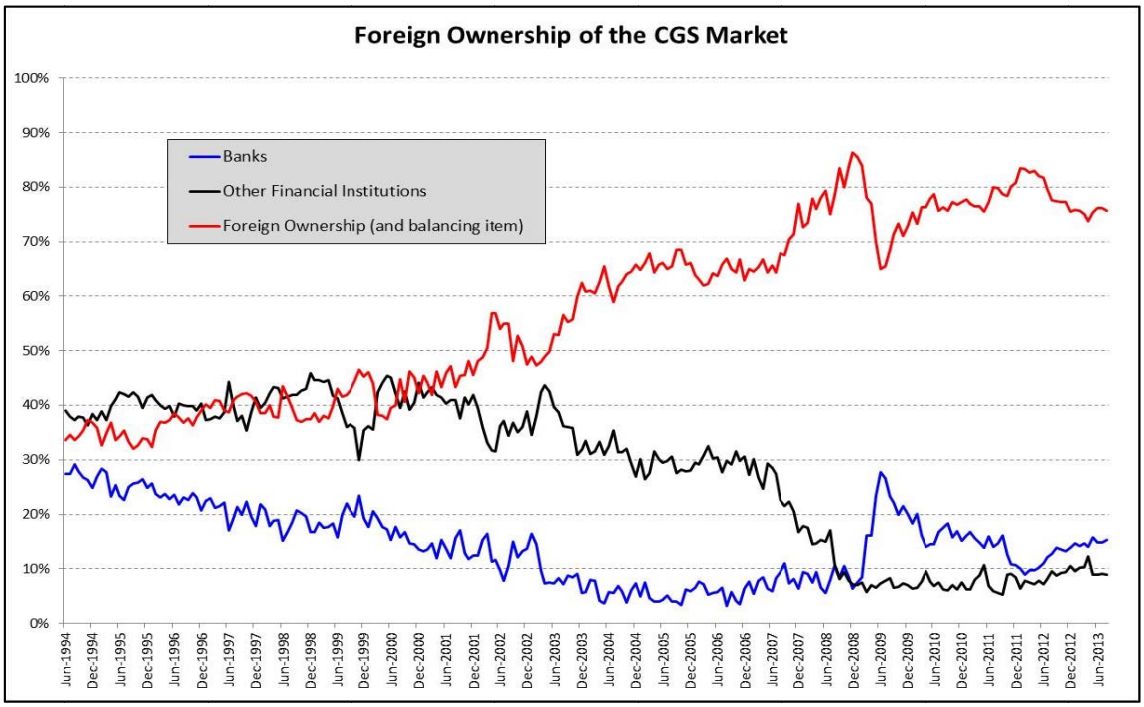


Source: www.rba.gov.au/statistics/tables/xls/e03hist.xls

Australian fund managers did not put extra funds into Australian bonds – there was no flight to quality by Australian investors into Australian bonds. Once the yields had dropped to historically low levels, the risk to returns to Australian bond investments was on the downside – because any increase in yields would cause a fall in bond prices.

In the following plot, Figure 4, of CGS ownership by industry group, a trend which can be discerned is that of the sharp fall in the proportion of bonds owned by banks and other financial institutions. Note that the term "other financial institutions" includes domestic fund managers. Foreign investors have progressively increased their holdings of CGS issues.

Figure 4: Foreign ownership of the CGS Market[4]



Source: www.rba.gov.au/statistics/tables/xls/e03hist.xls

The following is a quote by Colonial First State Global Asset Management (CFSGAM), a very large professional fund manager of Australian fixed interest securities:

> Not surprisingly, as the foreign ownership of the CGS market has increased, domestic ownership has declined.
>
> As shown in the chart above, CGS ownership by Australian banks had been very low for a number of years. This changed during the peak period of the GFC, where a 'flight-to-quality' and the need for liquidity saw Australian bank ownership of the CGS market rise dramatically. Since that time, however, CGS ownership by Australian banks has again declined sharply.

CFSGAM: Australian government bonds: Demand and supply, Economic research paper, 19 April 2012, page 6.

In order to understand why there was a surge of foreign investment into Australia, you need to understand the restrictions on the relevant international bond investors.

[4] The data is aggregated as "Other Financial Institutions" = "Government" + "Non-Bank Financial Institutions" where "Government" = Commonwealth Government + RBA + Government Financial Institutions and "Non-Bank Financial Institutions" = Life Insurance + Other Private Financial Institutions (mainly private investment funds) + Other Public Authorities (which includes public investment funds such as Victorian Workcover Authority etc).

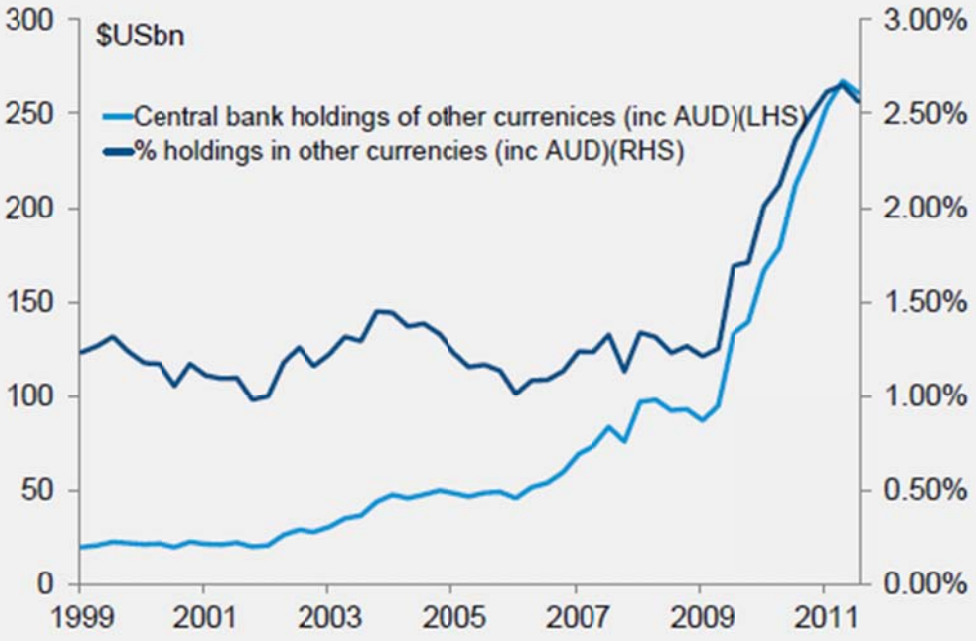
The Flight to Quality into Australian Bonds was by foreigners – particularly foreign central banks and sovereign wealth funds.

While no official data is collected on the source of foreign buying, it is well known that the vast bulk of this increase in demand for CGS has come from central banks and sovereign wealth funds.

One way to see this is in the dramatic increase in holdings of 'other' currencies in the foreign exchange reserves of the world's major central banks.

As shown in the chart below, the holdings of 'other' currencies (which include the AUD and currencies such as the CAD and SGD) have increased very sharply in the past few years.

Central Bank allocation into 'other' currencies



Source: IMF

CFSGAM: Australian government bonds: Demand and supply, Economic research paper, 19 April 2012, page 4.

Central Banks and Sovereign Wealth Funds often have strong asset allocation limits set for the quality of the bonds in which they may invest. These restrictions will include limits along the lines of "at least 50% of total funds invested in sovereign securities rated AAA by at least two rating agencies."

The restrictions became an issue post the GFC because only a minority of governments found that they were able to maintain an AAA rating. The following CLSA document summarises the credit ratings from three ratings agencies for mostly investment grade, government debt issued by various sovereign states.

Appendix 3: Countries' credit rating

List of countries by credit rating

	Moody's	Standard & Poor's	Fitch
Australia	Aaa	AAA	AAA
Austria	Aaa	AA+	AAA
Belgium	Aa3	AA	AA
Brazil	Baa2	BBB	BBB
Canada	Aaa	AAA	AAA
Chile	Aa3	A+	A+
China	Aa3	AA-	A+
Colombia	Baa3	BBB-	BBB-
Czech Republic	A1	AA-	A+
Denmark	Aaa	AAA	AAA
Egypt	B1	B	BB
Finland	Aaa	AAA	AAA
France	Aa1	AA+	AAA
Germany	Aaa	AAA	AAA
Greece	C	SD	CCC
Hong Kong	Aa1	AAA	AA+
Hungary	Ba1	BB	BB+
India	Baa3	BBB-	BBB-
Indonesia	Baa3	BB+	BBB-
Ireland	Ba1	BBB+	BBB+
Israel	A1	A+	A
Italy	Baa2	BBB+	A-
Japan	Aa3	AA-	A+
Korea	Aa3	A+	AA-
Malaysia	A3	A-	A-
Mexico	Baa2	BBB	BBB
Morocco	Ba1	BBB-	BBB-
Netherlands	Aaa	AAA	AAA
New Zealand	Aaa	AA	AA
Norway	Aaa	AAA	AAA
Peru	Baa2	BBB	BBB
Philippines	Ba1	BB+	BB+
Poland	A2	A-	A-
Portugal	Ba3	BB	BB+
Russia	Baa1	BBB	BBB
Singapore	Aaa	AAA	AAA
South Africa	Baa1	BBB	BBB+
Spain	Baa3	BBB-	BBB
Sweden	Aaa	AAA	AAA
Switzerland	Aaa	AAA	AAA
Taiwan	Aa3	AA-	A+
Thailand	Baa1	BBB+	BBB
Turkey	Ba1	BB	BBB-
United Kingdom	Aaa	AAA	AAA
United States	Aaa	AA+	AAA

Notes: For Moody's, a bond is considered investment grade if its credit rating is Baa3 or higher. Bonds rated Ba1 and below are considered to be speculative grade, sometimes also referred to as "junk" bonds. For S&P, a bond is considered investment grade if its credit rating is BBB- or higher. Bonds rated BB+ and below are considered to be speculative grade, sometimes also referred to as "junk" bonds. For Fitch, a bond is considered investment grade if its credit rating is BBB- or higher. Bonds rated BB+ and below are considered to be speculative grade, sometimes also referred to as "junk" bonds. Source: Moody's, S&P and Fitch Ratings, CLSA Asia-Pacific Markets

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There are only TEN countries with an AAA rating from all three agencies – and this does not include the USA which was downgraded by S&P.

Australia is a relatively small economy overall but is of reasonable size when compared to ten other countries with investment grade credit ratings. Australia is the fourth largest after Germany, UK and Canada in terms of GDP @ PPP. Hence foreign central banks and sovereign wealth funds are likely to make sizeable allocations of their bond asset portfolio to Australian government bonds.

In summary, the "flight to quality" in the Australian bond market has been by foreigners, rather than by managers of Australian equities purportedly selling off Australian stocks. The ERA analysis of Flight to Quality completely misses the mark on this important issue.

Assumption 2: A Day is the appropriate measure

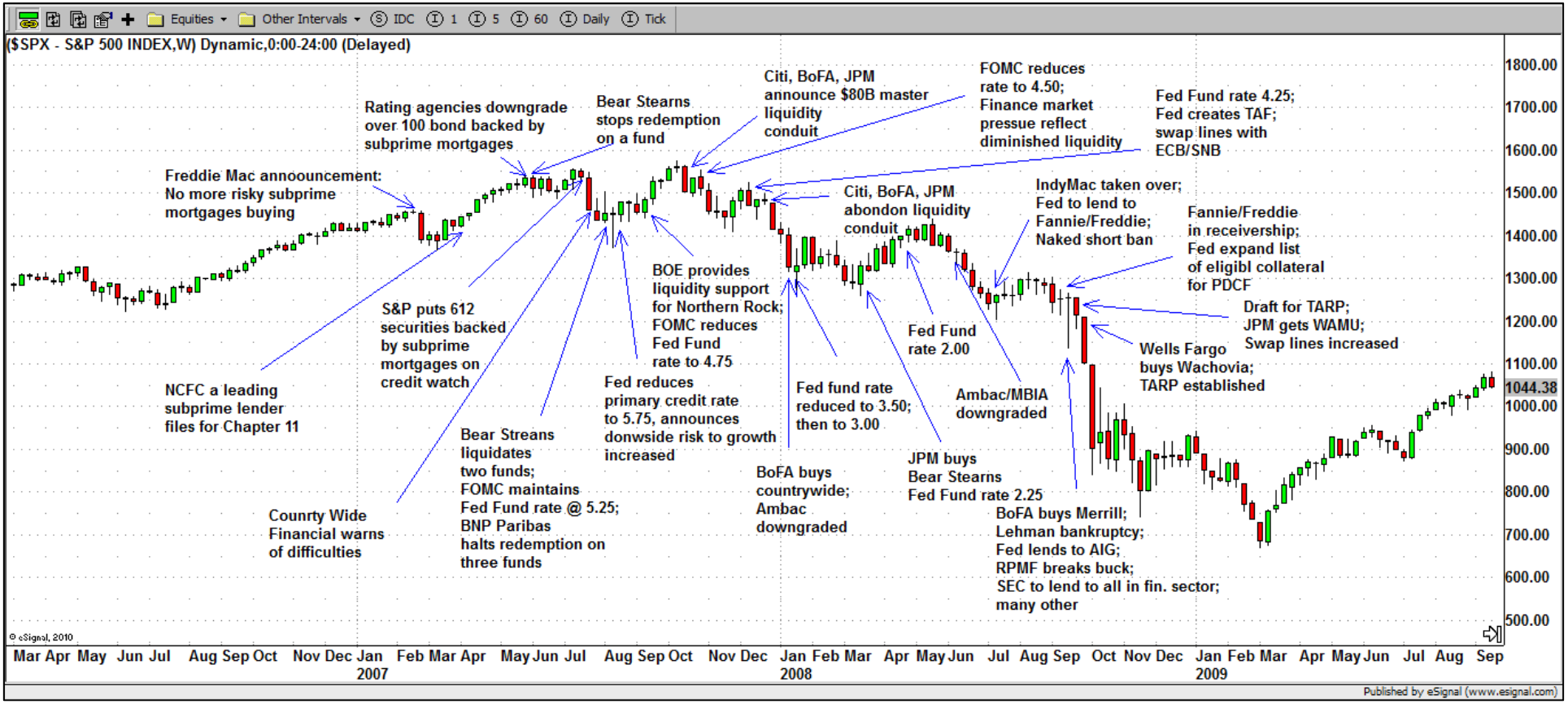
A day is clearly not the only appropriate period over which to measure risk. The ERA description of risk events (see Draft Statement, Appendix 13, paragraphs 31–35) describes most of these risk events evolving over times based on months and years. The ERA define a "crash event" as a 13 day time window comprising the day the market falls 5% or more, two days prior to that day plus 10 days after that day so their definition of a crash event is a 13 day window around a single day of 5% or more price fall. No justification at all is presented for this design. What role are the two days prior to the price drop meant to play? Is this meant to allow for some foresight that the price drop is about to occur? The only event that fits their narrow description of a daily event is the 20 Oct 1987 Stock Market Crash. And then the epilogue period lasted to almost Christmas 1987 as volatility slowly dropped out of the stock market. A 10 day epilogue period for that event is clearly wrong.

The Federal Reserve Bank of St Louis, USA has a 32 page document detailing the events and policy actions through the GFC that cover the period Feb 2007 – July 2009.

See http://timeline.stlouisfed.org/index.cfm?p=timeline.

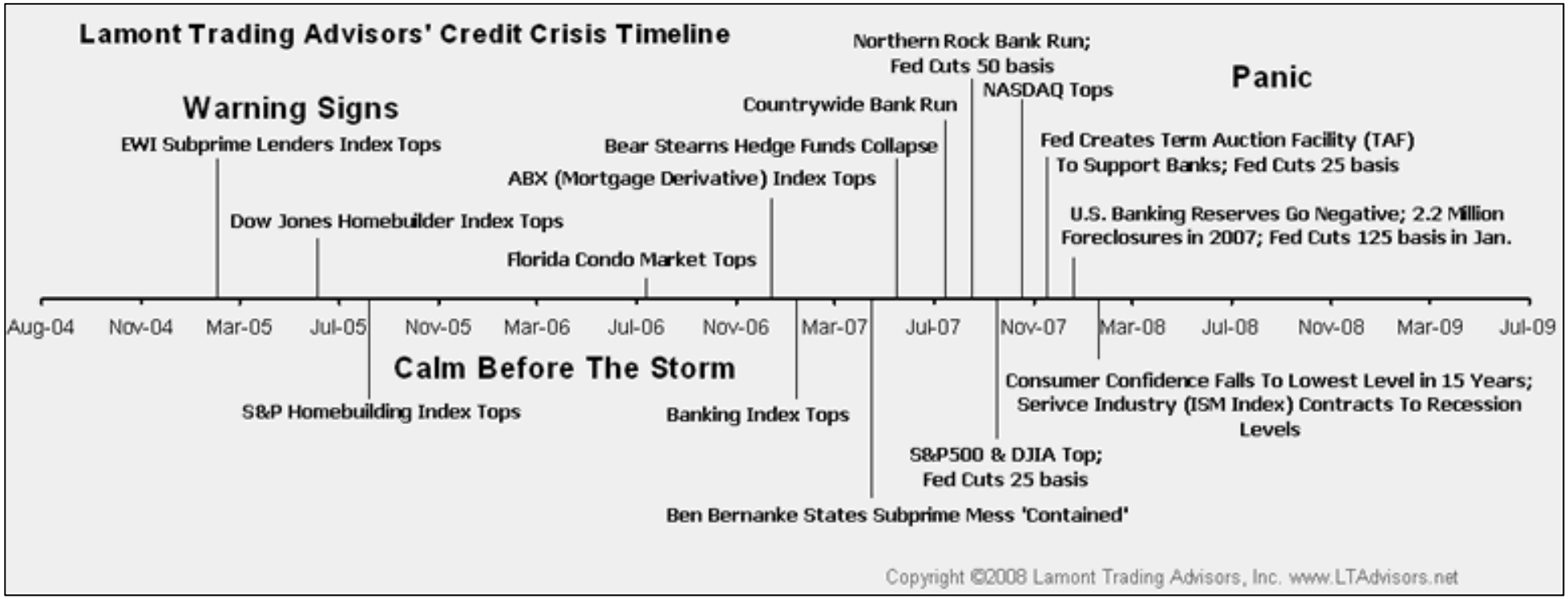
Various groups have published their own version of the important events leading up to and through the GFC period. The following are two versions of these timelines. There are many others and we do not claim that these two are necessarily complete descriptions. But they do convey the time elapsed for the event to unfold.

Figure 5: Timeline of the GFC - 1



Source: www.eSignal.com

Figure 6: Timeline of the GFC - 2

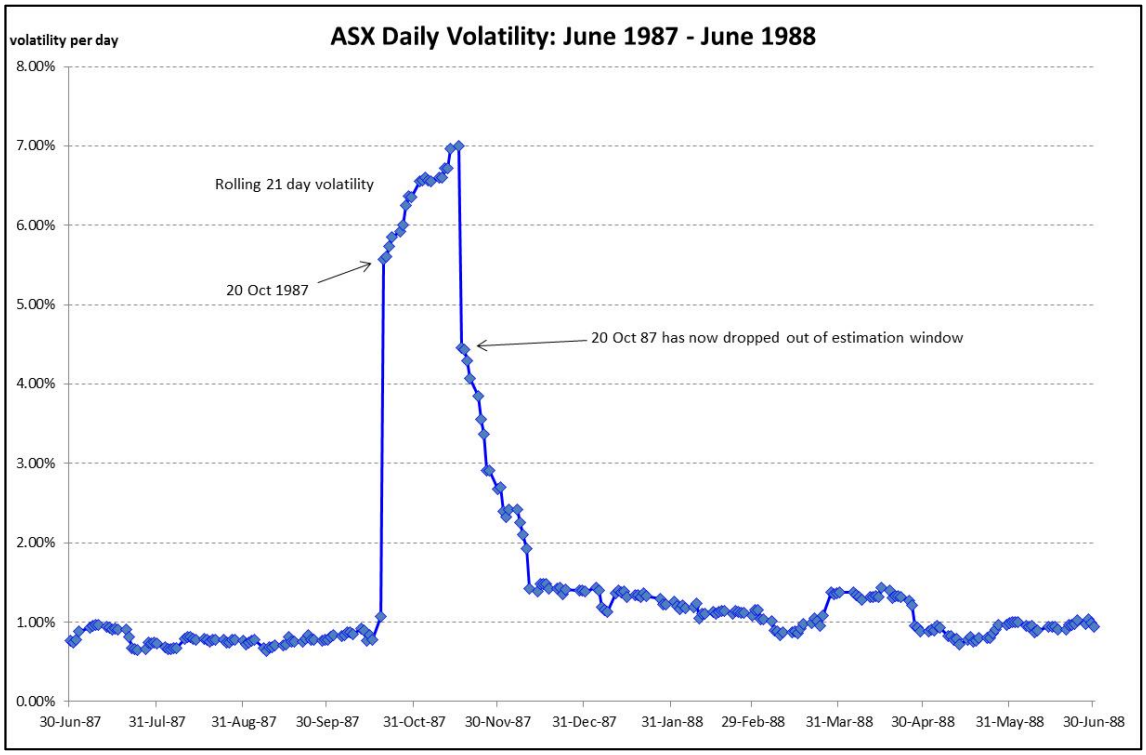


Source: Lamont Trading.

The ERA data set (see their Table 43, reproduced above as Table 1 above) shows five days in 2008 with "crash" events – four of them occurring within the one week in October 2008. Clearly, we cannot reduce the GFC event to just a few individual days and then analyse them as separate events. All four of these events clearly overlap with their "13 day crash window" and are part of the same event yet the ERA analysis treats them as four separate events within its regression analysis.

The only event that fits their narrow description of a daily event is the 20 Oct 1987 Stock Market Crash. And then the epilogue period lasted to almost Christmas 1987 as volatility slowly dropped out of the stock market. The market volatility remained very high up to almost Christmas 1987- see Figure 3. Therefore, even though the event happened on one day, the aftermath persisted for months.

Figure 7: ASX volatility through the October 1987 Crash



Assumption 3: Control periods are 10 days either side of event

A Flight to Quality is characterised by investors leaving asset classes and buying into the designated quality asset class. The primary observation should be on asset allocations, not on returns. Returns are an indirect means of measuring the observation but are meant to capture the impact of a flight. For every seller there must be a buyer, and so if one group is fleeing an asset class, then there must be another set or sets of investors taking up those assets, albeit at reduced prices. The behaviour of buyers and sellers might explain the logic of examining returns. Note however that the argument is strangely reversed. Examining price

drops is examining the asset that is being fled, rather than the asset that is being viewed as the quality asset. Why could not the event be investors fleeing risky asset classes in general and buying into the quality asset? The direct means of considering the extent of purchases into a quality asset should be via an examination of the price rises of the quality asset. The evidence from the examination of the price drop of one risky asset class is indirect, because the assumption then is that only one asset class is the candidate from which investors have fled.

Table 1 above (ERA Table 43) is a table of FLEEING Australian equity assets. It is designed that way. It is not a table of FLIGHT into an asset class because it would then be constructed on days of price rises of the Bond index. The ERA team have experienced confusion in determining precisely what they are investigating.

Assumption 4: A flight is a drop of 5% or more

A flight being defined as drop in price of 5% or more is arbitrary. Obviously others have used it in the past and the ERA also use it in their Draft Statement. However, why is a single day drop of 5% more important than the accumulated drop over a period? For example, the price drop on the ASX from March 2008 to March 2009 was 35%. This decline in the value of equities would itself have reinforced a further flight from equities by risk-averse investors, and would have had a bigger impact than a single day fall of 5%.

Obviously, the assumed price reduction of 5% is closely related to the use of daily data. Adopting such a short time span for price reductions forces the analyst to adopt artificial parameters for fleeing activity.

The use of returns as a metric also leads one to examine short period data, such as daily data. The more direct approach of examining asset allocations would clearly be silly on a daily data basis. Professional fund managers do not make daily decisions on asset class allocations. They make long term strategic allocations and may make tactical asset allocations based on time spans (typically months) or based on events that trigger re-allocations of assets such as accumulated movements in price. And once gain I reiterate that the bond market is solely one of professional investors. Retail investors only invest in it via investments through funds managers.

Assumption 5: Daily correlations are an appropriate test metric

The experimental design calls for measuring correlations between daily returns on equities and changes in the bond yields. The data is examined in the prologue periods, during the crash event itself, and over the epilogue period. The regression results are published in the Draft Statement as Table 47, page 286.

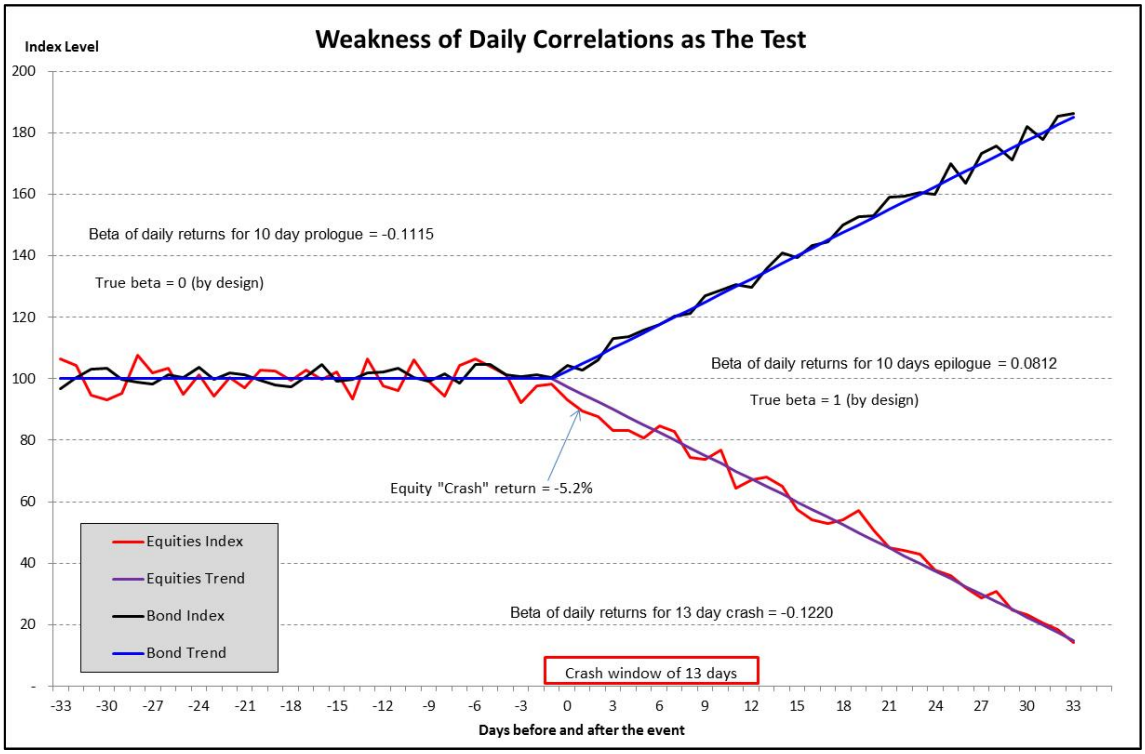
Over the period chosen by the ERA, bond yields fell by an accumulated 11% (from 14% down to 3% approximately) and the ASX rose by 400%, from a level of about 800 to a level of about 4000. Hence it is not surprising that outside of crash events, there is a very strong observed correlation between ASX returns and drops in bond yields and that the relationship was negative: bond yields on average *fell* and stock prices

on average *rose*. But equally if we used the period prior to 1973 we would see strong rises in yields over the period when prices on the ASX also increased. The results outside of a crash are totally dependent on the time frame chosen for review The ERA analysis finds that the relationship across their whole dataset of 7,650 daily observations from Sep 1983 to Jan 2013 was *positive* (see Table 47, Draft Statement page 286), so that their results imply that on average as the stock market rose the bond yield rose which is clearly false. Hence there is an obvious problem with this regression result. The Flight to Quality hypothesis as posed by the ERA is rejected when using this broadest sample of daily data for their regression analysis and the ERA report (see Table 47, Draft Statement page 286) that it is rejected in each of the three sub-periods comprising the crash periods and both the prologue and epilogue periods.

However, it is easy to construct an artificial model that shows a large 100% correlated event of moves between equities and bonds over say a month, but then add to the daily data a random noise. When testing using correlations between daily returns, the correlation will appear insignificant (by design) which only goes to prove that the test is wrong for the experiment.

The ERA analysis is flawed by design, and is wrong in its use of the metric employed of daily returns. Below we constructed two time series that have perfect correlation with respect to the trend in each. We call the declining trend the Equity index and the rising trend the Bond index (yield falls correspond to bond price rises). We add to each trend a noise variable with volatility that is in reasonable proportion to actual equity and bond price volatility. There is a 5.2% fall in the Equity index on the first day of the trend down – the "crash" day.

Figure 8: Weakness in the Daily Correlations Test



Just looking at the plot tells the casual inspector that there is indeed a powerfully strong relationship between these two variables after the crash day. By design, the beta between the two series was set at beta = 0 before the crash day and beta = 1.00 after the crash day. However, on the daily correlation test the hypothesis would be rejected because the results would hardly show any significant changes in the beta estimates between the prologue period beta value of -0.1115, the crash period beta value of -0.1220, and the epilogue period beta value of 0.0812. The respective 95% confidence intervals are (-0.44, 0.22), (-0.43, 0.19) and (-0.12, 0.28). All of these confidence intervals overlap so we could not conclude any significant change in relationship and, most importantly, the epilogue confidence interval does not include the true beta value of beta = 1.00. These findings demonstrate the weakness of the test unambiguously.

4. Co-integration Analyses

The ERA performs two co-integration analyses, the first to test "whether the currently observed low level of risk free rate may be explained by another factor, the cash rate determined by the RBA" (Draft Statement paragraph 785) and the second to "test between the observed yields of CGS bonds and the market risk premium … [so as to investigate] the proposal that any reduction in the risk free rate will be offset by a relative increase in the MRP" (Draft Statement, paragraph 786).

The ERA concludes that their tests indicate that the overnight cash rate and 5-year and 10-year CGS bond yields series are co-integrated, and that there is no evidence to support a co-integrating relationship between the 5-year bond yield series and market return/risk premium series.

4.1 Cash Rates and Bond Yields

This part of their study shows very little understanding of the Australian bond market. The Australian bond market is a fully professional investor market in which securities trade over the counter at any time, and on any day, with participation by appropriate investors from all over the world. In contrast, the Board of the Reserve Bank of Australia, (RBA), meets once per month to decide on the domestic cash rate. The concept that the bond market will wait up to a month until the RBA next meets in order to let the RBA take the lead on bond yields is naive. The ERA concedes that the bond yields *"are determined by markets which consider many macroeconomic variables including the RBA's overnight cash rates in the economy. From this perspective, it would be difficult to think of a scenario in which the causality runs from the CGS bond yields to the overnight cash rate (i.e. the CGS bond yields cause the RBA's cash rates)"*, (Draft Statement paragraph 16, Appendix 14).

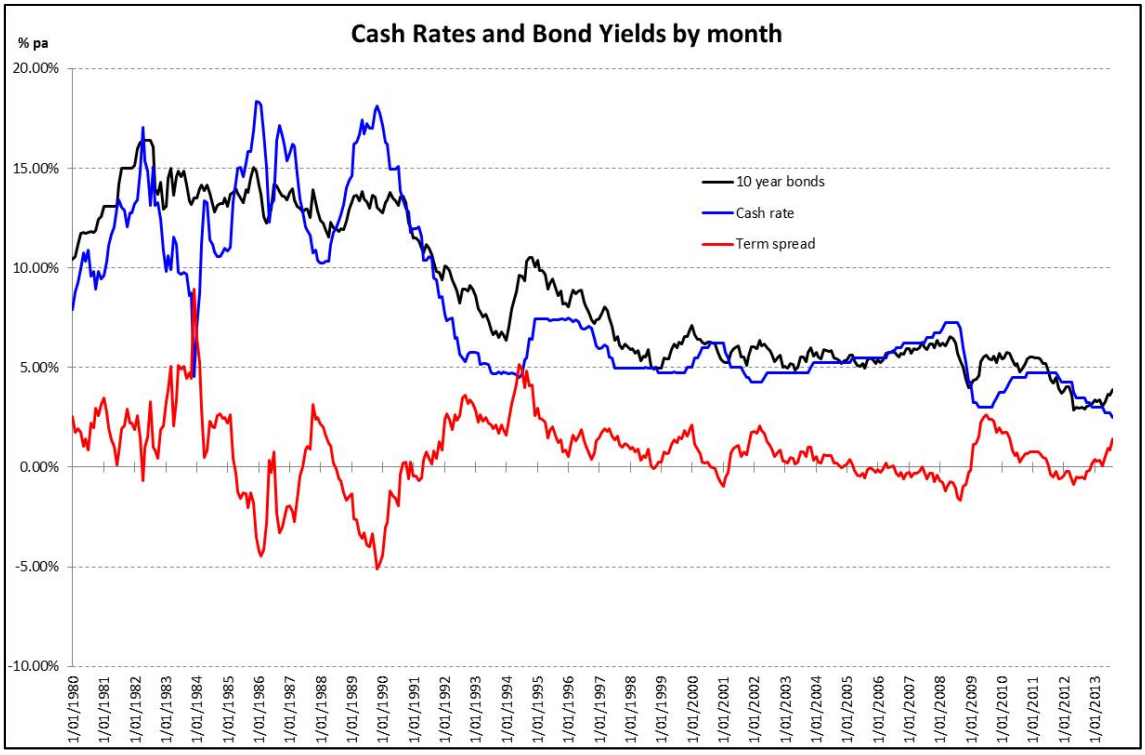
The fallacy with the ERA argument is the concept of causality, because one rate does not determine the other, and, instead both are taking in the same data inputs. The RBA has a wider charter than the CGS bond market which is solely focussed on investment returns, so there is no reason to think that there is perfect alignment between the bond market's view of ten year bond yields and the RBA's view on appropriate over-night cash rates.

Recall that the whole purpose of this analysis by the ERA is to permit the conclusion that the currently very low bond yield might be determined by the actions of the RBA via the cash rate. Such a direction of causation clearly does not occur, as will become apparent from an empirical investigation of the data. But even if it were the case that the RBA had a direct effect on bond yields, then would that matter? We would have another reason as to why rates are now so low (in addition to the very obvious reason seen above of foreign sovereign investors having flooded the Australian CGS market). The RBA's supposed influence over bond yields would not negate the point that yields are currently at unusually low levels.

To put aside this somewhat irrelevant argument that the RBA is somehow driving down Australian bond yields, I examine the data of the cash rate and 10 year CGS bond yields. I do this first using month-end data for an extended period from January 1980 to August 2013, and then using daily data from 2 January 2007 to 16 September 2013.

For the monthly data, I also include the term spread – the premium or discount of the ten year bond yields to the cash rate – see Figure 9.

Figure 9: Cash Rate and Bond Yields: monthly from January 1980



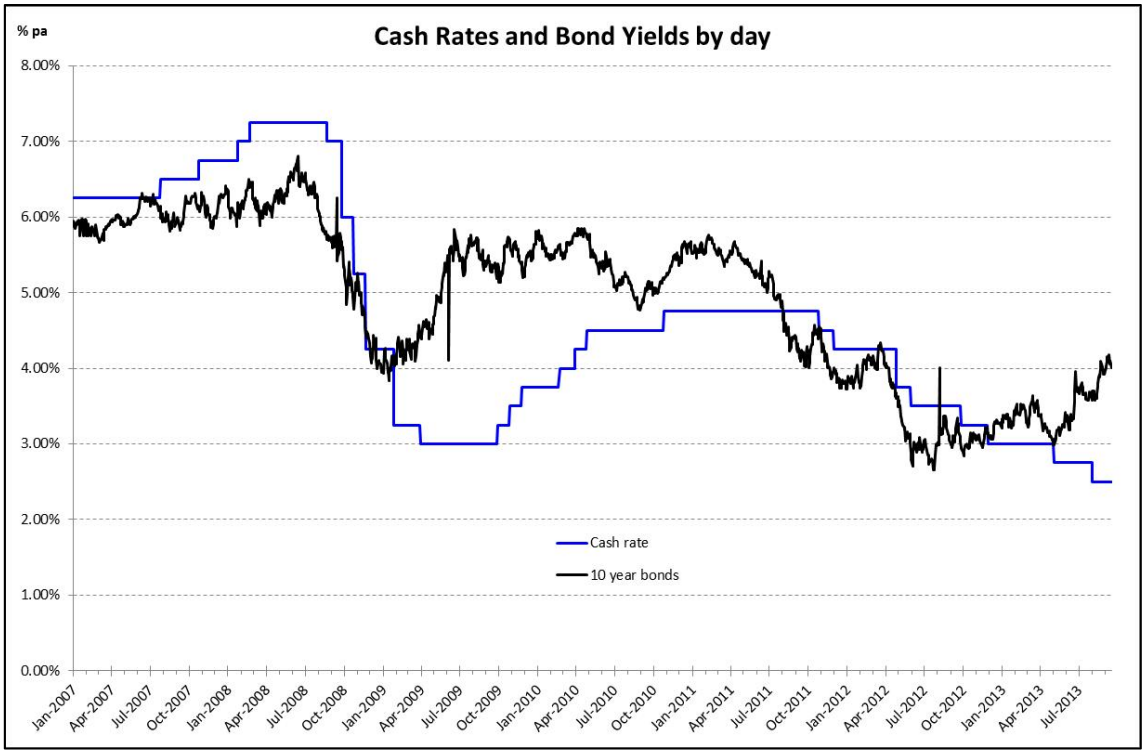
Source:

The data can be categorised into four overall sub-periods: a) 1980 – 1990, during which both cash rates and yields were quite high and volatile (driven by high inflation) with large reversals in the term premium; b) 1991 – 1998, when inflation effects declined as did cash rates and yields (albeit not without some temporary reversals); c) 1999 – 2006, during which rates and yields remained relatively stable and the yield curve was rather flat (i.e. there was very little term premium) and d) 2007 – 2013 which was the GFC event and its aftermath, over the course of which the term structure initially became inverted until the RBA aggressively cut the cash rate and temporarily established a positive term premium, which then dissipated but is now re-establishing.

A close examination of the data, especially after 1993, shows that the yields of bonds moved *before* the RBA reset the cash rate, sometimes many months before the cash rate rose. For example, bond yields started rising sharply in February 1994 but the cash rate remained essentially unchanged until August 1994.

The results obtained could be an artefact of using monthly data, and so misleading inferences could be drawn if it was the practice of the RBA to reset the cash rate at a time early in a month. Accordingly, I re-examine the issue using daily data – see Figure 10.

Figure 10: Cash Rates and Bond Yields from 2 Jan 2007



The data in Figure 10 is characterised by eight periods associated with the RBA setting of the cash rates.

Table 2: Comparative movements of Cash Rates and Bond Yields

Period	Cash Rate	Bond Yields
2-Jan-2007 – 25-Jul-2007	Steady	Flat, no net rise.
26-Jul-2007 – 22-Feb-2008	4 rises totalling 1%	Nearly flat, very small net rise.
23-Feb-2008 – 21-Aug.2008	Steady	Net decline. Peaked 16 June 2008.
22-Aug-2008 – 31-Mar-2009	6 drops totalling 4.25%	Began falling 17 June 2008 (9+ weeks earlier), bottomed 15 Jan 2009 then began rising.
1-Apr-2009 - 28-Sep-2009	Steady	Kept rising, peaked 19 Jun 2009 then essentially flat.
27-Sep-2009 – 27 Apr-2010	6 rises totalling 1.50%	Essentially flat with almost zero net rise or fall.
28-Apr-2010 – 30-Nov-2011	Largely steady, one rise of 0.25% on 26 Oct 2010	Began falling immediately after the cash rate rose on 27 Apr 2010. Rose ahead of the cash rate increase of 26 Oct 2010. Began falling after 11 Apr 2011.
1-Dec-2011 – 16-Sep-2013	8 drops totalling 2.25%	Initially falling (which began over 7 months prior to first cash rate cut), and bottomed at historical low of 2.655% on 23 Jul 2012 and has risen since (by 1.4%) as the cash rate keeps falling.

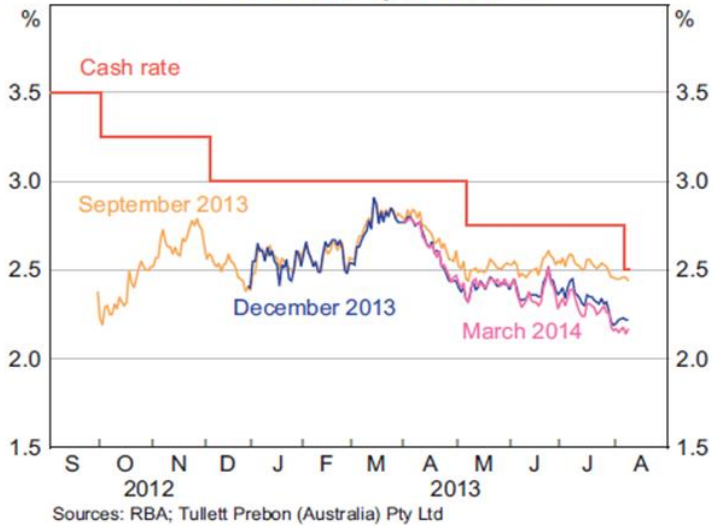
It is immediately obvious from this detailed look at the RBA's changes to the cash rate that in nearly every case that the bond yield has moved, the cash rate has also changed, sometimes by several months *after* the

change in the bond yield. The last year has been a clear case of the bond yield moving *opposite* to the cash rate. Yields have been rising but the cash rate has been falling. As stated in the RBA *Statement On Monetary Policy*, August 2013, page 37, *"Yields on long-term Commonwealth Government securities (CGS) have increased significantly since the previous Statement, reflecting the rise in bond yields observed globally. In more volatile trading conditions, 10 year CGS yields briefly reached an 18-month high of 4.04 per cent in late June as speculation grew that the US Federal Reserve may taper its asset purchase program earlier than anticipated"* – and yields have since consolidated that gain and moved a bit higher while the cash rate is falling. In spite of the markets pricing in a further fall in the cash rate in 2014, bond yields have kept rising – see the following extract from the RBA Statement.

Money Markets and Bond Yields

The Reserve Bank Board reduced the target for the cash rate from 2.75 per cent to 2.50 per cent at its August meeting. Prior to this, the pricing of money market instruments had pointed to some expectation within financial markets of a further easing in monetary policy during 2013, although the depreciation of the Australian dollar, at times, acted to temper these expectations. Rates on overnight indexed swaps (OIS) currently imply an expectation that the cash rate will be lowered to 2.25 per cent early in 2014 (Graph 4.1).

Graph 4.1
Cash Rate Expectations



Source: RBA *Statement On Monetary Policy,* August 2013, page 37

In light of this examination of the movements in both the cash rates and the CGS bond yields, I can reasonably conclude that the RBA's setting of the overnight cash rate does not dictate movements in the market yield on ten year bonds. Performing correlations and co-integration tests does not indicate which series is causing the other, or indeed if there is any causal relationship. The objective evidence is that the bond yields move ahead of the cash rate and sometimes, as for the past year, in the opposite direction. It is not the action of the RBA that drove bond yields down to an historic low on 23 July 2012. Rather, market forces drove the bond yield down to this level. No doubt the bond market and the RBA are incorporating a lot of common information inputs into their decisions. However, it is naïve and misleading to model one (the cash rate) as driving the other (the bond yield).

4.2 MRP and Bond Yields

The ERA conduct a co-integration test between yields of CGS bonds and a particular version of the market risk premium in order to examine the proposal that any reduction in the risk free rate will be offset by a relative increase in the MRP. They conclude that their results reject the hypothesis.

The ERA conducts their co-integration test between the MRP and other variables using *daily* data. The MRP is very difficult to extract from data over many decades and nearly every study that I have seen on the MRP uses at least monthly data over many years. The ERA construct their generalised MRP series of market returns based on the ASX accumulation index between day t and either day t+5 years or day t+10 years. The bond yield on day t is also used. They then move the series forward by one day and calculate the next MRP observation for the following day. A generalised premium is worked out because the series calculated are defined by (equation numbers as in the *Draft Statement*)

$$\varepsilon_t = R_{m,t} - \varphi Yield_t \quad . \tag{64}$$

In the restricted case of φ=1, the expression reduces to the usual MRP of return on the market minus the bond yield.

The results that the ERA obtains for this series with no trend nor drift allowed are presented in their Table 52, Draft Statement, page 295 and reproduced here along with their conclusion.

Table 52 Dickey-Fuller GLS Unit Root Tests: No Trend or Drift - ϕ = 1

Series	Observations	Test Statistic	Critical Value			Stationary
			1%	5%	10%	
5-Year Series	4,861	-1.3680	-2.57	-1.94	-1.62	No
10-Year Series	3,601	-0.7200	-2.57	-1.94	-1.62	No

Source: Economic Regulation Authority's analysis

16. The hypothesis that the series have a unit root cannot be rejected even at the 10 per cent level of significance. This suggests that in the 5-year and 10-year series, the market return and bond yield are *not* co-integrated. This conclusion implies that there is *no* long run equilibrium relationship between the two series observed over the period in which these observations are taken.

The Dickey-Fuller test is based on the estimation of the equation

$$MRP_t = \varphi MRP_{t-1} + u_t$$

with *u* a random noise variable. This equation can be re-written as

$$MRP_t - MRP_{t-1} = (\varphi - 1)MRP_{t-1} + u_t$$

or

$$\Delta MRP_t = \delta MRP_{t-1} + u_t$$

In the expression for the change in the MRP, $\delta = \varphi - 1$ and a test is undertaken for $\delta \neq 0$, which is equivalent to setting $\varphi \neq 1$. If we cannot reject the null hypothesis that $\varphi = 1$, then we cannot reject the proposition that changes in the MRP are just random noise and that the series of MRP estimates are simply a random walk.

The 10 year series has the weakest results for the ERA analysis, as shown in their Table 52, and so I chose to redo the analysis by following the more common approach of using monthly data. The results satisfied the criteria for the Dickey-Fuller test, and I therefore reached a conclusion which was opposite to that reported by ERA. I also performed the calculations by including one year returns, three year returns and five year returns. All calculations were underpinned by an identical mathematical form, and followed the method described in the *Draft Statement.* The data used was the ASX accumulation series and 10 year bond yields from 1989 to 2013. The set of results is as follows.

Table 3: Dickey-Fuller GLS Unit Root Test: No Trend or Drift, φ= 1 (using monthly data)

Equity returns over:	**Tau Statistic**	**Stationary**	**Comment**	**Critical values**	
1 year	**-2.86**	**Yes**	**Significant at 1% level**	**10%**	**-1.61**
3 years	**-2.22**	**Yes**	**Significant at 2% level**	**5%**	**-1.95**
5 years	**-2.02**	**Yes**	**Significant at 5% level**	**2%**	**-2.06**
10 years	**-2.12**	**Yes**	**Significant at 2% level**	**1%**	**-2.60**

The weakest result is that based on equity returns calculated over five years but even then the outcome is well within the band of significance at the 5% level, and falls just short of being significant at the 2% level. The null hypothesis that phi might be equal to one is rejected.

The monthly series of MRP estimates are stationary. The MRP potentially exhibits a tendency to return to a constant mean. Large estimates of the MRP will tend to be followed by smaller values, with small values generally succeeded by larger values. Hence, on the results of the Dickey-Fuller test, changes in the MRP will be negatively correlated with the previous level of the MRP. The test is limited in scope, and therefore cannot provide guidance as to how quickly or slowly mean reversion will occur, however the monthly data *does* show that the MRP is a stationary series.

The ERA also conduct an augmented Dickey-Fuller unit root test on two series, one based on the market returns and one based on the MRP series itself. These formulations allowed for drift terms. The two equations are reproduced here (with equation numbers as per the *Draft Statement*):

$$R_{m,t} = \alpha + \varphi Yield_t + \varepsilon_t \quad (65)$$

$$MRP_{m,t} = \alpha + \varphi Yield_t + e_t \quad (66)$$

The ERA perform augmented Dickey-Fuller tests by applying the two equations, and find that the ten year MRP and ten year market return estimates are co-integrated with the bond yields, meaning that there is a stationary relationship between them. The ERA's regression results for equations (65) and (66) are presented in their Table 55, Draft Statement, page 297, and have been reproduced here.

Table 55 10-Year Yield Series Regression (65) and (66) Results

Regression	Observations	Intercept (alpha)	Yield Coefficient (phi)	R-Squared
10 Year Series (2)	3,601	6.3702	0.4222	0.2896
p-value		0.0000	0.0000	
10 Year Series (3)	3,601	6.3702	-0.5778	0.4329
p-value		0.0000	0.0000	

Source: Economic Regulation Authority's analysis

> 23. The intercept for both cases is highly significant at 6.37 per cent annualised return. The yield coefficient ϕ (known as the co-integrating coefficient) indicates a positive relationship between returns and the risk free rate. The sign of this result is intuitively appealing, given we expect that market returns consist of some premium over the risk free rate; market returns tend to rise when the risk free rate rises and vice versa. There is no obvious reason in practice however, why the coefficient should not equal one. Conversely, ϕ indicates a negative relationship between the market risk premium and risk free rate series.
>
> 24. These coefficients should be interpreted with caution. In addition to the nonsensical value of ϕ in (66) generally, these Ordinary Least Squares (**OLS**) estimates have a non-normal distribution meaning inference based on the student distribution can be misleading. While dynamic OLS estimates can resolve this latter issue, one would expect to see a value of one on the yield coefficient in regression (66).

Note that the ERA results actually *concur* with the proposition that a reduction in the risk free rate will be offset by a relative increase in the MRP. The negative coefficient of -0.5778 for the MRP equation (66) means that on average when we use a *lower* estimate of yield in equation (66) we will get a *higher* estimate of the MRP (as we are then subtracting a smaller number). I do not claim that the ERA has estimated sensible regression results with this analysis. Rather, I point out that the results that the ERA obtain are consistent with the hypothesis of an inverse relationship that the ERA then rejects: that f*alls* in yields correlate with *rises* in the MRP. I am not surprised to see this result in daily data as the market post-GFC has been characterised by "risk-off" and "risk-on" days. A short term move out of risky assets into safe assets ought to result in higher risk premiums and lower yields on bonds, and vice-versa.

In summary, the result that the ERA gets of rejecting the stationary property of the MRP series does not hold with the common method of using monthly estimates for the MRP. In addition, their daily data results actually concur with the concept of an inverse relationship between changes in yields and changes in the MRP.

Both co-integration tests are poorly designed by using daily data. The concept of the RBA setting cash rates for which the trend in these cash rates drives the daily trend in long term bond yields clearly does not happen in practice. It is easy to observe extended periods of time over which the two rates are moving in opposite directions. The bond market anticipates, as best as it can, any relevant actions by the RBA in setting the cash rate. One observes that the bond market moves much earlier than does the more structured process of setting

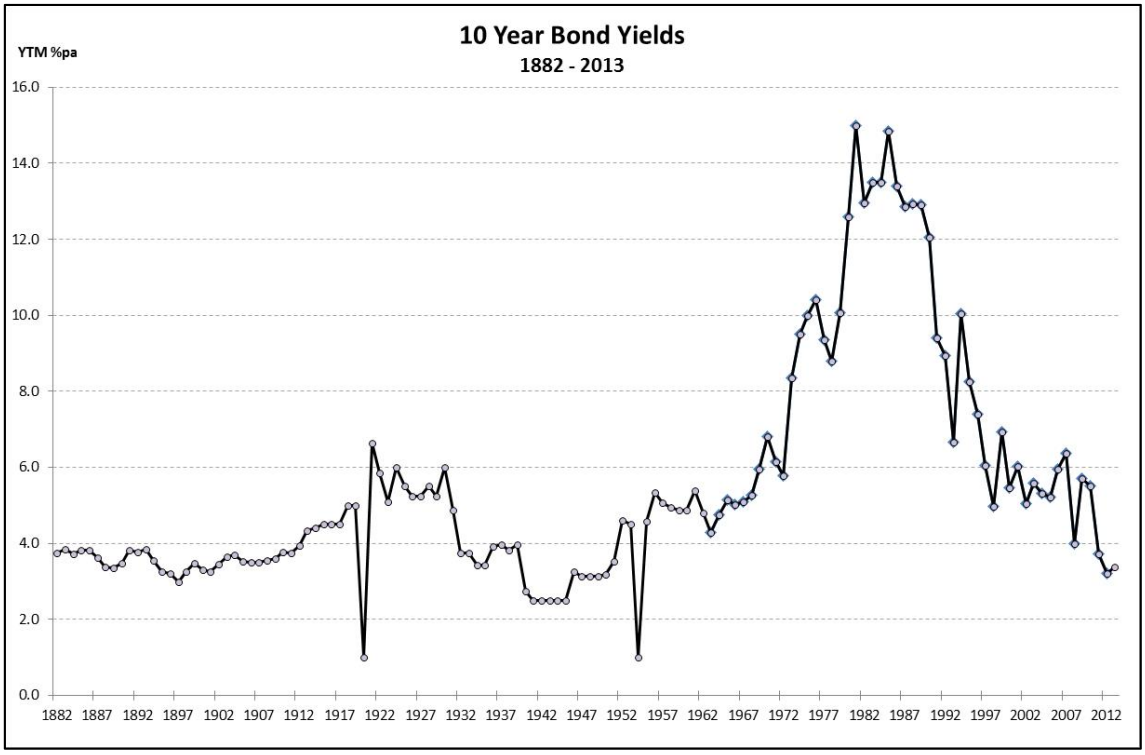
the cash rate, in some cases by more than six months in advance. In other cases, such as the past year, one sees that yields are increasing in the bond market, whilst the RBA has been reducing the cash rate and the market is expecting a further cut in the cash rate. Nevertheless, bond yields are now rising which belies the concept that these two series are co-integrated on a daily data basis. There is a possibility that the two variables are co-integrated over the long run because they are both driven by the same economic fundamentals.

The MRP series is a stationary one when measured over months. The monthly series of the MRP estimates cannot be characterised as following a random walk. One can reasonably conclude that high levels of the observed MRP will trend downwards at some stage and that low levels will revert upwards. An average of past historical MRP estimates may be informative, although the use of an unconditional MRP estimate is also problematic. There is no reason to believe that the price of risk (ie the MRP) is fixed over time. The application of the risk premium is as a forward looking or ex-ante estimate, but the historical averaging process delivers a backward looking, ex-post or realised estimate.

5. Which Period is Abnormal?

The other argument that the ERA uses against the current rates being abnormally low is that "the more recent history of interest rates (in the seventies, eighties and nineties) is not truly representative of the long run in this market" so that a whole 30 year period can be called abnormal. The following is a plot of Australian 10 year bond yields since 1882 – see Figure 11.

Figure 11: YTM on government securities

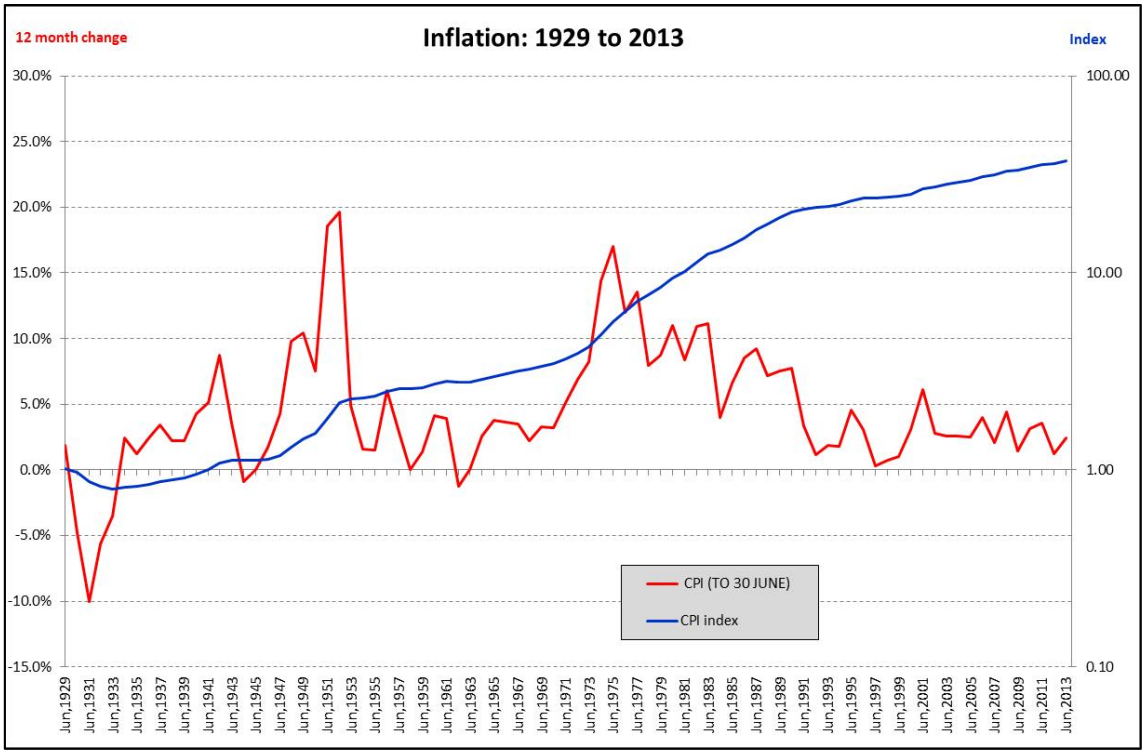


This is incorrect logic. Interest rates were high during the 1970s and 1980s because inflation was similarly high for that period. We had high inflation and so high nominal bond yields for this period. But this does not mean at all that the current yields are not abnormally low. It is not an "either-or" trade-off scenario. Both can be true. Rates were abnormally high due to high inflation and rates are now abnormally low due to a flight to quality. From Figure 9 we see that yields have only been as low as they are now during the period of the Second World War and prior to that for the period before the First World War. Over modern history of the 20th and 21st Centuries these current yields are abnormally low.

The CPI data in Figure 12 are annual data during the period from June 1929 to June 2013. Unlike the data post-1948, the early data exhibits periods of negative inflation. This was particularly prevalent in the period prior to 1935. The period 1975-1995 was one of prolonged high inflation but the highest bout of inflation occurred in the early 1950s. This corresponded to a trebling in the world wool price (the USA Army was said to be stockpiling wool for the Korean War) which, through various mechanisms, led to a severe bout of domestic inflation. The inflation of the 1970s onwards was an outcome of the USA funding of the Vietnam

War and the oil price crisis. (These were apparently related events in that OPEC oil producers worried that their oil price was set in US dollars and inflating the US dollar eroded their real income. Hence they responded by increasing their US dollar denominated oil prices.).

Figure 12: Australian consumer price index



Source: ABS and RBA data

Note that if one proposes the argument that bond yields were abnormally high in the 70's 80's and 90's then you must also concede that the historical MRP as the difference between the return on equity market and risk free rate must have been abnormally low. Does this mean the ERA concedes that the historical MRP should be adjusted upwards to correct for the historical MRP estimate?

If one can assert that a thirty year period is abnormally high, how does that sit with a five year review time span? Would the ERA argue in reverse that the MRP should not be added to the high nominal yield but rather adjusted down to some long run average which reflects more "normal" yields? It is hard to follow the logic in these arguments. The exercise looks very much like "cherry picking" to suit the desired outcome by the Regulator.

6. Summary

The ERA presents an analysis that purports to show that there has been no Flight to Quality in the Australian bond market, and therefore that current values of 10 year bond yields cannot be regarded as being unusually low.

Unfortunately, the analysis is misdirected in a number of critical ways. The ERA has not sought to provide a sound conceptual underpinning for the empirical work that is being undertaken. The ERA analysts assume that any Flight to Quality is by investors out of Australian equities and into Australian bonds. They find no evidence of this by examining returns to the two broad asset classes. This is hardly surprising because the data, which is readily available from the Reserve Bank of Australia, (RBA), and the Australian Bureau of Statistics, (ABS), amply demonstrates that nearly all of the flows into the Australian bond market after the GFC event were from foreign investors, who absorbed unprecedented amounts of new Australian government bond issues. Whilst the official data does not describe the categories of such foreign bond investors, professional bond managers in Australia, who ought to be in the best position to know this, claim that it was nearly all from foreign government sources or from foreign sovereign wealth funds. And the reason for this would be obvious – such funds are restricted to having sizeable asset allocations to high quality sovereign bonds and there are not many countries like Australia for which the three main ratings agencies have each awarded an AAA rating (or equivalent).

The other main misconception of the ERA analysis is that a day is the appropriate time frame over which to analyse events. They examine a "crash" as an equity price fall of at least 5% on a day and use prologue and epilogue events of 10 days around the daily event as controls. Apart from the October 1987 Stock Market Crash, nearly all such negative events evolve over weeks and months. Even for the 1987 Crash, the epilogue period of heightened volatility did not dissipate until well into December 1987, and so 10 days was hardly the appropriate epilogue event. It is easy to construct an "event" where a fall of over 5% on a day for "equities" and a subsequent 100% correlated trend out of "equities" and into "bonds" is never accepted by a correlation of daily returns. The examination of daily returns is in essence a poor metric for events that play out over time.

The choice of a drop of 5% or more on equity markets as a marker for flight is quite arbitrary. A monthly series of falls of 4% per day would not qualify as "flight" under this definition but, surely, a whole month of prices falling by 4% on each day would be regarded as the most pronounced flight out of equities in history.

Even if the ERA analysis were made more complete by an expansion of the definition of a flight *out* of equities, the effort would still be misdirected because the primary analysis should be of the flight *into* bonds. A flight into bonds need not be accompanied by a flight out of equities. The flight into bonds could proceed in tandem with a flight from any other asset class, or from a combination of asset classes.

The whole focus on returns is also an indirect one. A flight into an asset class means that more capital is being applied to that asset class by a group of investors. That should be directly evident from the asset allocations of investors, and should not have to be inferred from the indirect evidence of asset class returns. The government bond market is a professional wholesale market, and so the evidence can be found in the asset allocations of these investment managers. This evidence *belies* the assertion that Australian professional managers have fled the Australian equity market in favour of the Australian bond market.

Unfortunately, the analysis by the ERA that purports to show that there has not been a flight into Australian bonds contributes nothing at all towards an investigation of this hypothesis. Inadvertently, the ERA analysts investigate a joint hypothesis of both a flight from Australian equities and a flight into Australian bonds. The test is too narrow in its focus and clearly misses the most important investors into Australian government bonds after the GFC event. These investors happened to be foreign investors.

The ERA performs two co-integration analyses which are aimed at testing the following propositions:

- Whether the currently observed low levels of the risk free rate may be explained by the actions of the RBA in setting the cash rate; and
- Whether any reduction in the risk free rate will be offset by a relative increase in the MRP.

The ERA conclude that their tests indicate that the overnight cash rate and 5-year and 10-year CGS bond yield series are co-integrated, and that there is no evidence to support a co-integrating relationship between the 5-year bond yield series and market return/risk premium series.

Both these conclusions are wrong. The bond yields are set in the market place in anticipation of whatever may happen in the future. The future cash rate is but one input into setting the prices and hence yields in the bond market. The past year has a been a case of yields moving higher as the cash rate has fallen and in spite of the short term money market also anticipating a further reduction in the cash rate. We can easily see that the bond market has moved many months ahead of the RBA's determinations. For policy reasons the RBA might have held off acting in the cash market but the bond market has had no such hesitations. The concept that the deliberations of the RBA are the determinant of the yields in the bond market is clearly not true.

The conclusion of the ERA that the 10-year bond yield series and the corresponding market risk premium are co-integrated, implying that the MRP can be described by a random walk, only holds for their test using daily data for MRP estimates. The finding is soundly rejected when one uses the more normal estimation approach of monthly data. In addition, the test results of the ERA are actually *consistent* with the hypothesis that changes in the MRP estimate move in the opposite direction to changes in the bond yield, and so their results actually reinforce the hypothesis of an offsetting process between the MRP and bond yields.

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TERMS OF REFERENCE – The Current Level of the Risk Free Rate

Background

The Economic Regulation Authority (Western Australia) is developing rate of return guidelines that will form the basis of the regulated rate of return to be applied in energy network decisions. In December 2012, the ERA (WA) published a consultation paper, which was said to be consistent with the National Gas Law (NGL) and the National Gas Rules (NGR). The ERA (WA) released its draft rate of return guidelines on 6th August 2013. An explanatory statement was also prepared to accompany the draft rate of return guidelines[1].

The draft rate of return guidelines will help to inform the calculation of the regulated rate of return to be applied to third party access regimes in Western Australia. The businesses for which access arrangements will be subject to review are the Dampier to Bunbury Natural Gas Pipeline, the Goldfields Gas Pipeline and the Mid-West and South-West Gas Distribution System.

Under the previous National Electricity Rules (NER), the ERA (WA) was required to estimate the cost of equity for electricity network businesses using the Sharpe-Lintner (SL) version of the Capital Asset Pricing Model (CAPM). In this model for the expected return on equity, an equity risk premium (ERP) is added to a risk free rate of return in order to derive an expected return that is meant to compensate investors for the price of time (the risk-free rate), plus a price of risk (the ERP). This ERP is in turn decomposed into two factors, notably a generic risk premium (the Market Risk Premium, or MRP) and a risk scalar factor, called beta.

Although the previous National Gas Rules (NGR) did not mandate the use of the SL CAPM, in practice, the ERA (WA) also applied this approach in gas network decisions.

The recently revised NER and NGR now require the ERA (WA) to have regard to financial models more generally. Clause 6.5.2 of the rules states that:

> *(e) In determining the allowed rate of return, regard must be had to:*
>
> > *(1) relevant estimation methods, financial models, market data and other evidence;*

[1] ERA (2013a), Explanatory Statement for the Draft Rate of Return Guidelines, Meeting the requirements of the National Gas Rules, Economic Regulation Authority (Western Australia), 6th August 2013.

(2) the desirability of using an approach that leads to the consistent application of any estimates of financial parameters that are relevant to the estimates of, and that are common to, the return on equity and the return on debt; and

(3) any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.

Return on equity

(f) The return on equity for a regulatory control period must be estimated such that it contributes to the achievement of the allowed rate of return objective.

(g) In estimating the return on equity under paragraph (f), regard must be had to the prevailing conditions in the market for equity funds.

These clauses require the ERA (WA) to consider all relevant financial models and therefore provide greater scope for the ERA (WA) to look at cost of equity models beyond the traditionally adopted SL CAPM.

The ERA has reported that submissions from regulated businesses can generally be characterised in the following terms[2]:

- The MRP has been estimated using historical data whereas the risk-free rate is measured using an "on-the-day" approach.
- The risk-free rate of return is at an historical low due to a flight to quality in the Australian financial market. The reported yields on Commonwealth Government Securities (CGS) are generally used as a proxy for the risk-free rate.
- A constant return on equity should be adopted in regulatory decisions because of the existence of a negative correlation between the risk-free rate and the MRP.

The ERA considers these propositions and posits two possibilities in relation to the current level of the risk-free rate[3]:

(i) The current level of a risk-free rate is at an historical low; or

(ii) The current level of a risk-free rate reflects the mean-reversion of a risk-free rate to a low level from a very high level in the previous decades due to high expected inflation.

The ERA conducts its own analyses of the propositions, and its work includes an examination of the question of whether or not there has been a flight to quality within the CGS market, and whether or not the Reserve Bank of Australia has driven the yields on CGS to very low levels.

The ERA conclusion, reported in the explanatory statement is that[4]:

> It is unclear that the current level of the risk free rate is at an historical low.

[2] ERA (2013a), Explanatory Statement for the Draft Rate of Return Guidelines, Meeting the requirements of the National Gas Rules, Economic Regulation Authority (Western Australia), 6th August 2013; section 11.3, page 140.

[3] Ibid.; section 11.3, page 149.

[4] Ibid.; paragraph 794, page 150.

The ERA further states that[5]:

> In conclusion, the Authority is of the view that there is no empirical evidence to support the view that there is a "flight to quality" in the Australian financial market during periods of economic uncertainty.

The ERA also concludes that[6]:

> On balance, the Authority is of the view that a scenario which indicates the possibility that a reduction of a risk-free rate of return is not associated with any move in the MRP is the most appropriate.

The ERA cites, as one reason for this conclusion, the Authority's own analysis of the data.

United Energy and Multinet Gas are looking for an expert consultant to provide a review of the arguments presented by the ERA (WA) for its conclusion that there has not been a flight to quality into the market for Commonwealth Government Securities (CGS), and that there is no reason therefore to conclude that the yields on CGS are currently at historically low levels. A broader question being posed by United Energy and Multinet Gas is whether treating the MRP as a constant through time, for all practical purposes, will lead to estimates of the return to equity that are, as the NER and NGR require, consistent with prevailing conditions in the market for equity funds.

Scope of work

The consultant should:

- Assess the relevance of the evidence that the ERA intends to use in order to determine an appropriate estimate of the risk free rate.
- Review the literature and undertake any empirical work that may be deemed to be relevant.
- Assess other evidence that might be pertinent to the question of determining whether the risk free rate is at an historically low level.

Relevant documents that the consultant will be required to consider include:

- The draft rate of return guideline and its supporting explanatory statement.
- The Appendices to that draft which discuss the empirical analyses conducted by the ERA (WA).

The consultant should document the methods, data, adjustments and assumptions used and made.

A draft report will be required for preliminary review by United Energy and Multinet Gas. The final report must be of sufficient standard that it can be submitted to the ERA as part of the response by United Energy and Multinet Gas to the ERA's draft rate of return guideline.

Timeframe

The consultant is to provide a draft report by 10th September 2013.

A final report which addresses any feedback should be provided by 18th September 2013.

[5] Ibid.; paragraph 805, page 153.

[6] Ibid.; paragraph 818, page 155.

Reporting

Jeremy Rothfield will provide the primary interface for the duration of the engagement. The consultant will report on work in progress on a regular basis. The consultant will make periodic presentations on analysis and advice as appropriate.

The consultant may be called upon to present analysis and advice to the ENA Cost of Capital Subgroup.

Conflicts

The consultant is to identify any current or future potential conflicts.

Fees

The consultant is requested to:

- Provide a fixed total cost for the project, and set out hourly rates for the proposed project team, should additional work be required.
- Supply details about the staff who will provide the strategic analysis and advice.
- Declare the absence of any relevant conflict of interest in undertaking the project; and
- Indicate preparedness to enter into a confidentiality agreement regarding research and findings.

Any changes to the scope of the consultancy must be agreed with United Energy and Multinet Gas before the quotation is submitted. Miscellaneous costs such as travel and accommodation will be reimbursed, on the understanding that prior agreement will be sought from United Energy and Multinet Gas before the costs are incurred.

Contacts

Any questions regarding these terms of reference should be directed to:

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