Update to AER WACC parameters and expected inflation

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1 Update to WACC parameters

1. CEG has updated the nominal cost of debt and nominal cost of equity (using AER assumptions) in addition to our best estimate of inflation (see Table 1-1). This update, consistent with our previous advice to AGN, incorporates the most recent actual ABS inflation figures at the time of the AER's decision and financial information from within AGN's averaging period.

Table 1-1: Updated AER nominal WACC and AER/CEG inflation parameters

Estimate	October 2015^	December 2015	Feb/March 2016 averaging period	6 May 2016[+]
AER nominal cost of debt	5.30%*	5.59%	5.51%	NA
AER nominal cost of equity (sum of 4.55%[#] plus next row)	7.22%	7.42%	7.12%	6.86%
10 year risk free rate	2.67%	2.87%	2.57%	2.31%
AER inflation (based on closest dated SoMP[##])	2.50%	2.50%	2.50%	2.39%
10 year break-even inflation	2.21%	2.22%	1.96%	1.64%
5 year RAB RFM forecast*	1.88%			1.16
CEG PTRM Inflation (October 2015)	2.01%			
CEG PTRM Inflation (Current. 40% weight to 10 year break-even during averaging period, 60% weight to most recent 5 year RAB RFM (both highlighted)				1.48%

*Source: ABS, Bloomberg, RBA, CEG analysis. ^Based on CEG's 6 January 2016 report for AGN: Measuring expected inflation for the PTRM (note the cost of debt estimate differs from our "Curve testing and selecting averaging periods" because that report used a placeholder DRP. + 6 May 2016 is the most recent estimate at the time of writing. Only one day is used because, at the time of writing, only one day has passed since the release of the May 2016 SoMP (an important market event). The AER could reasonably use a longer averaging period starting on this date when measuring expected inflation over the remainder of the RAB RFM period (or in the event it persists with only using a 10 year horizon). #4.55% = 0.7*6.5%. ##RBA Statement on Monetary Policy (SoMP). * Weighted average of actual and forecast inflation (Actual = December 14 to March 16, Forecast = March 16 to December 19).*

2. The most material changes between finalisation of our previous advice and AGN's averaging period (and beyond) are the falls in both the nominal risk free rate (and therefore the AER cost of equity) and break-even inflation expectations. We consider that these falls are interdependent. Specifically, we consider that the fall in the nominal risk free rate (proxied by nominal Commonwealth Government Securities (CGS)) is, in large part, as a result of the fall in inflation expectations – leaving the real risk free rate largely unchanged.

3. Specifically, the fall, moving left to right, in the "AER nominal cost of equity" row needs to be viewed in the context of the similar fall in break-even inflation expectations – with the net effect that, relative to December, the best estimate of real

returns (not shown) declines only marginally in moving to AGN's averaging period (and actually rises in moving to 6 May 2016). This underlines the importance of using consistent market data in measuring the nominal risk free rate and inflation.

1.1   Actual inflation has been persistently low

4.   The two most recent quarters of inflation, both released since our 6 January 2016 report, are well below the bottom end of the RBA range. The December 2015 quarter inflation (released on 27 January 2016) was 1.5% annualised and the March quarter CPI was -0.7% annualised. Combined, these represent a 0.37% annualised inflation rate for the last half year. This reflects an intensification of a pre-existing trend whereby over the nearly five year period beginning 1 July 2011, average annual inflation has been 1.9%. Over the last two years inflation has averaged 1.3%.

5.   On 5 May 2016 the RBA released its May SoMP which included a dramatic reduction in the range for forecast inflation – from 2-3% to 1.5-2.5%. This is entirely consistent with international experience, with inflation persistently at or below the bottom end of central bank targets.[1] RBA Governor Glenn Stevens has made the same point in a speech shortly after the end of AGN's averaging period.[2]

> *Inflation is quite low. Recent information has confirmed that growth in labour costs remains quite subdued. Given this, and with inflation also restrained elsewhere in the world, inflation in Australia **is likely to remain low over the next year or two.***

1.2   Falling inflation expectations and nominal CGS yields

6.   There has been a material fall in nominal CGS yields since our last report. The fall in nominal CGS yields has been associated with a similar fall in break-even inflation estimates.[3] If one believes, as we do, that break-even inflation estimates are an

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[1]   See IMF, World Economic Outlook (WEO), April 2016. "*Headline inflation in advanced economies in 2015, at 0.3 percent on average, was the lowest since the global financial crisis, mostly reflecting the sharp decline in commodity prices, with a pickup in the late part of 2015 (Figure 1.2). Core inflation remained broadly stable at 1.6–1.7 percent but was still well below central bank targets.*"

[2]   RBA, Statement by Glenn Stevens Governor: Monetary Policy Decision, 2016-08, April 2016. Note that this statement was made before: a) the ABS published deflation for the March quarter 2016; b) the RBA responded with an interest rate cut and inflation forecast downgrade; and c) 10 year break-even inflation fell to 1.64% (as per Table 1 above). One can reasonably assume that assumption that current views are pessimistic than when this speech was made.

[3]   Inflation is the link between nominal and real returns on assets. Other things equal, a rise/fall in expected inflation implies a rise/fall in nominal yields as investors demand more/less compensation for the erosion of the purchasing power of money. Under clause 87(5)(c) of the NGR, the AER is required to consider "any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt". Consistent with this, the AER must be cognizant of the

accurate measure of expected inflation, then this implies that most of the fall in nominal CGS yields since December 2015 has been due to a fall in inflation expectations – rather than falls in real yields. This would imply that the real yield on 10 year CGS has been relatively stable over this period.

Figure 1-1: 10-year nominal CGS rates and 10-year breakeven inflation
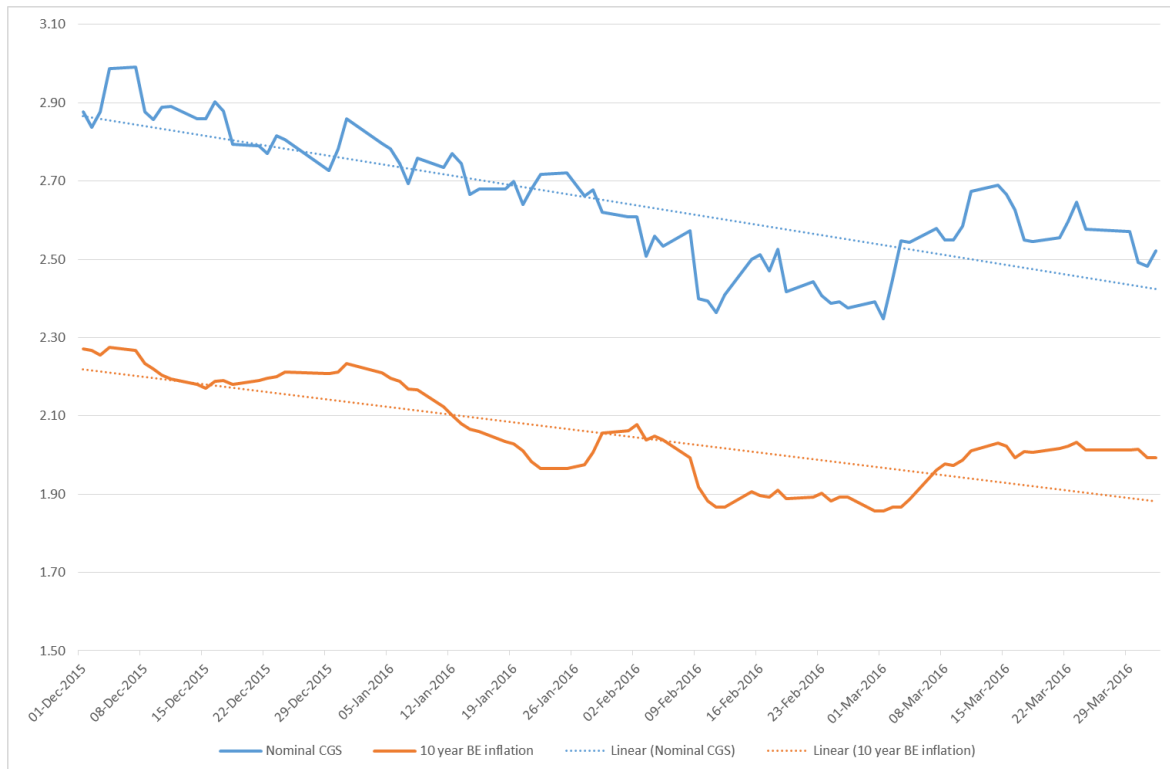
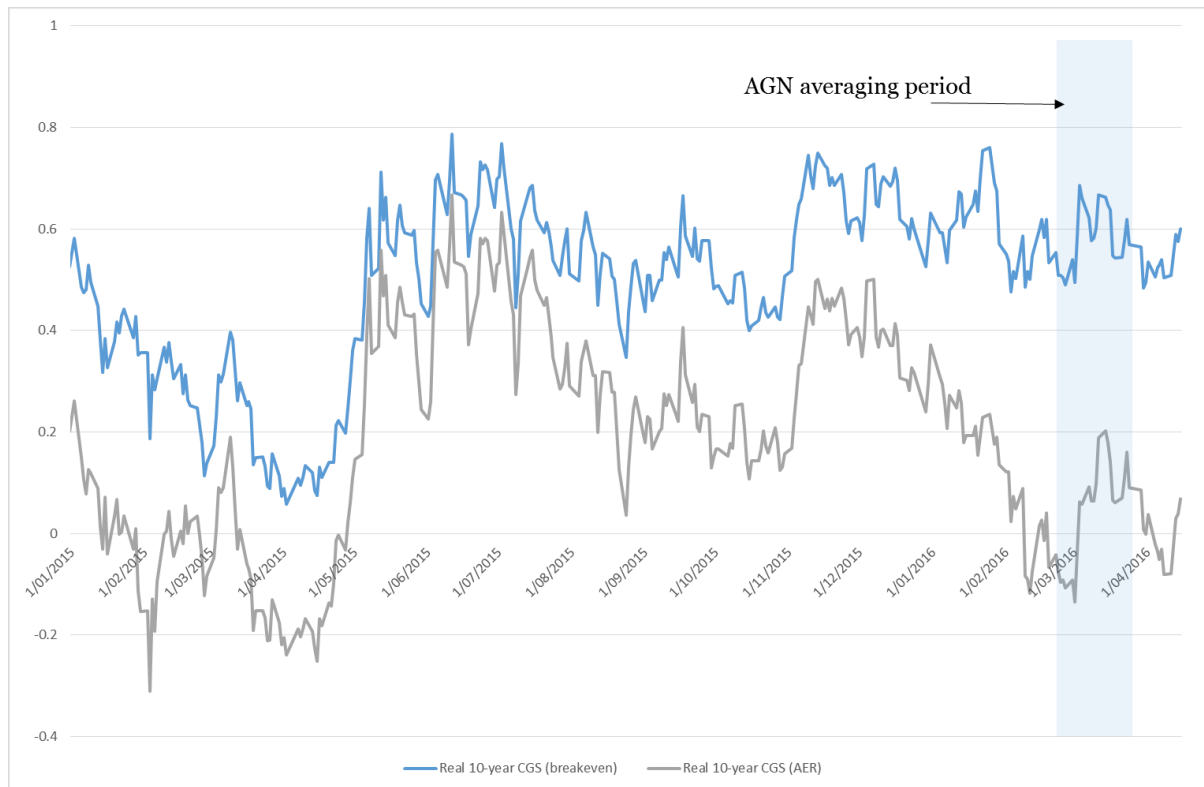
Source: RBA, CEG analysis

7. By contrast, if, as is the case with the AER estimation technique, inflation is assumed to have remained constant at 2.5%[4] over the December 2015 to March 2016 period, this would imply that real CGS yields have fallen by the same magnitude as nominal CGS yields. Indeed, it would imply that real yields became negative during the first week of AGN's averaging period– implying that investors were happy to invest in

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interrelationship between the inflation forecast input to the PTRM and the nominal risk free rate input into the cost of equity.

[4] The RBA's most recent revision to inflation forecasts occurred on 5 May – one month and 25 days from the middle of the AGN averaging period and followed the 27 April ABS announcement of March quarter deflation. In any event, even if this forecast is inferred backwards to the AGN averaging period the AER forecast for 10 year inflation would only fall to 2.39%; due to the 80% weight given to the assumption that investors expect inflation to be 2.5% in years 3 to 10 (see discussion at paragraph 11 below).

nominal CGS in the expectation that the purchasing power of their investment in 10 years' time would be lower than it was at the time of their investment.

Figure 1-2: Real 10 year CGS yields using AER vs break-even inflation expectations

Source: Bloomberg, RBA, CEG analysis.

8.   It is not impossible for investors in nominal CGS to buy them in the expectation of receiving a negative real return (i.e. it is not impossible for investors to save in order to have lower future consumption options than they have if they did not save and instead consumed now). However, this is an anomalous result and one that would, in our view, require investigation and justification before being accepted. This is especially so in the context where the investor could have bought inflation indexed CGS at a guaranteed real return of around 0.59% (the average yield on CPI indexed 10 year CGS over AGN's averaging period).

9.   CEG believes that the anomaly (negative estimated real returns to risk free saving in nominal assets during AGN's averaging period) is a result of inaccuracies in the AER's inflation forecast rather than a true anomaly in investor required returns.

10. This conclusion is supported by the fact that, over the course of 2016, daily changes in 10 year break-even inflation have a strong explanatory power in explaining daily changes in nominal 10 year CGS yields (as one would expect of an accurate measure). From 31 December 2015 to the end of March 2016 regression of daily changes in CGS

yields on daily changes in break-even inflation results in an estimated coefficient of 0.93 (i.e., close to 1.0 - suggesting that, on average, changes in inflation expectations are reflected in changes in nominal yields of a similar magnitude), as shown in Table 1-3 below. This coefficient is highly statistically significantly different to zero (significant at the 99% confidence level, with the standard errors of each parameter shown in parentheses).

Table 1-2: Regression of nominal CGS yields against inflation

	Constant	**Slope**
Change in 10 year nominal CGS vs change in 10 year breakeven inflation	-0.00 (0.01)	0.93 (0.27)

Source: Bloomberg, RBA, CEG analysis

## 1.3   AER methodology in the current market context

11.   The AER's current practice is to arrive at an estimate of expected inflation at a 10 year horizon based on the most recent RBA SoMP forecast ranges at the time of its final decision – which we expect to be the May 2016 SoMP. (The AER does not link its forecast of inflation to the specific averaging period used to set the risk free rate. The AER then estimates expected inflation as the average across 10 years:

- for the first two financial years (ended June 2017 and June 2018) inflation is assumed to be the midpoint of the RBA's forecast range as published in Table 6.1 of the SoMP (2.0% for each year); and

- for each of the subsequent 8 years inflation is assumed to be 2.5% (being the midpoint of the RBA's target range for inflation (being the range the RBA is attempting to achieve as opposed to the range it expects).

12.   The AER's forecast methodology makes the following assumptions:

a.   there is no need to link inflation expectations to the period that the AER has estimated the risk free rate and cost of debt;

b.   the AER implicitly assumes that, in years 3 to 10, investors place the same probability on inflation being above as opposed to below the middle of the RBA target range;

c.   in the two years in which the AER uses the midpoint of the RBA forecast range the AER implicitly assumes that:

  i.   the midpoint of the RBA range is the RBA's central estimate within that range; and

  ii.   the RBA's published range reflects the probability weighted (as opposed to most likely) inflation outcomes.

13. In relation to the assumption at paragraph 12.a, we have previously explained why we consider that the portion of expected inflation that is used within the PTRM to determine the real return on equity should be determined based on expected inflation within the averaging period used to measure the nominal risk free rate (and cost of equity).

14. The assumption at paragraph 12.b is, in our view, unreasonable in the context of current domestic and international market conditions outlined in this report. This assumption implies that, based on the May 2016 SoMP, even though inflation has averaged 1.3% over the most recent two years to March 2016 and even though the centre of the RBA forecast range (published in Table 6.1) is 2.0% for the next two financial years, investors expect inflation to then immediately jump from 2.0% to 2.5% in the year ended June 2019. This assumption would be problematic in general. However, it is also problematic in the specific context where the RBA's central forecast of underlying inflation (trimmed mean inflation)[5] increases only gradually over the next two years as evidenced from Graph 6.4 of the May SoMP (reproduced below).

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[5] The RBA's standard measure of underlying inflation is trimmed mean inflation. See RBA Bulletin, Measures of Underlying Inflation, March Quarter 2010 which states "Given that CPI inflation is quite volatile, most of the models and equations used in the Bank to explain inflation use some measure of underlying inflation (often 15 per cent trimmed-mean inflation) as the dependent variable."

Figure 1-3: RBA forecast path for underlying inflation

Graph 6.4
Trimmed Mean Inflation Forecast*
Year-ended
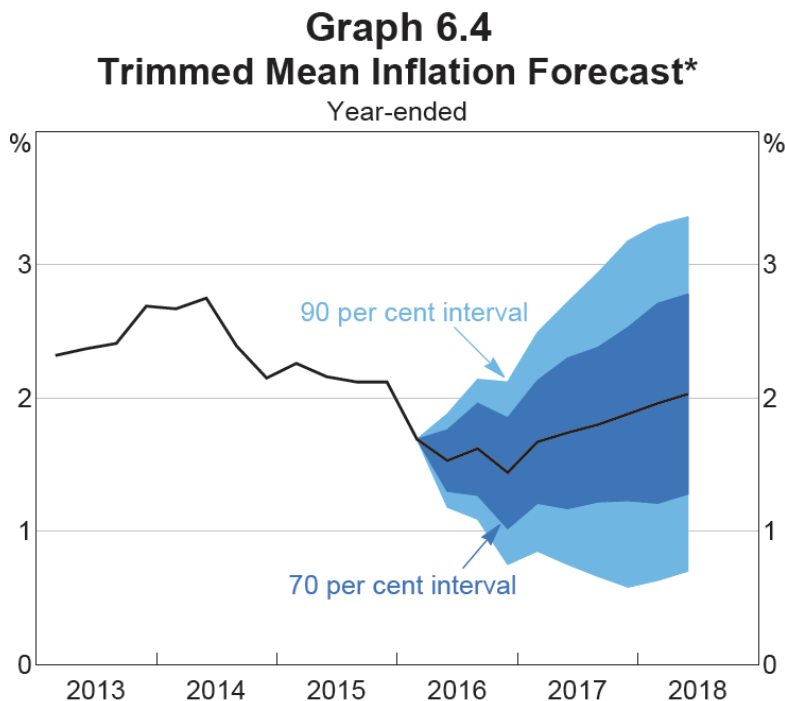
* Confidence intervals reflect RBA forecast errors since 1993
Sources: ABS; RBA

15. That is, the RBA's central forecast is for gradual increases in underlying inflation[6] over the next two financial years with inflation only just reaching 2.0% at the end of the forecast period. There is no obvious reason to assume inflation would then jump immediately to 2.5% in the following year.

16. The AER's implicit assumption set out at paragraph 12.c.i is also problematic based on the same Graph 6.4 from the May 2016 SoMP. To see this, note that the RBA reports a range of 1.5-2.5% for underlying inflation in Table 6.1 which is the same range as for CPI inflation (from which the AER draws its forecast). The AER adopts the middle of this range (2.0%) as its forecast for inflation for both 2017 and 2018 financial years. However, in Graph 6.4 the RBA provides a more detailed time-path for its central estimate which shows the midpoint of its forecast is actually below 2.0% until June 2018.

17. Notwithstanding the above, the implicit AER assumption at paragraph 12.c.ii is potentially the most problematic in the current circumstances. This is the assumption that the midpoint of the RBA forecast range (and the midpoint of the RBA target beyond that) can be used as a probability weighted forecast across all potential inflation outcomes (i.e., the AER assumes the forecast represents actuarially expected

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[6] Noting that underlying inflation has the same forecast range in Table 6.1 of the SoMP as "headline" CPI inflation.

outcomes). As is explained below, the RBA makes clear that its forecast range is a forecast of the most likely outcome and that there are downside risks to this forecast that are not embodied in the central estimate. Moreover, these downside risks extend beyond the forecast range making the adoption of the middle of the RBA's target range (2.5%) as a mean (probability weighted) estimate of possible future inflation outcomes problematic.

18.   In our June 2015 report, *Measuring expected inflation for the PTRM*, we explained why, in a low interest rate environment, the risks associated with inflation outcomes in the current environment are asymmetric – with greater risk of below target inflation than above target inflation.[7] The essential point is that monetary policy is constrained in how low interest rates can go in order to raise inflation (the 'zero lower bound') with no similar constraint on raising interest rates in order to reduce inflation. This creates the potential for a 'low inflation/interest rate trap' that has no symmetrical opposite. Consistent with our previous advice, following the RBA's most recent rate cut, the Australian Financial Review (AFR) reported that:[8]

> *Australians must urgently confront the danger that the Reserve Bank of Australia is nearing the very limits of its powers and risks stumbling into the same zero-interest rate trap that has neutered European and Japanese central banks, say two high-profile economists. ...*

> *"The evidence is that even aggressive monetary policy action doesn't seem to be driving up inflation, so far," Mr Yetsenga told* AFR Weekend.

19.   Bloomberg also correctly reported that the May SoMP inflation forecasts are built on an assumption that the RBA will reduce interest rates in line with market expectations.[9] This implies that the RBA's inflation forecasts are based on the RBA reducing interest rates again at least once in the near term which would imply cash-rates fall to at least 1.5%.[10]

> *"If after cutting once and factoring in another rate cut, as per market pricing, you are still only getting to the bottom half of your target band by the end of the forecast horizon, that's giving a clear signal you feel quite*

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[7]   See CEG, Measuring expected inflation for the PTRM, June 2015, section 2.1, paragraphs 27 to 33.

[8]   AFR Weekend, RBA joins race to the interest rate bottom, 6 May 2016 at 11.45pm. Available at this link: http://www.afr.com/news/economy/monetary-policy/rba-joins-race-to-the-interest-rate-bottom-20160506-gooblo#ixzz47xFNhJoE

[9]   RBA, May 2016 SoMP, p. 60. "*In preparing the domestic forecasts, a number of technical assumptions have been employed. The forecasts are conditioned on the assumption that the cash rate moves broadly in line with market pricing as at the time of writing.*"

[10]   Bloomberg, Reserve Bank of Australia Cuts Core Inflation Forecast to 1-2%, May 6, 2016. (Available at http://www.bloomberg.com/news/articles/2016-05-06/rba-cuts-core-inflation-forecast-unlikely-to-hit-target-in-16.)

concerned about underlying inflation pressures and the outlook," said James McIntyre, head of economic research at Macquarie Group Ltd.

20. In this context, break-even inflation has a further critical advantage over simple analyst forecasts of the most likely inflation outcomes. This is because, in the presence of asymmetry, the most likely inflation outcome (which is, as is discussed below, typically what published forecasts are predicting) will not equal the mean expected inflation outcomes (which is what prices in financial markets reflect). That is, break-even inflation reflects the market's probability weighted assessment of all possible inflation outcomes – not just the most likely outcome.[11]

21. The most recent IMF April 2016 World Economic Outlook provides a cogent summary of the difference between central forecasts and probability weighted forecasts where the distribution of possible outcomes is tilted to the downside. This discussion, while focussed on global forecasts and risks is, as we shall show, effectively mirrored in the RBA February SoMP and explanatory statements by the RBA. Notable also is the fact that the IMF continues to express concern about low inflation outcomes in a world where low interest rate environments limit central banks' scope to raise inflation expectations. [12]

> *WEO [(World Economic Outlook)] growth forecasts form a **central, or modal, scenario**—growth rates that the IMF staff estimates to be the **most likely** in each year of the forecast horizon. The weakening in global growth in late 2015 and the escalation of threats to global economic activity since the start of this year have led the staff to reduce the projected growth rates under the central scenario.*
>
> *Alongside these reduced central projections, the staff views **the likelihood of outcomes worse than those in the central scenario as having increased**. Put differently, not only is the central WEO scenario now less*

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[11]   For example, if investors perceive:

- a 2/3rd probability that Australia will escape the "low inflation trap". In this state of the world, 10 year inflation may be expected to fall within the RBA target range (centred on, say, 2.5%);
- a close to 0% probability of inflation being above the RBA target range; but
- a 1/3rd probability of being, at least for a time, stuck in a "low inflation trap". In this state of the world 10 year inflation might be expected to average only 1.0%.

Faced with these perceived probabilities an investor's (actuarially) expected inflation will be 2.0% (=0.67*2.4 + 0.33*1.0%). This is the additional return that they will demand to compensate them for the, probability weighted, expected level of inflation. This is notwithstanding the fact that the most likely outcome may well be that inflation is around 2.5%. The AER methodology automatically takes lower nominal CGS yields resulting from asymmetrical inflation expectations into account and reflects this in a lower nominal risk free rate as observed in bond markets. However, the AER does not automatically reflect the same lower probability weighted inflation expectations in its PTRM inflation input. This is even though this can also be directly observed from bond markets in the form of break-even inflation estimates.

[12]   IMF, World Economic Outlook (WEO), April 2016, p. 24.

*favorable and less likely; **in addition, the even weaker downside outcomes have become more likely**.*

*… Over the near term, the main risks to the outlook revolve around (1) the threat of a disorderly pullback of capital flows and growing risks to financial stability in emerging market economies, (2) **the international ramifications of the economic transition in China**, … **Perceptions of limited policy space to respond to negative shocks, in both advanced and emerging market economies, are exacerbating concerns about these adverse scenarios.** In the euro area, **the persistence of low inflation** and its interaction with the debt overhang is also a growing concern. Beyond the immediate juncture, the danger of secular stagnation **and an entrenchment of excessively low inflation in advanced economies,** as well as of lower-than-anticipated potential growth worldwide, has become more tangible.* [Emphasis added.]

22. RBA Assistant Governor Christopher Kent, in a speech made on 6 April 2016, has used precisely the same example to illustrate the difference between central forecasts of what is most likely to occur and probability weighted consideration of all possible outcomes.[13]

    *One can also imagine scenarios that are unlikely to occur but may have far more substantial implications for the economic outlook if realised. These scenarios can be difficult to quantify but may be worth discussing nonetheless. **An example that we discussed in our most recent Statement which was the potential for financial instability in China to lead to a sharp slowdown in economic activity there and in the Asian region more broadly.***

23. The "Statement" referred to above is the February 2016 SoMP where there is a long discussion of downside risks to the forecasts associated with negative development in China which mirrors the IMF's own discussion.[14] This is repeated in the May SoMP in which the RBA states under the heading of "uncertainties":[15]

    The forecasts are based on a range of assumptions about the evolution of some variables, such as the exchange rate, and judgements about how developments in one part of the economy will affect others. One way of demonstrating the uncertainty surrounding the central forecasts is to

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[13] Christopher Kent, Assistant Governor (Economic), Address to the Economic Society of Australia (Hobart), University of Tasmania, Hobart – 6 April 2016. See also section 5.3 of RBA Research Discussion Paper, Estimates of Uncertainty around the RBA's Forecasts, Peter Tulip and Stephanie Wallace, 2012-07. This article is referenced by Assistant Governor Kent in his 6 April 2016 speech.

[14] See RBA, Statement On Monetary Policy, February 2016 pp. 63-64.

[15] RBA, Statement On Monetary Policy, May 2016 pp. 63.

present confidence intervals based on historical forecast errors (Graph 6.3, Graph 6.4 and Graph 6.5).

It is also worth considering the consequences that different assumptions and judgements might have on the forecasts and the possibility of events occurring that are not part of the central forecast. One of the key sources of uncertainty continues to be the outlook for growth in China and the implications of high levels of debt there.

24. Put simply, the midpoint of the RBA's forecast range cannot be assumed to be the probability weighted mean inflation expectation that is perceived by investors (and which will be reflected in nominal CGS yields).[16] The best way to ensure that this is the case is to use inflation forecasts derived from financial market prices which automatically reflect investor's mean actuarial expectations across all possible outcomes.

1.4   Conclusion

25. We calculate that the nominal cost of debt and nominal cost of equity (using AER assumptions) updated over AGN's averaging periods are 5.51% and 7.12% respectively, giving rise to an overall AER nominal WACC outcome of 6.15%. This is lower than the estimate that would have resulted from application of the same method in the month of December (immediately prior to our 6 January 2016 report). This is primarily due to a 30bppa reduction in the nominal risk free rate.

26. Consistent with our previous advice, we have now updated our inflation estimate over AGN's averaging periods. This update suggests that 26bppa of the 30bppa fall in nominal risk free rates is attributable to a fall in inflation expectations. The evidence since the finalisation of our previous report[17] continues to support the conclusions that:

- Actual inflation is below 2.5%, the newly published December and March 2016 quarters averaging just 0.37% annualised; and

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[16]   In this context it is also relevant to note that the biggest challenge the RBA faces is avoiding a low inflation trap. However, the greatest risk in this regard is the self-fulfilling prophecy of low inflation expectations. In the words of Nobel Prize winning economist Paul Krugman, "…if nobody believes that inflation will rise, it won't" (Paul Krugman, Rethinking Japan, 20/10/2015, New York Times, The Opinion Pages (online, available here). If the RBA does forecast inflation to continue to be below its target range then this very act may make its job task of returning inflation expectations, and ultimately actual inflation, back to within its target range more difficult. One way the RBA could deal with this issue is to adopt a very wide range for its forecasts (which it has done). Similarly, the RBA can ameliorate this tension by discursively dealing with downside risks to its forecast range dealt with rather than embedding these in its central estimate (which it is also apparent that it has done – see discussion at paragraphs 22 to 24 above).

[17]   CEG, Measuring expected inflation for the PTRM: A report for AGN, January 2016.

- Inflation expectations are below 2.5% in the short and long term.

27. Updating CEG's previous October 2015 estimate of the best estimate of inflation to be used in the PTRM (2.01%) for subsequent actual inflation and estimates of expected inflation results in a revised best estimate of 1.48%. This reflects a 40% weight given to 10 year break-even inflation measured over AGN's averaging period (1.96%) and 60% weight given to a forecast of inflation to be used in the next application of the RAB RFM (1.16%). This 1.16% estimate reflects actual inflation to date over the RAB RFM period and expected inflation over the remainder of the RAB RFM period measured on 6 May 2016 (although the AER may choose to use a longer averaging period starting on this date).

28. I acknowledge that I have read, understood and complied with the Federal Court of Australia's Practice Note CM 7, "Expert Witnesses in Proceedings in the Federal Court of Australia". I have made all inquiries that I believe are desirable and appropriate to answer the questions put to me. No matters of significance that I regard as relevant have to my knowledge been withheld.

29. I have been assisted in the preparation of this report by Johnathan Wongsosaputro in CEG's Sydney office. However, the opinions set out in this report are my own.

Thomas Nicholas Hird