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By email

17 December 2014

Dear Nick

CEG report on new issue premium

Please find attached to this letter a CEG report which estimates the magnitude of the new issue premium on bonds issued by Australian corporate entities. This report was originally prepared for Citipower, Jemena, Powercor Australia, SA Power Networks, AusNet Services and United Energy.

All of these businesses are regulated by the AER and the AER's practice is to estimate the cost of debt using fair value yield estimates published by the RBA and/or Bloomberg. Both the RBA and Bloomberg derive their fair value yield estimates from estimates of the yield on secondary bonds in the secondary market (i.e., trades made subsequent to the bonds issuance) as reported by the data service Bloomberg.

The methodology that we adopted in the attached report is specifically designed to estimate the new issue premium relative to Bloomberg's published estimates of secondary market yields. Therefore, the results in that report are relevant to any estimate of the cost of debt in the primary bond market (i.e., the market for debt at the time of issue) that is being estimated using yield estimates of secondary bond market yields as reported by Bloomberg.

I understand that the ERA's proposed methodology for estimating the cost of debt, as expressed in its most recent draft decision for ATCO, is to estimate the cost of debt using a number of different curve fitting techniques.[1] The data used by the ERA in these curve fitting exercises is made up of secondary market yields sourced from Bloomberg.[2] Therefore, the results in the attached report are equally relevant to the ERA's estimation technique as they are to the AER's technique (based on RBA and Bloomberg fair value curves).

[1] See page 199 of ERA, Draft Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution System

[2] Ibid, p. 198, footnote 446.

I also confirm that I am aware of no new information or analysis that would cause me to change the opinions expressed in the attached report.

Yours sincerely

Tom Hird
Director

Competition Economists Group

ceg COMPETITION ECONOMISTS GROUP

The new issue premium

December 2014

COMPETITION ECONOMISTS GROUP

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Executive summary

1. The National Electricity Rules and the National Gas Rules (the Rules) require the Australian Energy Regulator (AER) to estimate a return on debt allowance for an energy network business consistent with the allowed rate of return objective. That is, that the rate of return for the energy network business be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the energy network business.[3]

The Rules require compensation for the new issue premium

2. It has been commonly observed in the academic literature that newly issued corporate bonds tend to be issued at a yield that is above the yield on similar bonds trading in the secondary market (the secondary market is the market for sale and purchase of bonds subsequent to the issuance of the bond). This gives rise to the potential that an estimate of the cost of debt based on secondary market yields will tend to be below the cost of debt incurred by issuers of debt.

3. Economic logic suggests that compensation for the cost of debt should be based on the cost of issuing debt into primary (issuance) markets. This is because this is the market which determines the actual yield paid by an issuer on debt raised. The language of the Rules appears to be consistent with this conclusion. The allowed rate of return objective states:

> *The allowed rate of return objective is that the rate of return for a Distribution Network Service Provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the Distribution Network Service Provider in respect of the provision of standard control services (the allowed rate of return objective).*

4. The reference to the efficient financing costs of *a benchmark efficient entity* would appear to us to be a reference to the cost *an entity* faces when issuing debt. This requires an estimate of the cost of debt in issuance rather than yields in secondary markets (which are not costs that an entity faces when financing itself).

5. This is also consistent with the requirement in the Rules that the allowed return on debt reflect either:[4]

   (1) the return that would be required by debt investors in a benchmark efficient entity if it raised debt at the time or shortly before the

[3] NER, 6.5.2(b), 6A.6.2(b)

[4] NER, 6.5.2(j)(1)-(3)

making of the distribution determination for the regulatory control period;

(2) the average return that would have been required by debt investors in a benchmark efficient entity if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period; or

(3) some combination of the returns referred to in subparagraphs (1) and (2).

6. These requirements refer to the need to estimate a return on debt associated with the raising of debt (i.e., the issuance of debt).

7. A new issue premium is the difference between the primary issue yield on bonds and the yield on the same bonds subsequently traded in the secondary market. For the purposes of our report, the relevant secondary market yields are not usually derived from traded prices but reflect indicative prices supplied by Bloomberg that are based on indicative pricing information provided by contributing investment banks, averaged in a proprietary manner and adjusted in a proprietary manner based on yield estimates for similar bonds.

Context of our study

8. A critical context for our study is the AER's position in its Rate of Return Guideline. The AER proposes the use of third party published estimates of the cost of debt (published estimates for which we use the term 'fair value' yields as a short hand).[5]

9. The AER's Rate of Return Guideline proposes the following in relation to estimates of the cost of debt:[6]

> *The AER proposes to apply the following estimation procedure for estimating the prevailing return on debt for each service provider during the averaging period:*
>
> - *Using the published yields from an independent third party data service provider.*
> - *Using a credit rating of BBB+ from Standard and Poor's or the equivalent rating from other recognised rating agencies. If the published yields do not reflect the assumed credit rating of BBB+ or the equivalent from rating agencies, the AER will apply the*

5 AER, *Explanatory Statement: Rate of Return Guideline*, December 2013, p. 128

6 AER Rate of return guideline, section 6.3.3 "Estimation procedure".

published yields that are the closest approximation of the BBB+ credit rating.

- *Using a term to maturity of debt of 10 years. …*

10. In addition to the target credit rating and maturity, this suggests that any estimate of the new issue premium must be able to be combined with a published yield from an independent third party data service provider. As far as we are aware, only Bloomberg and the Reserve Bank of Australia (RBA) currently publish independent third party fair value yields.

11. This creates an important context for our study. Any estimate of new issue premium that we arrive at must be internally consistent with, and therefore, capable of being added to, the Bloomberg and/or RBA fair value yields.

12. Both the Bloomberg and RBA fair value yields, are themselves derived from Bloomberg 'BVAL' based estimates of the secondary market yields on specific bonds. Therefore, we consider that in order to be consistent with these fair value curves, the new issue premium should ideally be estimated using Bloomberg BVAL yields (i.e., including a yield derived from a BVAL price) as the proxy for secondary market yields.

The published literature

13. The published literature employs two distinct methods to arrive at an estimate of the new issue premium The older literature tended to simply compare the yield on a bond at issuance with a benchmark estimate of the secondary market yields for similar bonds on the same day. The more recent literature has estimated the new issue premium by estimating the change in a bond's yield in the immediate week(s) after it is issued (attempting to account for general movements in interest rates that might explain some part of that fall). If yields (adjusted for general movements in interest rates) tend to fall after issuance then this is evidence a new issue premium exists.

14. We consider that the methodology employed by the newer literature is more robust because it does not rely so heavily on identifying a benchmark secondary market yield series that closely matches the characteristic of each newly issued bond.

15. Estimates of the new issue premium from the literature vary – depending on the methodology used, the type of bonds being examined, and the time periods examined – and range from zero to 50bp (0.5%). The published literature offers a number of theoretical reasons for why a new issue premium could be expected to exist. These theories tend to have as a common source the existence of imperfect and asymmetrically held information about the value of new issues.

16. While the published literature is informative, it is of limited use in arriving at an estimate that is specific for the current context. As noted above, the current context requires an estimate of the new issue premium based on BVAL estimates of the secondary market yield on bonds. Moreover, it is also necessary to arrive at an estimate for bonds issued by Australian companies with 10 years maturity and a credit rating within the BBB band. None of the studies in the existing published literature provide such an estimate.

Our estimates

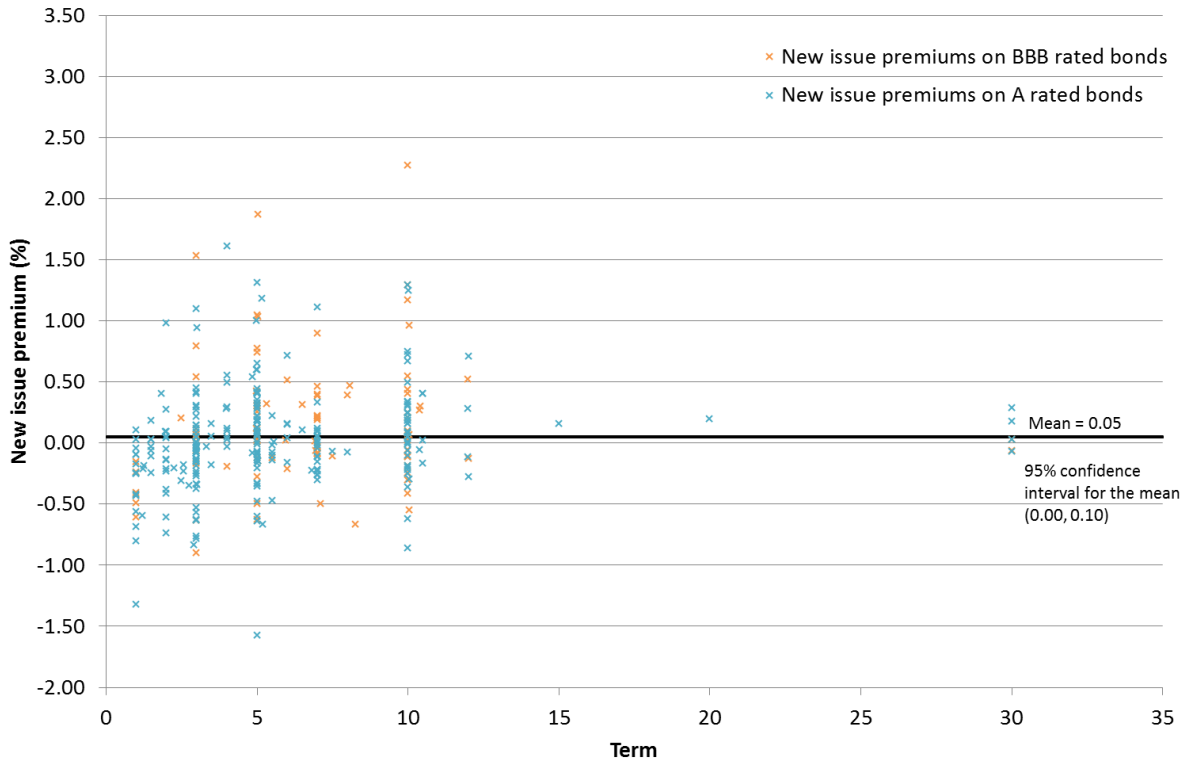
17. We identify a broad sample for our study of newly issued bonds which meet the following criteria:

- **reported an issue price**. We use Bloomberg formulae to calculate issue yields from issue prices because this method maximises the amount of data available;
- **rated between BBB- and A+ with Standard & Poor's at the time of issue**. We consider that the broad 'BBB' band of ratings is likely to be most relevant to assessing the new issue premium in our specific context. However, we have included the adjacent 'A' band as a sensitivity to this;
- **were issued by an Australian domiciled entity**. This is consistent with the calculation of the fair value curves as well as the process for assessing the debt risk premium. We collect data for companies operating in all sectors consistent with the inputs into the Bloomberg fair value curve but also perform our analysis on non-financial companies only, consistent with the more restricted inputs to the RBA's fair value curve;
- **were issued in Australian dollars, United States dollars (USD), Euros or British pounds**. Australian corporates issue substantial amounts of debt in foreign currency and United States dollars, Euros and British pounds represent by far the largest denominations on issue. While Bloomberg's fair value curve only includes Australian dollar bonds as inputs, the RBA's fair value curve also includes United States dollars and Euros; and
- **had a BVAL yield available from Bloomberg** on one or more of the dates: 2, 4, 6, 8, 10, 12, 14 or 16 weeks after the issue date. A range of possible time intervals were considered because the period over which any new issue premium will be measured will be endogenously determined during the estimation process. The process by which relevant measurement periods are assessed is discussed in more detail at sections 5.4 and 7.2 below.

18. For any given measurement period, this gives us between 325 and 355 bonds for which the new issue premium can be calculated. The full dataset is illustrated in Figure 1 below showing the new issue premium on each bond estimated over 12 weeks and using Bloomberg fair value curves to adjust for general movements in

interest rates over those 12 weeks (other estimates of the new issue premium are reported in the body of the report).

Figure 1: 12 week new issue premiums on full sample calculated relative to movements in fair value yields



Source: Bloomberg data, CEG analysis

19. The mean new issue premium in this sample is 5bp. The 12 week new issue premium measured relative to movements in swaps curves is 16bp (shown in Figure 4 on page 40 of the body of this report).

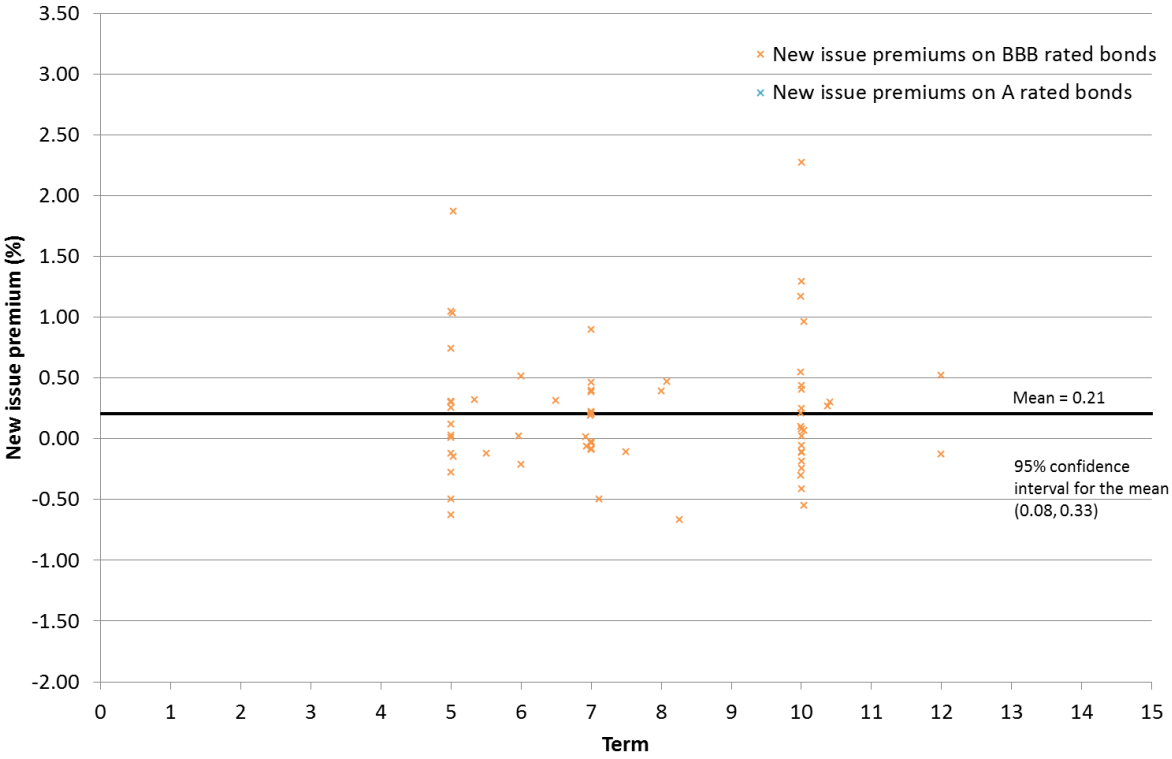
20. This estimate of the new issue premium is not annualised. In order to use this estimate it is appropriate to add it first to a non-annualised Bloomberg or RBA fair value curve and then annualise the resulting yield.

21. It can be seen in the above figure (and Figure 4 in the body of the report) that the new issue premium appears to be materially higher for bonds with maturity above 5 years and for BBB rated bonds than for A rated bonds. We also considered a restricted sample of broad BBB (BBB- to BBB+) bonds with a maturity of between 5 and 15 years. This restricted sample is intended to provide a closer approximation to the characteristics of the bonds we are most interested in (centred on a maturity of 10 years and a broad BBB credit rating).

22. We compared the average new issue premium of the restricted sample to the average new issue premium of the bonds not in the restricted sample and found that they were statistically significantly different. We also tested whether bonds issued in foreign currencies by Australian companies had statistically significantly different new issue premiums to bonds issued in Australian dollars in the restricted dataset. We found that they did not.

23. On this basis we adopted the restricted dataset as our core dataset. The core dataset is represented in Figure 2 below.

Figure 2: 12 week new issue premiums on core sample calculated relative to movements in fair value yields



Source: Bloomberg data, CEG analysis.

24. The mean of the data set in the above graph is 21bp. The 12 week new issue premium measured relative to movements in swaps curves is 31bp (shown in Figure 6 on page 44 of the body of this report).

25. We consider that, having regard to the full range of new issue premium estimates, the best estimate of the new issue premium based on the core sample to be 27bp. This is based on a simple average of all new issue premium estimates with lags of between 8 and 16 weeks. All of the individual estimates used in this average are

significant at the 5% level. We regard this as the best estimate of the new issue premium for the purposes of adding this to a Bloomberg or RBA fair value curve.

1 Introduction

26. Citipower, Jemena, Powercor Australia, SA Power Networks, AusNet Services and United Energy (collectively 'the businesses') have retained CEG to investigate the existence of a new issue premium for Australian corporate debt issuers.

27. This report addresses the following issues:

- defines the new issue premium and considers the circumstances that might give rise to a new issue premium.
- determines how a new issue premium could be estimated relative to the Bloomberg and RBA aggregate estimates of secondary yields/spreads, taking into account the data that each service provider uses to construct their aggregate estimates.
- considers the relevance of pre-existing new issue premium analysis conducted for foreign debt markets.
- provides and applies a quantitative framework for analysing the extent of the new issue premium in Australian corporate bonds.
- determines the best estimate of the current size of the new issue premium that might be paid by an Australian corporate borrower with a similar degree of risk to the benchmark energy network business.

1.1 Structure of this report

28. The remainder of this report is set out as follows:

- Section 2 sets out the statutory and regulatory background for estimating the return on debt;
- Section 3 discusses how this context affects the approach to estimating new issue premium;
- Section 4 surveys relevant academic literature, the theory of and empirical estimates for a new issue premium and assesses its relevance to the objective of this report;
- Section 5 describes our approach to estimating the new issue premium;
- Section 6 summarises our results; and
- Section 7 interprets our results.

1.2 Authorship and Federal Court Guidelines

29. The authors of this report are Dr Tom Hird and Mr Daniel Young. We acknowledge that we 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*. We have made all inquiries that we believe are desirable and appropriate to answer the questions put to us. No matters of significance that we regard as relevant have to our knowledge been withheld. We have been provided with a copy of the Federal Court of Australia's *Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia*, and confirm that this report has been prepared in accordance with those Guidelines.

2 Requirements under the Rules

30. The National Electricity Rules and the National Gas Rules (the Rules) both require the Australian Energy Regulator (AER) to estimate a return on debt allowance for an energy network business consistent with the allowed rate of return objective. That is, that the rate of return for the energy network business be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the energy network business.[7]

31. Bond issuers sell their debt in primary debt markets. Bondholders are entitled to receive coupon payments from the bond issuer expressed as a percentage of the "face value" of the bond (conventionally set at $100 per bond) and, ultimately, repayment of the face value of the bond. A common practice is for bond issuers to set the issue price equal to the face value of the bonds issued – with market forces determining the coupon rate at which the bond is sold. In which case, the yield at the time of issue is simply the coupon rate for fixed rate bonds (i.e., the dollar value of coupons paid by the bond divided by the issue price which is also the face value of the bond (i.e., divided by $100).

32. Alternatively, a bond issuer can set the coupon on the bond and let market prices determine the issue price - allow the issue price to deviate from the face value of the bond. This means that if a bond is issued at less than face value (less than $100) the issue yield on the bond will be above the coupon rate and *vice versa*.

33. Either way, the debt is issued and sold by the issuing firm to primary bondholders at a price and yield determined by market conditions and the characteristics of the issuer and the bond at the time of issue.

34. Subsequent to purchasing bonds in the initial issuance, bondholders may elect to sell their bond, and entitlement to these coupons, to other parties. Such transactions are said to occur in the "secondary market" for debt. These trades do not involve the bond issuer and the implied yields from secondary market prices do not affect the coupon payments made by the issuer or its actual cost of debt. Rather, it is the yields in primary debt markets that determine the cost of debt for a bond issuer – including regulated energy network businesses.

2.1 The Rules require an estimate of issue yields

35. In our view, the Rules require that compensation for the cost of debt is based on the cost of issuing debt into primary (issuance) markets. This is the market which determines the actual yield paid by an issuer on debt raised. As a matter of economics, the cost of debt faced by a business is the return they promise to pay at

7 NER, 6.5.2(b)-(c), 6A.6.2(b)-(c); and NGR, 87(2)- (3)

the time of issue. To the extent that the Rules attempt to compensate a business for efficiently incurred costs that they face, an objective that is in our view economically sensible, then it is the cost of debt in primary debt markets, not secondary debt markets, that must be estimated.

36. The language of the Rules does appear to be consistent with this conclusion. The allowed rate of return objective states:[8]

> *The allowed rate of return objective is that the rate of return for a Distribution Network Service Provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the Distribution Network Service Provider in respect of the provision of standard control services (the allowed rate of return objective).*

37. The reference to the efficient financing costs of *a benchmark efficient entity* would appear to us to be a reference to the cost *an entity* faces when issuing debt. This requires an estimate of the cost of debt in issuance rather than yields in secondary markets.

38. This is also consistent with the requirement of the Rules that the allowed return on debt reflect either:[9]

> *(1) the return that would be required by debt investors in a benchmark efficient entity if it raised debt at the time or shortly before the making of the distribution determination for the regulatory control period;*
>
> *(2) the average return that would have been required by debt investors in a benchmark efficient entity if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period; or*
>
> *(3) some combination of the returns referred to in subparagraphs (1) and (2).*

39. These requirements refer to the need to estimate a return on debt associated with the raising of debt (i.e., the issuance of debt).

8 NER, 6.5.2(c). Similar language is included at NER, 6A.6.2(c) and NGR, 87(3).

9 NER, 6.5.2(j)(1)-(3). Similar language is included at NER, 6A.6.2(j)(1)-(3) and NGR, 87(10)(a)-(c).

2.2 Using secondary market yields as a proxy for primary market yields

40. Notwithstanding that the objective should be to estimate the yield on debt issuance, the yield on debt in secondary markets is likely to be an important input into any such estimate. This is because over any particular estimation window, there is likely to be a limited number of new debt issuance with the relevant characteristics of interest (e.g., credit rating and maturity). Indeed, there will commonly be no bonds issued with similar characteristics where the window is, say, monthly or even quarterly.

41. By contrast, at any given time there will be a large number of bonds on issue and for which there are estimated yields on secondary markets. This is because, for example, a bond issued with a maturity of 15 years remains on issue for 15 years. Therefore, even if there were only 10 new issues of such bonds each year, at any given time there would be 150 bonds on issue (with a maturity between 0 and 15 years). That is, the 'stock' of bonds on issue is materially larger than the 'flow' of new bonds issued.

42. Any estimate of the cost of debt that relies solely on observed yields on primary market issuance will have to rely on a much smaller sample than if estimated yields from secondary markets are used. Consequently, yield estimates based only on primary debt issuance will be much noisier (less accurate) than estimates that include data on secondary market issuance.

43. However, in order to use yields in secondary markets without introducing bias into the resulting estimate of primary market yields it is necessary to investigate whether secondary bond market yields are systematically different to yields at issuance. If there is no systematic difference then it may be reasonable to simply estimate new issue yields based on observed yields for similar bonds in secondary markets. However, to the extent that secondary bond market yields are systematically different (either higher or lower) than primary bond market yields then an adjustment must be made to the former if they are to be used as the basis of an estimate of the latter. If yields on bonds at the time of issue are systematically higher/lower than secondary market yields for the same or similar bonds then a positive/negative new issue premium (NIP) can be said to exist.

44. These are the issues that this report addresses, namely:

    - is there evidence of a systematic difference between primary and secondary market yields? and
    - if so, what is the best estimate of this systematic difference?

45. We note that the AER does estimate an allowance for debt raising costs. This is intended to provide compensation for the transactions costs of raising debt such as

marketing, underwriting and credit ratings. It does not, and is not designed to, compensate for a positive new issue premium.

3 The context for our study

3.1 The context for our estimate of the new issue premium

46. The methodology underlying our empirical study is outlined in detail in section 5. In many respects we adopt the same or similar methodologies to those adopted in research published in academic journals. However, there is a key difference in our approach to all published articles that we are aware of.

47. This difference in approach is driven by a different context for our study compared to those of the published literature. Specifically, this context is the AER's position in its Rate of Return Guideline that proposes the use of third party published estimates of the cost of debt for particular credit ratings (described in this report as 'fair value' yields).[10]

48. The AER's Rate of Return Guideline proposes the following in relation to estimates of the cost of debt:[11]

> *The AER proposes to apply the following estimation procedure for estimating the prevailing return on debt for each service provider during the averaging period:*
>
> - *Using the published yields from an independent third party data service provider.*
> - *Using a credit rating of BBB+ from Standard and Poor's or the equivalent rating from other recognised rating agencies. If the published yields do not reflect the assumed credit rating of BBB+ or the equivalent from rating agencies, the AER will apply the published yields that are the closest approximation of the BBB+ credit rating.*
> - *Using a term to maturity of debt of 10 years. …*

49. The currently published candidates for a published yield by an independent third party data service provider are Bloomberg's publication of a BBB BVAL fair value curve and the RBA's publication of BBB fair value yields for non-financial Australian corporates. In this report we refer to such publications as 'published fair value curves'. Also in this report, when we refer to "Bloomberg fair value curves" we mean, unless otherwise stated, Bloomberg BVAL fair value curves.

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[10] AER, *Explanatory Statement: Rate of Return Guideline*, December 2013, p. 128

[11] AER Rate of return guideline, section 6.3.3 "Estimation procedure".

50. This creates an important context for our study. Any estimate of the new issue premium that we arrive at must be internally consistent with, and therefore, capable of being added to, the Bloomberg and/or RBA fair value curves.

3.2 New issue premium needs to be measured relative to BVAL yield estimates

51. How such published curves could be adjusted to include a new issue premium depends on how they are constructed and, in particular, what data source is used to derive the published yields. As it happens, both the Bloomberg and the RBA use the same data source which is Bloomberg's published BVAL source for bond pricing information. These are, in effect, estimates of the yields that a bond would trade at if a transaction did occur. Bloomberg arrives at these estimates using indicative pricing information provided by contributing investment banks, averaging those yield estimates in a proprietary manner and adjusting them in a proprietary manner based on yield estimates for other similar bonds.

52. It is necessary for Bloomberg to arrive at its estimates in this fashion because secondary market trades of a given bond are rare and, even when they occur, are not always publicly disclosed. For example, Cai, Helwege and Warga (2007) report that the median number of trades per bond over their 5 year sample period was 22 trades and that the great majority of these occur in the first year (15 trades).[12]

53. This means that neither Bloomberg nor the RBA use actual secondary market traded prices to determine their fair value curves. Rather, they use estimates of yields that would exist in the secondary market (BVAL yields) if a trade were to occur.

54. This is important because the objective for our study is to arrive at an estimate of the new issue premium (which may be zero) that can be added, in an internally consistent manner, to the fair value curves published by Bloomberg and/or the RBA. In this context, the new issue premium must be estimated relative to Bloomberg BVAL yields.

55. That is, if BVAL yields immediately after issue are systematically lower than the issue yield then a new issue premium can be said to exist relative to BVAL yield estimates. Moreover, if this is the case a new issue premium can be said to exist relative to the Bloomberg and RBA fair value curves because both of these methodologies are based on fitting a curve to BVAL yields.

56. In this report, we refer to "BVAL yields" as our source of bond yield data from Bloomberg. It is important to note that we source our yield estimates by obtaining

[12] Cai, N., Helwege, J. and Warga, A. (2007) "Underpricing in the Corporate Bond Market", *The Review of Financial Studies,* Vol. 20, No. 6, p. 2027

BVAL prices from Bloomberg and then using Bloomberg formulae known as "overrides" to transform these into yields. Throughout this report, when we refer to our use of BVAL yields we mean yields sourced through this process, which maximises the amount of yield data available for our analysis.

3.2.1 Contrast to the published literature

57. By contrast, the academic literature tends to estimate the new issue premium by comparing the yield at the time of issue to subsequent yields associated with secondary market trades of the same bond. This is entirely appropriate if, as one would expect of an academic study, the focus of the inquiry is the size and determinants of differences in yields between the issue of debt and subsequent trades in that debt.

58. However, this is not the focus of our study because the Bloomberg and RBA fair value curves in question are not based on actual secondary market yields. Rather, they are based on 'BVAL' estimates of secondary market yields – which are generally produced in the absence of any recent data on actual secondary market trades.

59. We would expect that a new issue premium estimated using BVAL yields would be correlated with, but not necessarily the same as, a new issue premium estimated using data based on actual traded prices. There are at least two broad reasons why we would not expect the same result:

- BVAL yields are available for a different and likely much larger set of bonds than the set of bonds that have actual traded data; and
- BVAL yield estimates may not necessarily be unbiased estimates of the yield at which bonds will actually trade in secondary markets.

60. There are good reasons to believe that the sample of bonds on which actually traded data is available shortly after a bond is issued (i.e., the sample that would be used to estimate a new issue premium based on actually traded yields) would be systematically different to the sample of bonds that have BVAL yields (i.e., the sample that would be used to estimate a Bloomberg or RBA fair value curve).

61. For example, more liquid (heavily traded bonds) are, by definition, more likely to have actual trade data than other bonds. This is particularly relevant because one of the hypothesised explanations for the existence of a new issue premium is secondary market illiquidity. Ellul and Pagano state in relation to under-pricing of equity issues (and with the same logic applying to bond issues):[13]

[13] Ellul and Pagano, (2006) "IPO Underpricing and After-Market Liquidity", *The Review of Financial Studies*, Vol. 19, No. 2, pp. 381-421.

We argue that the less liquid shares are expected to be and the less predictable their liquidity, the larger will be the required underpricing.

62. If correct, this means that studies of the new issue premium based on actual traded data will disproportionately capture the more liquid bonds, the bonds with the smallest new issue premium, and will tend to underestimate the new issue premium based on all bonds with BVAL prices as a result. Of course, liquidity is just one possible source of difference between the samples. Other possible differences include, for example, bonds that are traded immediately after an issue may tend to be bonds where there is a greater variety of valuations of the bonds and/or bonds where "news" affecting the value of the bond occurs shortly after the bond was issued.

63. Furthermore, the fact that there are likely to be more BVAL prices available than actually traded prices means one would expect a much larger sample of yields based on BVAL prices than a sample based on actually traded prices. An analysis of new issue premium using BVAL yields is therefore likely to be more precise than if traded yields were relied upon. That is, an analysis based on BVAL yields would be more reliable than an analysis based on traded yields assuming that BVAL yields were unbiased estimates of traded yields– i.e., setting aside any systematic differences in the samples that might give rise to such bias.

64. The second potential source of difference contemplates the possibility that BVAL yields tend to systematically under or overestimate actual traded yields for the same bond. If the former/latter is true then, other things equal, a larger/smaller new issue premium will be estimated using BVAL yields than actual traded yields. Combining this larger/smaller BVAL based estimate of the new issue premium with a fair value curve derived using BVAL yields will tend to cancel out any bias that exists in the fair value curve.

65. For example, if BVAL yields tend to systematically overestimate the traded yields that would exist on the same bonds then this will mean that the BVAL based fair value curves will also tend to systematically overestimate traded yields. However, it would also mean that a BVAL based estimate of the new issue premium would tend to underestimate, by the same magnitude, the new issue premium that would be observed if the bond was traded. Combining these two estimates, both based on BVAL yields, will tend to cancel out any bias in the BVAL estimates. The same logic applies if BVAL yields tend to systematically underestimate the traded yields that would exist on the same bonds.[14]

66. Either of these factors listed at paragraph 59 above is, by itself, a strong reason for preferring an estimate of the new issue premium based on BVAL yields rather than

[14] An assumption underlying this approach is that the primary yield at issuance can be measured accurately and that the measured new issue premium is unaffected by changes in the bond sample used to proxy secondary market yields.

traded yields in the context where that estimate of the new issue premium is to be added to a fair value curve based on BVAL yields. In combination, they provide a clear basis for focussing on such estimates in preference to the results of studies that are based on actual bond trades.

67. Some academic studies do report on the difference between the yield on new issues and some other third party estimate of the secondary market fair value for bonds with similar characteristics (e.g., industry, credit rating and maturity). That is, rather than estimating the new issue premium by comparing the issue yield of a bond with subsequent traded yields of *the same* bond they compare the issue yield of a bond with an estimate of the fair value yield for bonds of that 'class'.

68. This approach is very simple to implement but relies critically on the assumption that each bond is appropriately matched to a fair value curve and that the fair value curve is an accurate estimate of the yield in secondary markets. These are strong assumptions that need not be true and which should, in our view, be avoided if possible. This is why we do not favour this form of estimate and, as explained in section 5, prefer an estimate that attempts to measure the movement in each bonds yield in the weeks following the issue date. However, we do report this form of simplistic estimate for our sample and conclude that it is very similar to the more sophisticated estimate.

69. Notwithstanding the problems with using the published literature to arrive at an estimate of the new issue premium that is relevant to our specific context, we survey the published literature in the following section. However, for the reasons described above, we caution against assuming that the results of these studies can be assumed to apply equally to a new issue premium basis on BVAL yields.

70. We note that the RBA fair value yields are based on yields on bonds issued by non-financial corporations only. However, Bloomberg's fair value curves capture yields on bonds issued by such firms. In section 7.4.1 we examine the effect on our estimate of the new issue premium of restricting our dataset of bonds to only those issued by non-financial corporations.

3.3 Attributes of the benchmark efficient debt management strategy

71. Our specific context requires an estimate of the new issue premium that is consistent with the benchmark efficient debt management strategy for a benchmark efficient entity with a similar degree of risk as that which applies to the network service provider providing regulated services. We understand that, consistent with

the quote from the AER at paragraph 48 above, that this involves issuance of BBB[15] rated debt with a maturity of 10 years.

72. This is another clear difference in context to the published literature where the authors' focus is not to provide an estimate of the new issue premium at a particular credit rating and maturity for an Australian debt issuer, let alone specifically at 10 years for an Australian BBB rated issuer.

73. As discussed in more detail at section 5.1 below, our wider sample of bond yields collected is wider than just BBB rated bonds with maturities around 10 years, and includes bonds with credit ratings and maturities significantly different from this. For example, as well as sourcing bonds with a broad credit rating of BBB with Standard & Poor's, we also admit bonds with investment grade credit ratings in the immediately adjacent broad credit rating band of A.

74. While the effect of this inclusion is to significantly broaden our dataset, we note in section 5.6.1 below that empirical studies of the new issue premium have found that a lower credit rating is associated with higher estimates of the new issue premium. At section 6.2 we apply statistical inference to determine whether narrowing the sample to a core subset of bonds with similar credit ratings and maturities to the benchmark bond is justified.

[15] The AER's proposal in its Rate of Return Guideline is to adopt a BBB+ credit rating while the Energy Networks Association submitted that a BBB credit rating was appropriate. In any event, the RBA and Bloomberg published fair value curves are only currently available for a broad "BBB" credit rating (using bonds from BBB- to BBB+ as inputs into the curve fitting.

4 Literature review

4.1 Summary of theoretical literature

75. There is a long history in the literature of findings that a new issue premium is the norm in bond markets. In 1969, Conard and Frankena concluded: [16]

> *Recorded data indicate that in the period since the 1951 Accord there has generally been a substantial excess of yields on new corporate bond issues offered to the market above the average yield on apparently comparable bonds already outstanding.' The average new-seasoned yield spread as recorded by Moody's for Aa corporate bonds for the period from 1952 through 1963 was 16.7 basis points. During extended periods in this interval appreciably higher returns could be earned on new Aa corporates than on seasoned A-rated bonds, and on occasion the new Aa's yielded more than seasoned Baa's. Yet, the size of the new-seasoned yield spread is extremely variable, and on some occasions new issues sold below the average yield on seasoned bonds with the same quality rating.*

76. The literature offers a range of theoretical explanations for why the return on buying assets at the time of issue may exceed the return on buying the same assets in secondary markets. Ultimately these theories have in common that they rely on the existence of imperfect information and transaction costs in financial markets.

77. In a world with 'perfect information'[17] and zero 'transaction costs'[18] there would be no systematic difference between the yields at which a company issued debt and the subsequent yields at which the debt trades. That is, the only difference between issue and secondary market yields would relate to changes in information/market conditions between the time at which the issue yield was set and the time at which secondary trades occurred.

78. This is because if all investors were perfectly informed (which they would rationally be if the transaction costs associated with information collection were zero) then

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16 Conard, J.W. and Frankena, M.W. (1969) "The Yield Spread between New and Seasoned Corporate Bonds" *Essays on Interest Rates*, Vol. 1, National Bureau of Economic Research: New York, pp, 143-222.

17 In the economics literature 'perfect information' describes a situation in which all relevant economic agents have all the information relevant to make a decision. A consequence of the assumption of perfect information is that all agents have the same information.

18 In the economics literature a 'transaction cost' is a cost that must be incurred in transacting/trading (including acquiring information about transacting/trading).

there would be a single 'correct' price at which all trades for financial assets would take place.

79. In reality, financial markets are characterised by imperfect and asymmetrically held information and buyers and sellers must incur real costs and risks in order to acquire information. Put simply, it is costly to acquire information on the value of a financial asset. Consequently, if all assets always traded at their 'true' value (based on perfect information) then investors would have no compensation for the costs of acquiring information on the value of the assets. This cannot be an equilibrium outcome because only if investors are fully informed will prices trade at their 'true' market value but in this case investors must make a loss – because there is no scope to recover the costs of becoming informed. Grossman and Stiglitz summarised this result in 1980.

> *If competitive equilibrium is defined as a situation in which prices are such that all arbitrage profits are eliminated, is it possible that a competitive economy always be in equilibrium? Clearly not, for then those who arbitrage make no (private) return from their (privately) costly activity. Hence the assumptions that all markets, including that for information, are always in equilibrium and always perfectly arbitraged are inconsistent when arbitrage is costly.* [19]

80. The impact of asymmetric information and the costs of acquiring information are the focus of theoretical explanations for the existence of a new issue premium. Sherman and Titman (2002)[20] focus on the costs of investors acquiring information for why investment banks tend to sell assets at below the price at which they subsequently trade. They argue that:

> *Investors face a moral hazard problem because they know that the price of the issue will be based on all reported information. Rather than purchasing his or her own signal, each investor may be tempted to free-ride on the information of others. IPOs must be underpriced sufficiently to offset this problem and to induce all investors to collect information. In equilibrium, this information collection constraint, rather than the truth-telling constraint, is the binding constraint that determines pricing policy. We will show that if the pricing policy provides sufficient incentive for investors to collect information, they will also have sufficient incentive to reveal the information.*

81. They conclude:

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19 Grossman and Stiglitz (1980) "On the Impossibility of Informationally Efficient Markets", *The American Economic Review*, Vol. 70, No. 3, pp. 393-408

20 Sherman and Titman (2002) "Building the IPO order book: underpricing and participation limits with costly information", *Journal of Financial Economics,* Vol. 65 , No. 1, pp. 3–29

> *When information is costless, the optimal number of participating investors is infinite and underpricing approaches zero. When information is costly, the level of underpricing is determined by the desire for information. For firms with the most to gain from accurate pricing, more investors will be invited to participate in the offering and underpricing will be greater.* [21]

82. Sherman and Titman's analysis is built on a specific set of stylised assumptions about asset markets and institutions. It is but one example of many from the literature which attempt to shed light on why a positive new issue premium may exist on average. We do not attempt to describe all potential theoretical models but note that others, as summarised in Cai, Helwege and Warga (2007) include: Rock (1986),[22] Allen and Faulhaber (1989),[23] Grinblatt and Hwang (1989),[24] Welch (1989),[25] Benveniste and Spindt (1989),[26] Benveniste, Busaba and Wilhelm (2002)[27] Ellul and Pagano (2006).[28] More recently Green (2007),[29] in the Journal of Finance presidential address, presented a model that attempted to explain a new issue premium in bond markets in terms of strategic interactions between issuers, underwriters and investors when the secondary market has limited price transparency (i.e., when information on secondary market trades was costly to acquire).

83. This literature is not inconsistent with the simple observation that there are essentially two mechanisms as alternatives or in combination by which the seller of a new issue can convince the requisite number of buyers to participate in the sale process for a new issue (of debt or equity). These are by:

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21 Ibid, p. 19

22 Rock, K. (1986) "Why New Issues are Underpriced", *Journal of Financial Economics* 15:187-212.

23 Allen, F., and G. Faulhaber. (1989) "Signaling by Underpricing in the IPO Market", *Journal of Financial Economics* 23:303-23.

24 Grinblatt, M., and C. Y. Hwang (1989) "Signaling and the Pricing of Unseasoned New Issues", *The Journal of Finance* 44:393-420.

25 Welch, I. (1989) "Seasoned Offerings, Imitation Costs, and the Underpricing of IPOs", *The Journal of Finance* 44:421-49.

26 Benveniste, L. M., and P. Spindt. (1989) "How Investment Banks Determine the Offer Price and Allocation of New Issues", *Journal of Financial Economics* 24:341 -61.

27 Benveniste, L. M.. W. Busaba, and W. J. Wilhelm. (2002) "Information Externalities and the Role of Underwriters in Primary Equity Markets". *Journal of Financial Intermediation* 11:61-86.

28 Ellul, A., and M. Pagano. (2006) "IPO Underpricing and After-Market Liquidity", *Review of Financial Studies* 19:381-421.

29 Green, (2007) "Presidential Address: Issuers, Underwriter Syndicates, and Aftermarket Transparency", *The Journal of Finance,* Vol. 62, No. 4, pages 1529–1550

- marketing the issue in an attempt to provide information to potential buyers that raise the price those buyers are willing to pay for the issue; and/or
- lowering the price of the issue in order to make the investing in valuation of the issue attractive to the requisite number of buyers.

84. In this respect, financial assets are much like any other asset, good or service. Sellers must choose an optimal combination of marketing expenditures and price point that attracts the number of buyers required by the seller.

4.2 Methodology for estimating the new issue premium used in the empirical literature

85. There are two standard approaches in the literature for estimating the new issue premium. The first, and in our view the most preferred, approach is to estimate:

- the change in the yield on a bond over some defined period after it has been issued (i.e., the yield on the bond at the time of issue less the yield on the bond in secondary markets after given period of time); less
- the change in a measure of general interest rates over that period (i.e., less the change in that part of the bonds yield that can be explained by movements in general interest rates.

86. The second approach is to estimate the average difference between the yield at issue and an estimate of the typical or fair value of bonds with similar characteristics.

87. For the reasons set out in section 3 above we consider that it is important not to place too much emphasis on the results of the empirical literature on the new issue premium. The specific context of this report, such as the purpose of the estimates that we arrive at, and the data used to estimate them, are very different to the context in which new issue premiums are estimated in the empirical literature. Care should be taken in drawing direct comparisons between the results of the empirical literature and the results in this report.

4.2.1 Measuring the change in bond yields immediately after issuance

88. When estimating the new issue premium by measuring the change in bond yields immediately after issuance, there are two important methodological decisions. The first is what measure is used to attempt to account for any move in general interest rates over the measurement period. The second is over what period the change in interest rates should be measured.

89. Different authors have used different measures to account for the general move in interest rates. Datta, Iskandar-Datta & Patel (1997) use risk free rates:

> *To adjust for changes in the term structure of interest rates, each corporate bond is matched with a treasury bond according to maturity and coupon rate.*[30]

90. Weinstein (1978) uses the return on a randomly constructed sample of bonds with the same rating as the bond in question.[31] Cai, Helwege & Warga (2007) use the Lehman Brothers index with the same rating and similar maturity as the bond in question.[32] Similarly, Ronn and Goldberg (2013a) state:

> *To adjust for changes in the overall market, data for CFOX, which is the Merrill Lynch composite index for investment grade non-finance companies, was collected from Bloomberg for the same time period.*[33]

91. Our approach, described in the next section reports the results of using both maturity matched risk free rates (in our case swap rates) and maturity and credit rating matched fair value curves to adjust for changes in interest rates.

92. The same authors also use different periods over which the change in yields is measured.

- Datta, Iskandar-Datta & Patel (1997) use a period that is at least 60 days and up to 130 days after the issue.[34]
- Cai, Helwege and Warga (2007) use only a single day after the bond issue (although they report that results using 14 days were similar but do not publish those results).[35]
- Ronn and Goldberg (2013a) use a period of 4 to 8 weeks.[36]
- Weinstein (1978) uses a period from one month to six months.[37]

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30 Datta, S., Iskandar-Datta, M. and Patel, A. (1997) "The Pricing of Initial Public Offers of Corporate Straight Debt", *The Journal of Finance*, Vol. 52, No. 1, p. 384

31 Weinstein, *The seasoning process of new corporate bond issues*, the Journal of Finance, December 1978.

32 Cai, N., Helwege, J. and Warga, A. (2007) "Underpricing in the Corporate Bond Market", *The Review of Financial Studies,* Vol. 20, No. 6, p. 2027

33 Ronn, E.I. and Goldberg, R.S (2013a) "Quantifying and Explaining the New-Issue Premium in the Post-Glass–Steagall Corporate Bond Market", *The Journal of Fixed Income*, Vol. 23, No. 1, p. 45

34 Datta, S., Iskandar-Datta, M. and Patel, A. (1997) "The Pricing of Initial Public Offers of Corporate Straight Debt", *The Journal of Finance*, Vol. 52, No. 1, p. 384

35 Cai, N., Helwege, J. and Warga, A. (2007) "Underpricing in the Corporate Bond Market", *The Review of Financial Studies,* Vol. 20, No. 6, p. 2026

36 Ronn, E.I. and Goldberg, R.S (2013a) "Quantifying and Explaining the New-Issue Premium in the Post-Glass–Steagall Corporate Bond Market", *The Journal of Fixed Income*, Vol. 23, No. 1, p. 45

93. Our approach, described in the next section reports the results of using periods of between 2 and 16 weeks to measure the new issue premium.

4.2.2 Measuring the spread at issuance to a fair value curve

94. The alternative approach is to measure the spread at issuance to a measure of fair value. This is the methodology that was typically used in early papers on the new issue premium such as those by Conard and Frankena (1969),[38] Ederington (1974) and Lindvall (1977).

95. However, this approach has been criticised on the grounds that there is not a sufficiently accurate estimate of the fair value of an identical bond trading in secondary markets. Weinstein (1978), in critiquing Conard and Frankena states:

> *Another criticism of* [Conard and Frankena] *is that their results were based entirely on the behavior of bond indexes, not on the behavior of individual bonds. It is well known (e.g., Fisher [6], and Officer |14]) that indexes constructed from assets may have properties that none of the assets themselves have. The problem is quite likely to occur in the case of bond yield indexes, which do not, in fact, measure the yield on any real bond.*[39]

96. Notwithstanding this type of criticism there has been more recent work that has estimated the new issue premium as the spread to a typical/fair value curve for bonds with similar characteristics at the time of issue. However, such studies have typically been set in contexts where the above criticisms are less applicable. For example, Carayannopoulos (1996) focuses on new issue premium for US Treasuries and, therefore, does have available a very accurate estimate of the yield on similar securities already on issue. In this regard, it is relevant to note that two of the three early studies listed above (Conard and Frankena (1969) and Ederington (1974)) restricted their analysis to highly rated bonds (bonds rated Aa by Moody's the equivalent of broad AA rating by Standard and Poor's) issued by public utilities. The Weinstein critique would likely apply more strongly to studies focussed, as ours is, on BBB rated bonds.

97. Our approach does not focus on this methodology because we do not consider that it is as robust. Nonetheless, we do report results from our dataset associated with this methodology.

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37 Weinstein, M. (1978) "The Seasoning Process of New Corporate Bond Issues", *The Journal of Finance*, Vol. 33, No. 5, pp. 1348

38 Conard and Frankena construct, or rely on other constructions of, a series of typical new issue yields to be compared with secondary market yields.

39 Weinstein, M. (1978) "The Seasoning Process of New Corporate Bond Issues", *The Journal of Finance*, Vol. 33, No. 5, pp. 1344

4.3 Summary of empirical literature

98. The following table provides a summary of the empirical literature that has examined the new issue premium in bond markets. This is not intended to be an exhaustive list of all studies relevant to this topic.

Table 1: Summary of empirical literature

Study	Methodology					Results				
	NIP measured over time for each bond vs measured relative to 'benchmark' on day of issue	**Number of bonds**	**Adjustment for movements in yields**	**Period over which NIP measured**	**Sample**	**Average NIP**	**Average NIP increases with lower credit rating?**	**10 year BBB specific estimate**	**Average NIP increases with maturity?**	**Skewed distribution?**
Cai, Helwege & Warga (2007)	Over time for each bond.	439 to 2,536	Yes – credit rating specific	1 to 14 days day	1995-1999 US corporate bond offerings	2.7bpto 37bp, statistically significant.	Yes	None	Conflicting evidence	Yes. Focus on mean not median.
Conard & Frankena (1969)	Relative to benchmark on day of issue	N/A	Not necessary.	N/A	1952-1962 Aa corporate bonds	16.7bp, statistical significance unknown	N/A	None	N/A	N/A
Datta, Iskandar-Datta & Patel (1997)	Over time for each bond.	50	Yes –treasury bond returns.	60 to 130 days	1976-1992 straight bond IPOs	15bp, not statistically significant	Yes	None	N/A	N/A
		710						None		
Ederington (1974)	Relative to benchmark on day of issue	611	Not necessary.	N/A	1964-1971 Moody's Baa or better nonconvertible public utility issues, with maturity 15 years or more.	30.9bp, statistical significance unknown	N/A	None	N/A	N/A
Weinstein (1978)	Over time for each bond.	79 to 143	No – compared to a contemporaneous portfolio of credit-rating	1-6 months	1962-1974	38bp, not significant*	N/A	None	N/A	N/A

Study	Methodology					Results				
	NIP measured over time for each bond vs measured relative to 'benchmark' on day of issue	**Number of bonds**	**Adjustment for movements in yields**	**Period over which NIP measured**	**Sample**	**Average NIP**	**Average NIP increases with lower credit rating?**	**10 year BBB specific estimate**	**Average NIP increases with maturity?**	**Skewed distribution?**
			matched bonds							
Carayannopoulos (1996)	Relative to benchmark on day of issue	6,121	No- compared to contemporaneous strips portfolios	N/A	US Treasury bonds. 1989-1994	-62bp at end of initial month, statistically significant	N/A	None	Absolute value of NIP higher at 10 years than those with 3, 5 and 30 year maturities	N/A
Lindvall (1977)	Relative to benchmark on day of issue	N/A	No – two contemporaneous yield series compared.	N/A	Aa Public Utilities 1963-1972	-8bp to +45bp	N/A	None	N/A	N/A
Ronn & Goldberg (2013a)	Over time for each bond.	1,494	Yes	4-8 weeks	Non-finance investment grade new issue bonds, 2008-Jan 2012	22.5bp, significance unknown	Yes (NIP positively related to Treasury spread)	Not reported.**	Tenor has a negative impact on NIP.	Yes

* Weinstein considers "While the r-statistic (1.43) is not significant at conventional levels, it is large enough to suggest there that there may be some abnormal activity." (p. 1350)** Ronn & Goldberg do report a regression for BBB bonds that includes a tenor. However, it is not possible to derive a 10 year estimate from this regression without other parameters specific to their regression.

99. Each of the studies summarised in the above table is discussed in more detail in Appendix A. However, Table 1 provides sufficient basis to conclude that a considerable degree of variation in the literature exists as to the estimated level of the new issue premium. While many academic studies have identified a positive new issue premium, some studies have found that the premium is not statistically significantly different from zero.[40]

100. Much of this variation in the literature comes as a result of the use of different data sources, different types of bonds examined (e.g., different credit ratings, industries, and maturities) and different periods of time. It also reflects the fact that, usually, researchers are not attempting to estimate 'the new issue premium' but instead are attempting to estimate determinants of the new issue premium and whether the data supports one or other of the theoretical explanations for the new issue premium.

101. Given the specific context for our study, as outlined in section 3, we consider that the results of the published literature are of limited relevance to the question addressed to us. Namely, we are attempting to estimate the new issue premium relative to the estimated BVAL secondary market yields on Australian corporate debt. BVAL bond pricing information forms the input data used by both Bloomberg and the RBA for the purpose of estimating their respective fair value curves. This is an estimate that can, in an internally consistent manner, be added to the fair value yields published by Bloomberg and the RBA in order to arrive at an estimate of the new issue yield (for a similar credit rating and maturity).

102. This is not the context of the academic studies and, as such, it is not possible to derive an estimate from those studies that is relevant to this context. However, it is possible to ask whether the estimates in this CEG study fall within the range of the estimates found in the academic studies. We return to this question when we report our results.

[40] That is, it is not possible to be sufficiently sure that the estimate derived from the data is not greater than zero purely due to chance (given the variability in the data that the estimate is derived from). The level of confidence at which this statistical significance is tested varies but 95% confidence is a common benchmark. If an estimate is not statistically different to zero at the 95% confidence level it means that, if the true value of the parameter were zero, we would nonetheless expect to see levels of the parameter estimate at or above our actual estimate in more than 5% of cases.

5 Estimating the new issue premium

103. Consistent with the preferred approach in the academic literature, as set out in section 4, the new issue premium is measured as:

- changes from the issue yield to an estimate of the indicative secondary market yield on a specific bond over a specific time frame; less
- changes in general market yields over the same time frame.

5.1 Sample selection

104. We have used Bloomberg to identify all bonds issued that meet the following criteria:

- **reported an issue price**. We use Bloomberg formulae to calculate issue yields from issue prices because this method maximises the amount of data available;
- **rated between BBB- and A+ with Standard & Poor's at the time of issue**. We consider that the broad 'BBB' band of ratings is likely to be most relevant to assessing the new issue premium. However, we have included the adjacent 'A' band as a sensitivity to this;
- **were issued by an Australian domiciled entity**. This is consistent with the calculation of the fair value curves as well as the process for assessing the debt risk premium. We collect data for companies operating in all sectors consistent with the inputs into the Bloomberg fair value curve but also perform our analysis on non-financial companies only, consistent with the more restrictive inputs into the RBA's fair value curve;
- **were issued in Australian dollars, United States dollars (USD), Euros or British pounds**. Australian corporates issue substantial amounts of debt in foreign currency and United States dollars, Euros and British pounds represent by far the largest denominations of issue. While Bloomberg's fair value curve only includes Australian dollar bonds as inputs, the RBA's fair value curve also includes United States dollars and Euros; and
- **had a BVAL yield available from Bloomberg** on one or more of the dates: 2, 4, 6, 8, 10, 12, 14 or 16 weeks after the issue date. A range of possible time intervals were considered because the period over which any new issue premium will be measured will be endogenously determined during the estimation process. The process by which relevant measurement periods are assessed is discussed in more detail at sections 5.4 and 7.2 below.

105. For any given measurement period, this gives us between 325 and 355 bonds for which a new issue premium can be calculated.

5.2 Source of secondary market yields

106. For the reasons set out in section 3 we use BVAL as our source for an estimate of the secondary market prices on a bond.

5.3 Adjusting for general movement in interest rates

107. We separately report our results using both Bloomberg fair value yield and swap yield estimates interpolated/extrapolated to the maturity of the bond to adjust for general movements in interest rates over the measurement period.

108. In sourcing the fair value yields, we use the Bloomberg composite fair yield curve appropriate to the broad credit rating of the bond (BBB or A) and its currency of denomination.[41] The fair value yield curve is interpolated to the maturity of the bond.

109. When using the swap curve it is commonly only necessary to interpolate in order to find a matching maturity because the published swap curve extends out beyond the maturity of the bonds in our sample. However, in some cases it is necessary to extrapolate the Bloomberg fair value curve beyond its longest published maturity.

110. Where the maturity of the bond requires an extrapolated fair value yield, this is calculated by:

    a. calculating the spread to swap at each point on the fair yield curve as the fair value yield less the interpolated swap rate at the tenor associated with each point on the curve;

    b. calculating a slope for the spread to swap curve from a. using simple linear regression (ie, ordinary least squares with an intercept and slope coefficient) across all points of 1 year of maturity and above;

    c. calculating the spread to swap at the maturity of the bond as the spread to swap from the fair value curve closest to that maturity, plus the difference in maturity between these observations multiplied by the slope calculated at b.; and

    d. calculating the fair value yield at the maturity of the bond as the spread to swap calculated at c. above plus the interpolated swap rate at the maturity of the bond.

111. We note that this approach has the advantage of being an extrapolation method that can be applied to any fair value based only on the information in that fair value curve and not on any other information. This makes it an effective extrapolation

[41] We sourced BFV fair value curves for this analysis because they have a longer history of data than other Bloomberg fair value sources.

method for the variety of fair value curves used in this study (including domestic curves, and foreign currency fair value curves for various credit rating levels).

5.4 Period over which the new issue premium is estimated

112. The length of the period over which the new issue premium is measured may be an important factor in its estimation.

113. The theory of the new issue premium proposes that it exists at the time that the bond is issued and is dissipated over time when the yield on the bond becomes commensurate with other secondary market yields. This is also important for how the new issue premium is estimated, as explained at section 4.2 above. The theory itself does not suggest whether this process would happen rapidly (eg, within a day) or slowly over a period of weeks or months. In our specific context, this will also depend on how quickly BVAL yields on the bond reflect the dissipation of any new issue premium.

114. As already discussed, different authors have taken different approaches to the period over which a new issue premium is estimated. Datta, Iskandar-Datta and Patel (1997) measure the new issue premium as the fall in yields (relative to the change in in risk free rates at the same maturity) over a period that is at least 60 days and up to 130 days after the issue.[42] Weinstein (1978) uses a period from one month to six months.[43] Ronn and Goldberg (2013a) use a period of 4 to 8 weeks.[44] By contrast, Cai, Helwege and Warga (2007) use only a single day after the bond issue (although they report that results using 14 days were similar but do not publish those results).[45]

115. In this report we have estimated the new issue premium over periods of 2, 4, 6, 8, 10, 12, 14 and 16 weeks after issue. The purpose of examining results estimated over this range of periods is to allow the data to determine the period over which the best estimate of the new issue premium should be estimated.

116. Obtaining estimates of the new issue premium over a range of estimation periods allows us to attempt to observe the appropriate period directly from the data. As we discuss in more detail when interpreting the results at section 7 below, consistent with the theory of the new issue premium being dissipated over time, then:

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42 Datta, S., Iskandar-Datta, M. and Patel, A. (1997) "The Pricing of Initial Public Offers of Corporate Straight Debt", *The Journal of Finance*, Vol. 52, No. 1, p. 384

43 Weinstein, M. (1978) "The Seasoning Process of New Corporate Bond Issues", *The Journal of Finance*, Vol. 33, No. 5, pp. 1348

44 Ronn, E.I. and Goldberg, R.S (2013a) "Quantifying and Explaining the New-Issue Premium in the Post-Glass–Steagall Corporate Bond Market", *The Journal of Fixed Income*, Vol. 23, No. 1, p. 45

45 Cai, Helwege and Warga (2007), FN 6 on page 2026.

- we would expect estimates of new issue premium over short periods to potentially be smaller and less significant than estimates over longer measurement periods; but
- as the period of estimation increases, factors other than dissipation of the new issue premium are likely to act upon the yields of the specific bond and the general market, such that the precision and reliability of the new issue premium estimate is reduced. At some point, we would expect the significance of new issue premium estimates to be reduced as the period over which they are estimated increases.

5.5 Annualisation

117. The resulting new issue premium estimate is not annualised. In order to use this estimate it is appropriate to add it first to a non-annualised Bloomberg or RBA fair value curve and then annualise the resulting yield.

5.6 Benchmark bond characteristics

118. The approach described above sets out a clear and replicable methodology for estimating the new issue premium on each bond in the dataset that we have constructed. However, the dataset is broad and there remains the question of identifying which parts of the data are relevant to assessing whether there is a new issue premium on the benchmark bond and, if there is, what the magnitude of the premium is.

119. Part of this assessment relates to the key characteristics defining the benchmark bond. To the extent that these characteristics also influence estimates of the new issue premium, then it would be desirable to assess the new issue premium for the benchmark bond based on data sourced from bond issues with similar characteristics. However, if particular characteristics of the benchmark bond do not affect estimates of the new issue premium then seeking to restrict the population of relevant bond issues by reference to these characteristics would unnecessarily narrow the scope of the analysis and lead to a less reliable estimate of the new issue premium.

120. We discuss below features that may be relevant to the definition of the benchmark bond, including credit rating, term, issue size, country of incorporation, industry sector and currency of issue.

121. Aside from these characteristics, it is important to note that we have estimated the new issue premium over periods of up to 16 weeks from issue. Specifically, we have generated estimates of the new issue premium for each bond at 2, 4, 6, 8, 10, 12, 14 and 16 weeks from issue. Which of these estimates is likely to be most relevant will

depend upon the period over which any new issue premium is dissipated into secondary market yields. We discuss considerations guiding this choice below.

5.6.1 Credit rating

122. As already discussed, the benchmark credit rating falls within the broad BBB Standard & Poor's credit rating band (BBB-, BBB and BBB+). Since our sample of new issue premiums include observations on bonds with broad A ratings, it is important to consider whether the information on A rated bonds can be considered to inform the estimate of new issue premium for the benchmark bond.

123. The existing literature associated with the new issue premium suggests that lower rated bonds tend to have higher new issue premium than higher rated bonds. Datta, Iskandar-Datta and Patel (1997) argue that:

> *"...since straight debt can be viewed as being made up of risk-free debt and equity, the riskier the straight debt offer, the larger the equity component in the security. Therefore, junk grade debt (rated BB or below) may be thought of as being more like equity than investment grade debt (rated BBB or above). ... we hypothesize that the higher the bond rating, the lower the degree of underpricing ..."*

124. The authors confirm this hypothesis. Cai, Helwege and Warga (2007) also find that the new issue premium is significantly higher for bonds with speculative grade credit ratings than for bonds with investment grade credit ratings. They also find that bonds with investment grade credit rating have a new issue premium that is insignificantly different to zero (although no attempt is made to distinguish between different levels of investment grade credit ratings).

125. This is consistent with theoretical explanations of the new issue premium that stress the need for recovery of valuation costs and the risks created by information asymmetry between issuer and buyer in the primary issue market.

126. Specifically, low risk bonds are generally simpler to value than high risk bonds and, in order to attract a given volume of demand for a sizeable new issue, the latter must be priced more attractively (in order to induce enough buyers to incur the costs of due diligence). Also with high risk bonds there is greater scope for asymmetry of information between issuer and investors and a new issue may signal to investors the potential that the issuer is raising debt before 'bad news' (known only to the issuer) becomes public.

127. These issues are less prevalent in secondary markets where sale parcels are smaller and transactions are just as likely to be initiated by buyers as sellers. Also, in such transactions the seller does not necessarily have any inside knowledge of the financial health of the bond issuer.

128. These considerations suggest that there may be *a priori* reasons to expect that new issue premiums for higher rated bonds would be lower than for bonds with credit ratings commensurate with that of the benchmark bonds.

5.6.2 Bond maturity at time of issue

129. We assume the benchmark bond to have a maturity from issue of 10 years. It is important to consider whether maturity affects the new issue premium because 10 years is a longer maturity from issue than most of the bonds in our dataset.

130. The theory underlying the existence of a new issue premium suggests that bond maturity may, in combination with credit rating, be a relevant determinant of the new issue premium. Long term bonds generally expose investors to higher valuation costs and risks than short term bonds issued by an identical issuer. Compensation for these higher costs and risks might be expected to result in a greater new issue premium on long maturity bonds than on short maturity bonds. Conversely, Ronn and Goldberg (2013a) find that tenor has a negative impact on the new issue premium, based on the compensation for the new issue being spread out over a greater length of time.[46]

131. These factors would suggest that estimating the new issue premium across our entire sample of bonds might be likely to give rise to a biased estimate of the new issue premium for the benchmark bond. Restricting consideration of the new issue premium data to bonds with maturities from issue of close to 10 years may be one way of mitigating this potential bias.

5.6.3 Issue size

132. The issue size of the benchmark bond is not typically a consideration that is discussed in the context of estimating the debt risk premium. Cai, Helwege and Warga (2007) present some contradictory results where larger offer sizes sometimes have a positive and sometimes a negative impact on the estimated new issue premium.[47] In addition, the RBA's fair value curve is derived using a weighted average where the size of the issue forms part of the weight (i.e., larger bond issued receive higher weight).

133. We consider that it might be reasonable to expect that issue size will affect estimates of the new issue premium, other things being equal. For example, larger offerings might suggest that greater discounting, and therefore a higher new issue premium, is required to attract investment in a very large new issue. However, larger offerings

46 Ronn, E.I. and Goldberg, R.S (2013a) "Quantifying and Explaining the New-Issue Premium in the Post-Glass–Steagall Corporate Bond Market", *The Journal of Fixed Income*, Vol. 23, No. 1, p. 50

47 Cai, N., Helwege, J. and Warga, A. (2007) "Underpricing in the Corporate Bond Market", *The Review of Financial Studies,* Vol. 20, No. 6, p. 2039, Table 5

are also likely to be associated with larger firms who are followed more closely by analysts and investors – suggesting less costly acquisition of information about the issue.

134. In section 7.4.2 we present estimates of the size weighted new issue premium as asensitivity to our main results which focus on the simple average new issue premium. The finding is that bigger issue amounts tend to be associated with higher estimated new issue premiums.

5.6.4 Country of incorporation

135. In analysis of the debt risk premium to date, it has been assumed that the benchmark bond is issued by a firm incorporated in Australia. This ensures that the yield on the bond reflects the risks perceived by investors of doing business in Australia.

136. We note that to date, there is not an academic literature focussing on the question of whether bonds issued by Australian companies would be expected to have higher or lower new issue premiums than bonds issued in other countries. Ronn and Goldberg (2013b) show that focusing on a narrow sample of Australian firms from a wider dataset yields 32 observations with an average new issue premium of 27 basis points.[48] This was very similar to the new issue premium that the authors found for their wider sample as a percentage of spread to swap.

5.6.5 Currency of issue

137. It has often been assumed that the benchmark bond would be denominated in Australian dollars. However, we have previously noted that many Australian firms, including regulated energy infrastructure businesses, issue bonds in foreign currencies as well as Australian dollars. This behaviour, and simple principles of financial arbitrage, suggests that the primary cost of debt raised in foreign currencies must not diverge greatly from the cost of debt raised in Australian dollars.

138. We have previously showed the secondary market yields, converted into Australian dollar terms, were similar for bonds issued by the same firm in different currencies.[49] Previous analyses of the debt risk premium by CEG and by regulators such as IPART have also relied upon yields on foreign currency bonds swapped into Australian dollar terms. Furthermore, the RBA fair yield estimates are themselves

[48] Ronn, E.I. and Goldberg, R.S, *Research into the New Issue Premium, and the Applicability of that Research to the Australian Corporate Bond Market*, October 2013 Table 5.1, p. 23

[49] CEG, *Estimating the regulatory debt risk premium for Victorian gas businesses*, March 2012, pp. 23-24

estimated based on yields sourced from foreign currency bonds in addition to Australian dollar bonds.

139. These facts suggest that the benchmark issuance of debt should include a mix of both Australian dollar and foreign currency bonds (consistent with the observed behaviour of Australian businesses including regulated businesses). In any event, there are no strong *a priori* reasons to believe that the new issue premium will differ depending on whether the bond is issued in Australian dollars or another currency. This is consistent with our findings in section 6.3 below that there is no statistically significant difference between Australian dollar and foreign currency bond new issue premiums in our core sample.

5.6.6 Industry sector

140. The benchmark bond is issued in the utilities sector. However, regulatory precedent to date has, in our view reasonably, assumed that any risk advantages or disadvantages that the utility sector has vis-à-vis other sectors is captured in the benchmark credit rating

141. We note that in formulating its fair yield estimates, the RBA, unlike Bloomberg, has specifically excluded bonds that are issued by firms operating in the banking and finance sectors. However, the purpose of the RBA's paper is focused at estimating the cost of debt for Australian non-financial corporations. It does not appear to ask whether one would expect yields on financial corporations to be different from those for non-financial corporations with the same credit rating.

142. In this report, we do not focus on industry sector as being an important characteristic of the benchmark bond – above and beyond the impact already captured in the credit rating. However, we do present a sensitivity that excludes financial firms in order to allow us to examine the impact, if any, of using the RBA's restricted sample selection. We do not find that this exclusion has a material impact on the estimated new issue premium.

5.6.7 Fixed and floating rate bonds

143. We have also collected data on whether the bonds in our sample are fixed rate or floating rate bonds. We consider that fixed and floating rate bonds are very close substitutes and there is no persuasive reason to focus only on fixed rate bonds. However, we present a sensitivity analysis that examines the inclusion of only fixed rate bonds. We find that this change has no impact on our results.

6 Summary of results

6.1 Full dataset of new issue premiums

144. We describe the construction of and structure of our dataset of new issue premiums in section 5 above. As we note there, the size and content of our dataset varies depending on the:

- measure used to capture the movement in market yields – fair value yields or swaps;[50] and
- period over which the new issue premium is estimated.

145. For the purpose of presenting the results, we focus on 12 week new issue premiums. This is not because we have an *a priori* preference for 12 week new issue premiums above 10 week or 14 week new issue premiums, but simply because presenting the dataset for each period is impractical. We discuss considerations relevant to the estimation period in sections 5.4 and 7.2 elsewhere in this report.

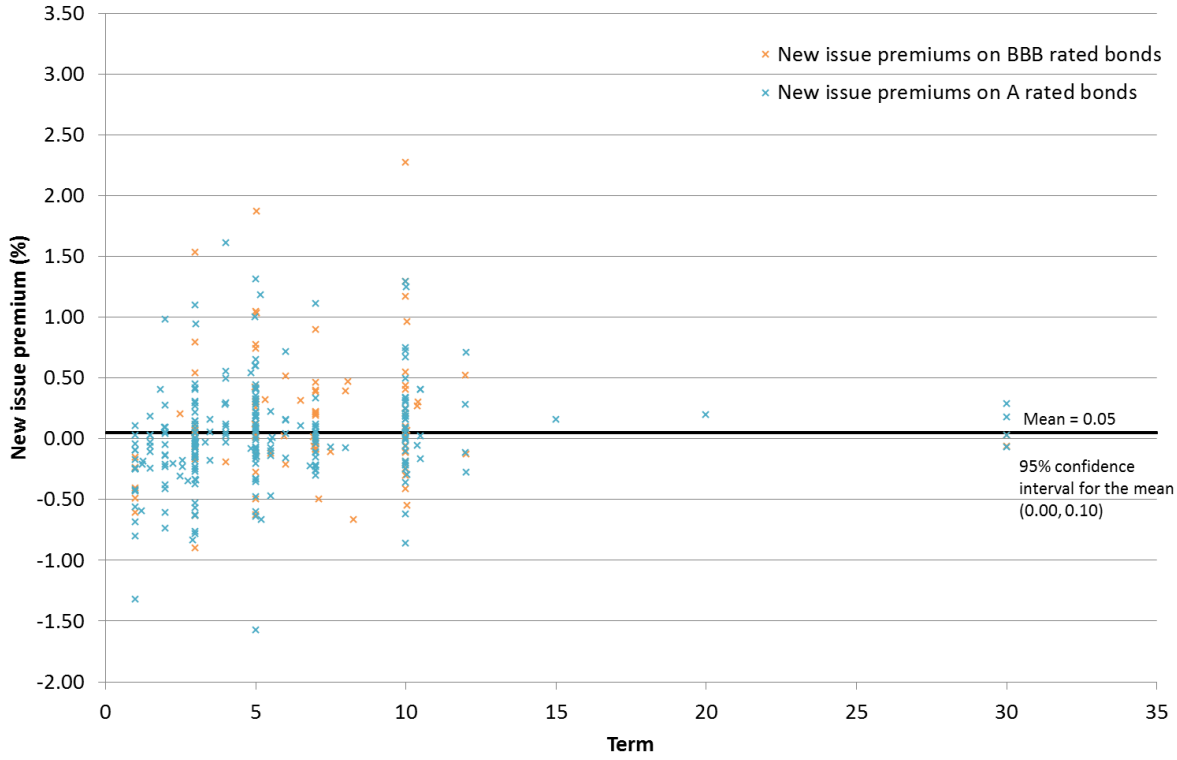
146. Figure 3 and Figure 4 below show a time series of new issue premiums estimated relative to movements in fair value yields and swap yields respectively. The charts differentiate between observations rated in the broad BBB range with Standard & Poor's (BBB-, BBB and BBB+, indicated by the orange circles) and the broad A range (A-, A and A+, indicated by the blue triangles).

147. Both figures show a wide dispersion in estimates of the new issue premium across the dataset. There are many observations that are positive and many that are negative.

148. We consider that observations of negative new issue premium are not surprising and are to be expected. Although the academic literature tends to identify a positive average new issue premium, this does not mean that each observation from the population sampled is itself positive. Each observation of the new issue premium is attempting to observe a value that is relatively small compared to the yield on the bond and discerning this value from movements in yields is imperfect (subject to 'noise'). Even if the underlying new issue premium were itself positive, many observations would not be. The focus of the statistical testing is to determine whether the *average* new issue premium, as an estimate for this underlying value, is statistically significantly different from zero. This is conceptually different from a test that asked, for a given observation, what level of confidence we have that the observation would report a positive new issue premium.

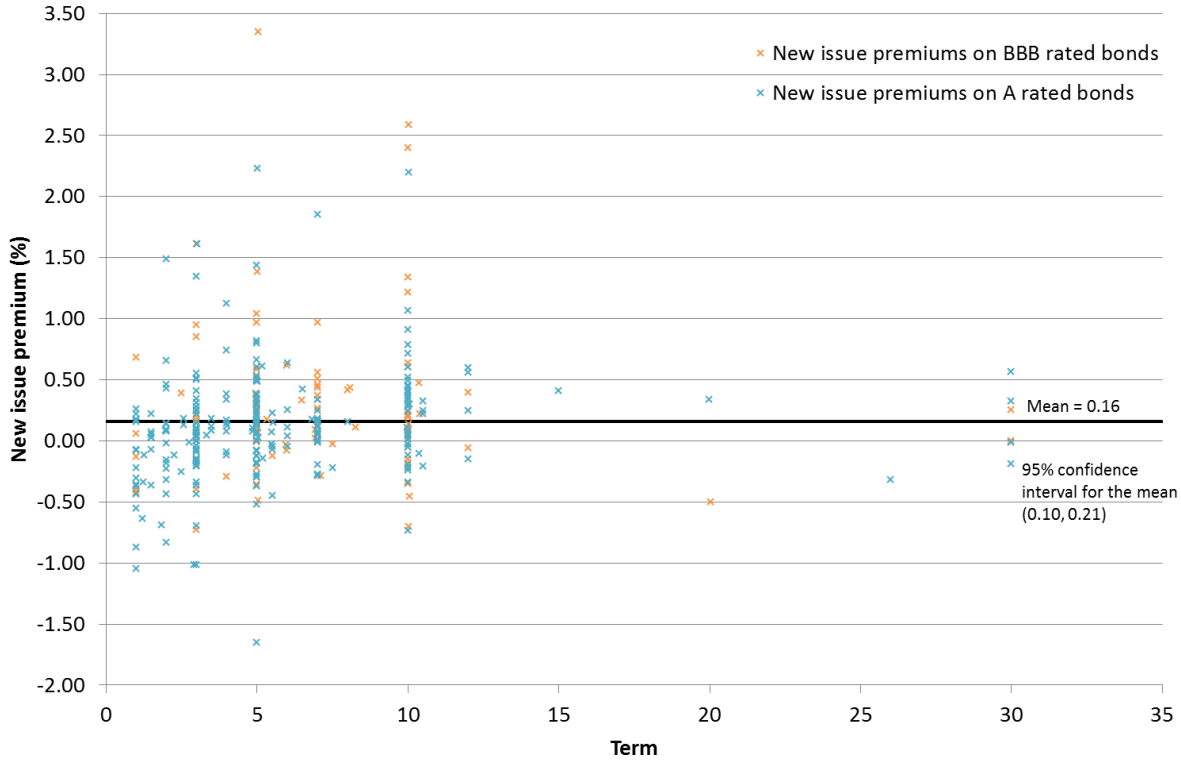
[50] While generally both fair value yields and swap yields are both available, more generally and over a longer period of history there are times at which fair value yields were unavailable for particular currency and credit rating combinations.

Figure 3: 12 week new issue premiums on full sample calculated relative to movements in fair value yields



Source: Bloomberg data, CEG analysis

Figure 4: 12 week new issue premiums on full sample calculated relative to movements in swap yields



Source: Bloomberg data, CEG analysis

149. The general pattern of the data in these charts is similar but there are some differences. In particular, the bond with the largest negative new issue premium when using fair values (issued in 2014 with a new issue premium of – 2.2%) has a new issue premium of only 0.3% when using swap rates to account for changes in general interest rates. This is because this bond is an A- Australian dollar bond with a term of 26 years but the A- Australian dollar fair value curve does not extend out beyond 10 years. Consequently, extrapolation must be heavily relied on and this increases the noise in our resulting estimate of the new issue premium for this bond when using fair values to account for changes in general interest rates. This is not the case for swap curves, which generally extend out to tenors of 30 years.

150. Both charts show that there are relatively few observations for bonds that meet the data requirements that were issued prior to 2010 and none prior to 2008. This is due to the fact that new issue premium data is constructed from three different sources, being:

- Bloomberg data on issue prices;
- Bloomberg BVAL price data and calculated yield data on subsequent yields; and
- Bloomberg fair value yields.

151. Estimating a new issue premium requires data from each of these sources. That is, an absence of data from any of the sources on a particular bond would mean that a new issue premium could not be estimated. The requirement for BVAL pricing information means that only recent data is available since the BVAL data source is a relatively recent innovation within Bloomberg. BVAL pricing information is used by both Bloomberg and the RBA to arrive at fair value yields and, consequently, we consider that any new issue premium that is to be added to these fair value yields should be estimated using BVAL yields in secondary markets. In addition, we also note that BVAL has by far the greatest coverage of data in recent years compared to alternatives such as Bloomberg generic pricing (BGN) and that overall relying on BVAL data maximises the amount of data available relative to these alternatives. We consider that the focus of the dataset on recent estimates of new issue premiums is appropriate and desirable.[51]

152. Table 2 below provides summary statistics for the full dataset, including new issue premiums calculated across periods ranging from 2 to 16 weeks which were not shown in Figure 3 and Figure 4 above.

[51] A BGN yield is Bloomberg's assessment, using bond-specific information only, of a market consensus price for the bond. Bloomberg will not estimate a BGN price if it is not comfortable that there is a market consensus on price. A BVAL price is Bloomberg's assessment, using bond-specific and/or general market information, of the price a bond might trade at.

Table 2: Summary new issue premium statistics for full sample

Estimation period (weeks)	2	4	6	8	10	12	14	16
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Observations	328	336	327	343	343	339	327	325
Maximum	3.54	2.76	2.33	3.03	2.22	2.27	2.83	4.16
75th percentile	0.17	0.20	0.22	0.23	0.23	0.26	0.24	0.23
Median	0.04	0.02	0.03	0.02	-0.01	0.02	-0.01	-0.05
25th percentile	-0.07	-0.10	-0.11	-0.12	-0.17	-0.18	-0.18	-0.26
Minimum	-0.86	-1.00	-1.26	-1.71	-2.63	-2.16	-2.42	-2.62
Mean	0.07	0.06	0.08	0.08	0.06	0.05	0.05	0.00
Stdev of the sample	0.31	0.34	0.38	0.43	0.44	0.46	0.52	0.56
Standard error of the mean	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
p-value	0.000	0.001	0.000	0.000	0.019	0.041	0.109	0.999
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Observations	332	340	331	348	348	344	332	330
Maximum	3.78	3.17	2.91	3.81	3.20	3.35	4.16	4.67
75th percentile	0.18	0.22	0.28	0.29	0.29	0.33	0.33	0.31
Median	0.06	0.07	0.09	0.09	0.09	0.10	0.12	0.08
25th percentile	-0.04	-0.06	-0.07	-0.06	-0.07	-0.09	-0.08	-0.13
Minimum	-0.74	-0.60	-1.19	-1.70	-1.72	-1.65	-1.83	-1.64
Mean	0.10	0.11	0.14	0.15	0.15	0.16	0.17	0.14
Stdev of the sample	0.32	0.35	0.40	0.46	0.46	0.51	0.60	0.66
Standard error of the mean	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Bloomberg, CEG analysis

153. The figures in Table 2 indicate that the mean new issue premium across the full sample of bonds is positive and significantly different from zero at the 5% level of significance and usually significant at the 1% level. The level of these estimates is higher when using swaps to control for general movements in interest rates, at 10 to 17 bp, and 5 to 7 bp when using fair value yields.

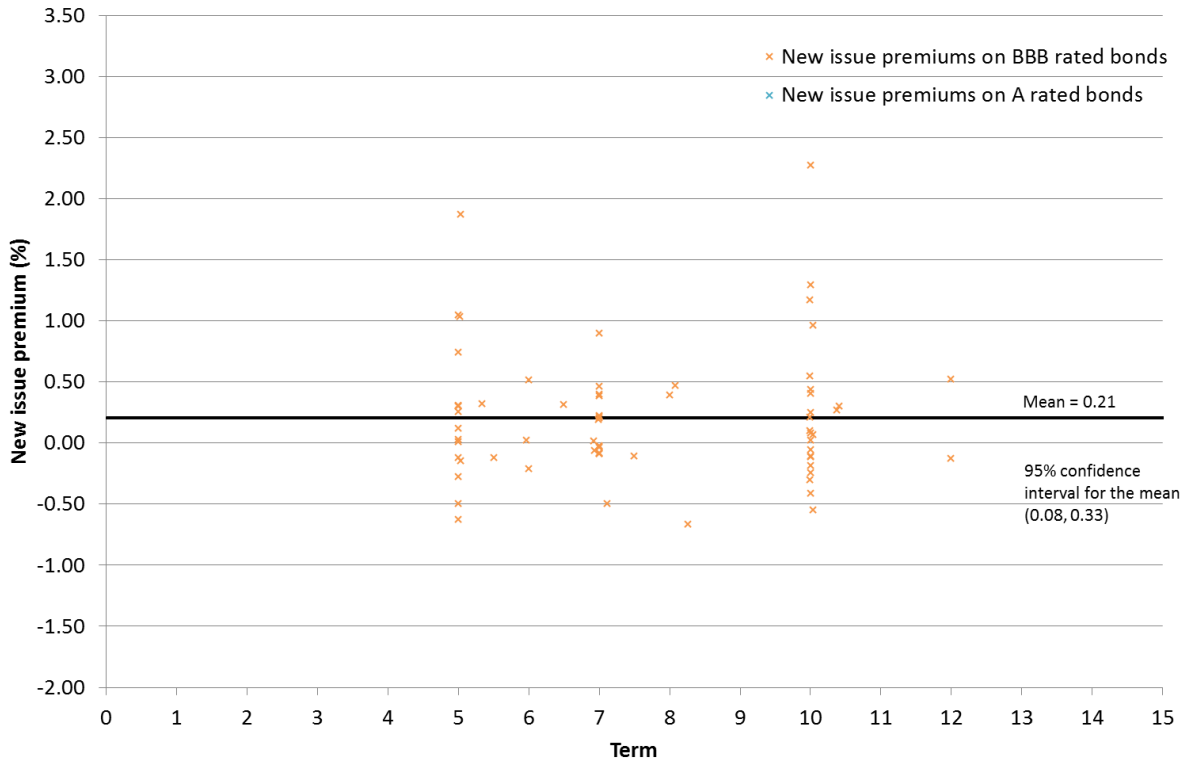
154. Two statistically insignificant estimates occur where the new issue premium is estimated over very long periods (14 and 16 weeks). As discussed at sections 5.4 and 7.2 in this report, one would expect the precision of estimates of the new issue premium to eventually decline as the new issue premium is calculated over a longer interval. Such an outcome appears to be consistent with the results at Table 2 above.

6.2 Core dataset of new issue premiums

155. As we discuss at section 5.6, the benchmark bond may be assumed to have certain characteristics. For the purposes of this report we assume that it has a credit rating of broad BBB with Standard & Poor's (ie, BBB-, BBB or BBB+) and a maturity of 10 years. In order to provide a more accurate assessment of the new issue premium associated with issuance of a bond with the above characteristics we have examined the effect of restricting our sample to bonds with a broad BBB credit rating at the time of issue and a with a maturity of between 5 and 15 years at the time of issue.

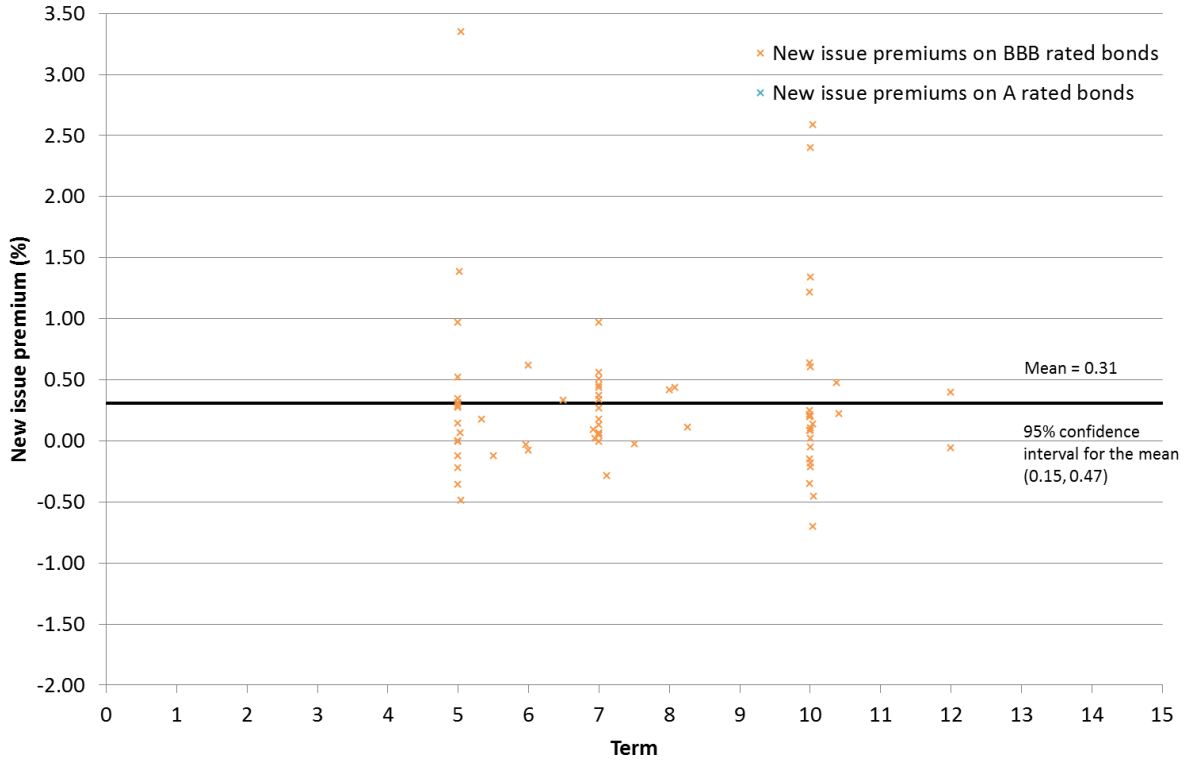
156. Figure 5 and Figure 6 below show the effect of restricting Figure 3 and Figure 4, respectively, to the core sample.

Figure 5: 12 week new issue premiums on core sample calculated relative to movements in fair value yields



Source: Bloomberg data, CEG analysis

Figure 6: 12 week new issue premiums on core sample calculated relative to movements in swap yields



Source: Bloomberg data, CEG analysis

157. Table 3 below provides summary statistics for this subset of bonds, which we refer to as the "core sample". It shows that the mean new issue premium estimates for the subset of BBB- to BBB+ rated bonds centred on 10 years maturity is higher than for the full sample. The average of mean new issue premium estimates rises, with estimates based on swaps ranging from 16bp to 36bp and from 13bp to 23bp based on fair value estimates.

158. All estimates are statistically significantly different to zero at the 5% level of significance and all but one are also significant at the 1% level.

Table 3: Summary new issue premium statistics for core sample

Estimation period (weeks)	2	4	6	8	10	12	14	16
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Observations	72	70	70	72	70	68	67	67
Maximum	1.88	1.98	1.90	2.55	2.22	2.27	2.83	4.16
75th percentile	0.19	0.23	0.28	0.30	0.38	0.39	0.41	0.43
Median	0.08	0.09	0.07	0.10	0.09	0.11	0.12	0.03
25th percentile	-0.02	-0.06	-0.06	-0.09	-0.08	-0.11	-0.10	-0.17
Minimum	-0.21	-0.32	-0.33	-0.39	-0.52	-0.67	-0.76	-0.81
Mean	0.13	0.15	0.16	0.20	0.19	0.21	0.23	0.21
Stdev of the sample	0.29	0.35	0.36	0.49	0.47	0.53	0.63	0.75
Standard error of the mean	0.03	0.04	0.04	0.06	0.06	0.06	0.08	0.09
p-value	0.000	0.001	0.001	0.001	0.001	0.002	0.003	0.022
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Observations	74	72	72	74	72	70	69	69
Maximum	2.02	2.07	2.07	3.81	3.20	3.35	4.16	4.67
75th percentile	0.21	0.26	0.36	0.37	0.39	0.43	0.46	0.48
Median	0.11	0.11	0.17	0.18	0.16	0.17	0.18	0.18
25th percentile	0.02	0.00	0.02	0.01	0.01	-0.01	-0.03	-0.09
Minimum	-0.30	-0.38	-0.37	-0.32	-0.28	-0.70	-1.09	-0.98
Mean	0.16	0.20	0.23	0.28	0.30	0.31	0.36	0.36
Stdev of the sample	0.30	0.36	0.38	0.56	0.58	0.66	0.83	0.96
Standard error of the mean	0.04	0.04	0.04	0.06	0.07	0.08	0.10	0.12
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003

Source: Bloomberg, CEG analysis

159. Notwithstanding that this core sample has characteristics closer to those of the benchmark we are interested in than the entire sample, it is relevant to ask whether the average new issue premium for the core sample is statistically different to the average new issue premium for the bonds not in the core sample. We introduce a testing procedure to assess whether splitting out the core sample from the full sample is statistically justified.

160. Welch's t-test provides a test of whether the means of two populations are the same.[52] Here we use Welch's t-test to test the mean new issue premium of the population of bonds within the BBB credit rating band from Standard & Poor's, and

[52] Welch, B. L. (1947). "The generalization of "Student's" problem when several different population variances are involved". *Biometrika* Vol. 34, pp. 28–35.

maturity at issue of between 5 and 15 years against the mean new issue premium of the population of bonds that do not meet these criteria.[53]

161. Statistics for bonds within the full sample that are not within the core sample are shown in Table 6 at Appendix A. The mean new issue premium estimates for this sample are lower than for the core sample but are still positive and statistically significantly different to zero at the 5% significance level for all swap based estimates of new issue premium. Fair value based estimates of the new issue premium are positive and significant over short measurement periods but become insignificant (and even negative) over longer periods.

162. When we conduct Welch's t-test on the difference in means between these samples, we find evidence to reject the null hypothesis that the means are the same:

- for all estimation periods at a significance level of 10%; and
- for all estimation periods of 4 weeks and above at a significance level of 5%.

163. Full results and steps of Welch's test are shown at Table 7 at Appendix A below.

164. The lower significance of the difference of means at 2 weeks is consistent with the new issue premium being only partially dissipated at this time. One would expect the difference in means to be smaller relative to its standard error than for periods over which a greater proportion of the new issue premium is dissipated.

6.2.1 Skewed distribution

165. It is clear from the above figures and tables that the distribution of the new issue premium is skewed towards positive new issue premiums. That is, an observation is more likely to have an unusually high positive new issue premium than an unusually low new issue premium. A statistical artefact of this is that the mean new issue premium is invariably higher than the median new issue premium – both in the full sample and the core sample and for both methods of accounting for general movements in interest rates.

166. This characteristic of the distribution is consistent with that reported in the literature. Most papers do not report on the shape of their sample distribution (noting that most papers focus on the sample mean and, consistent with the central limit theorem, the sample mean follows a normal distribution as the sample size increases so the properties of the sample distribution are generally not relevant). However, two authors of those surveyed do discuss their sample distribution (Cai et.

[53] This test differs from an iterative test that seeks to test separately the exclusion of A bonds and the exclusion of bonds with maturities outside 5 to 15 years. The single combined test is appropriate because it directly compares the population that we propose to rely upon to the population that we propose to exclude.

al.,[54] and Ronn and Goldberg[55]) and both note that it is skewed and both go on to focus on the mean of the sample.

167. In our view it is correct to focus on the mean. The mean new issue premium of the sample is the (actuarially) expected new issue premium associated with randomly selecting an observation from the sample. Put another way, it is the best estimate of the expected cost associated with issuing a bond if the new issue premium on that bond is drawn from the same population as that from which our sample was drawn.

168. Where the underlying population of bonds is skewed (as our sample and the literature suggests is the case) then compensating for the expected cost of the new issue premium must be based on the mean estimate of the new issue premium. If the median is used then the level of compensation will be lower than the expected costs of the new issue premium.

6.3 Inclusion of foreign currency bonds

169. A further sensitivity we investigate is whether bonds issued by Australian companies but in foreign currencies have a different new issue premium to bonds issued by Australian companies in Australian dollars. To the extent that this is the case, it would raise problems with using a sample that mixes bonds denominated in Australian dollars with bonds denominated in foreign currencies.

170. Of the bonds that are captured within our core sample, slightly fewer than half are denominated in Australian dollars. The exact figures depend upon which period the new issue premium is measured over and what market yield benchmark is used. However, in broad terms:

- the core sample comprises 67-74 observations of new issue premiums;
- 29-33 of these observations are denominated in Australian dollars; and
- 37-41 of these observations are denominated in foreign currencies.

171. The academic literature that we summarise at section 4 above does not contain any findings on whether the new issue premium is expected to be different when measured across different currencies. To investigate whether this is an issue for our core sample, we conduct Welch's t-test on the mean new issue premiums of Australian dollar bonds in the core sample against the mean new issue premiums of foreign currency bonds in the core sample.

54 Cai, N., Helwege, J. and Warga, A. (2007) "Underpricing in the Corporate Bond Market", *The Review of Financial Studies,* Vol. 20, No. 6, p. 2021-2046

55 Ronn, E.I. and Goldberg, R.S (2013a) "Quantifying and Explaining the New-Issue Premium in the Post-Glass–Steagall Corporate Bond Market", *The Journal of Fixed Income*, Vol. 23, No. 1, pp. 43-55

172. Summary statistics of the subsets of the core sample featuring Australian dollar bonds and foreign currency bonds are shown at Table 8 and Table 9 at Appendix A below. Both samples report positive new issue premiums that are generally significant at the 5% level. Estimates of the new issue premium:

- for the Australian dollar bonds range from 14bp to 23bp measured against changes in fair values and from 16bp to 30bp measured against changes in swaps; and
- for the foreign currency bonds range from 12bp to 27bp measured against changes in fair values and from 15bp to 43bp measured against swaps.

173. Table 10 in Appendix A shows the results of Welch's test applied to compare the means of these samples. For every estimation period and measured against both fair values and swaps, the test indicates that there is insufficient evidence to reject the null hypothesis that the means of these samples are the same.

7 Interpretation of results

174. This section discusses the interpretation of the results presented in section 6 in the context of arriving at an estimate of the new issue premium, if any, that it is appropriate to apply to a Bloomberg or RBA fair value yield estimate when estimating the cost of debt for a regulated business.

175. It is clear from the results described above that the mean new issue premium is positive for all of the samples that have been considered and across the methods of estimation within each sample.[56] It is also the case that the mean new issue premium is statistically significantly greater than zero in all cases. However, there is a reasonably wide range of mean new issue premium estimates depending on the sample used, the estimation period chosen and the measure used to control for general movements in interest rates over the period used.

176. In order to confine attention to the most appropriate estimate of the new issue premium it is necessary to determine what weight should be given to different ways of measuring the new issue premium, specifically:

- different ways of accounting for movements in interest rates during the period between primary market debt issue and the indicative estimate of the yield in secondary markets; and
- different measurement periods from the issue date used to first measure the indicative yield in secondary markets.

7.1 What method to control for interest rate movements

177. As set out at section 5.4 it is necessary to attempt to control for movements in general interest rates over the period used to measure the new issue premium. If this is not done then a falling level of general interest rates post issue date will tend to show up as a positive new issue premium on the bond and *vice versa*. That is, the yield on a bond might be lower post issue but if interest rates have fallen in the intervening time then part or all of the fall in the yield may be attributable to that factor rather than the bond being issued at a premium to secondary market yields.

178. We have used two interest rate benchmarks to adjust for movements in interest rates of this kind: fair value curves published by Bloomberg and the interest rate swap curve also published by Bloomberg. The former indicator series attempts to adjust for movements in both base (risk free) rates of interest and movements in risk premiums (associated with the relevant credit rating). The latter series serves to only adjust for movements in base rates of interest (proxied by the level of the interest rate swap curve at the relevant maturity). We note that the published

[56] That is, calculated relative to movements in fair value yields or movements in swap yields.

literature provides examples of both approaches being used (i.e., risk free and risky bonds being used to account for general movements in interest rates).

179. The use of fair value curves would be preferred to the extent that they are intended to capture movements in the risk premium for each bond. Since this is the objective of a fair value curve, the implication is that the use of fair value curves should, in theory, be preferred.

180. However, there is some reason to be sceptical that this is in practice achieved. At any given time the risk premium of a newly issued bond need not move in tandem with an estimate of the average risk premium on all bonds with similar credit ratings. Indeed, there have been times when fair value curves have been criticised (be CEG, the AER and other parties) for not accurately capturing movements in credit spreads.[57]

181. The swap curve has the advantage that it has much greater availability across time and across maturities. The swap curve is based on relatively robust estimates of traded interest rate swaps and is available at annual maturities out to 10 years and beyond. For example, the Australian dollar swap curve extends to 30 years maturity and has been available uninterrupted over the period during which BVAL yields are available for bonds. This also means that there is a reduced reliance on interpolation and extrapolation when using swap curves. Conversely, the availability of fair value yields depends on factors such as the existence of sufficient data for Bloomberg to populate its yield curve methodology.

182. We note also that there are no reasons of consistency that drive a preference for fair value curves over swap curves for this purpose. We estimate new issue premiums relative to *changes* in the levels of these curves. The fact that the estimate of new issue premium is added back to a fair value yield estimate does not demand that it must itself be calculated relative to the same fair value curve. The central issue of consistency, as discussed in section 3 above, relates to the use of BVAL indicative prices and yields on bonds, rather than actual traded prices and yields.

183. In light of the above we consider that equal regard should be had to estimates of the new issue premium based on both methods of controlling for general movements in interest rates. We have implemented this in section 7.3 by placing equal weight on estimates derived from both methods.

57 See CEG, *Estimating the regulatory debt risk premium for Victorian gas businesses,* June 2012, pp. 73-75; and AER, *Final decision: Envestra Ltd Access arrangement proposal for the Qld gas network*, June 2011, p. 50

7.2 What measurement period to use

7.2.1 Conceptual approach

184. It is not clear precisely how long a bond yield takes to adjust from the date of issue until its quoted prices are fully reflective of secondary market conditions. If the period that is used to measure the new issue premium is less than the length of the time taken for quoted yields to fully adjust, then the inadequacy of the interval may lead to an estimate of the new issue premium that is too low.

185. However, attempting to estimate the new issue premium over a period that is too long will tend to give rise to an imprecise or inefficient estimate of the new issue premium. This is because, as the measurement period increases, while there is more opportunity for yields to adjust to the levels of seasoned issues, the general variation in yields caused by factors other than the dissipation of the new issue premium is likely to cause additional variation in the estimate of the new issue premium.

186. We have estimated the new issue premium using a number of different periods of measurement: 2 weeks, 4 weeks, 6 weeks, 8 weeks, 10 weeks, 12 weeks, 14 weeks and 16 weeks. Consistent with the observation that the new issue premium is dissipated over time, we would expect to see the estimate of new issue premium increase over time as the observed yields tend towards the yields for secondary market bonds. This also suggests that the length of the seasoning period can be identified by observing the elapsed time after the issue date that is associated with a levelling off of the new issue premium.

187. We would also expect the standard error of the new issue premium observations to steadily increase as the measurement period increases, consistent with additional variation being introduced to the estimates from unrelated impacts on the bonds' yields. For sufficiently long measurement periods, the standard error is likely to be so high that the estimated new issue premium will not be significantly different from zero. These estimates cannot be relied upon.

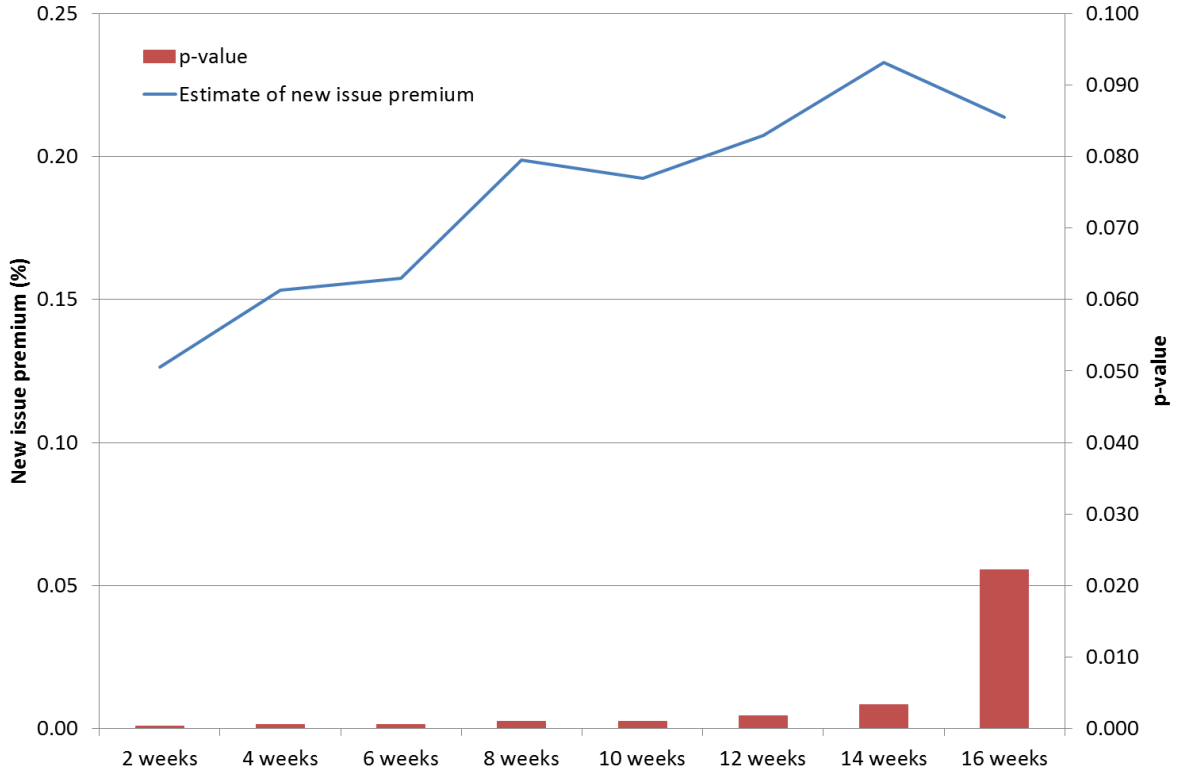
188. On the basis of the reasoning above, we adopt a process of identifying appropriate measurement periods to use for estimating the new issue premium as being those for which the associated estimate of the new issue premium:

- has plateaued such that the new issue premium does not systematically increase with further increases in the estimation period; and
- is statistically significant.

7.2.2 Practical application

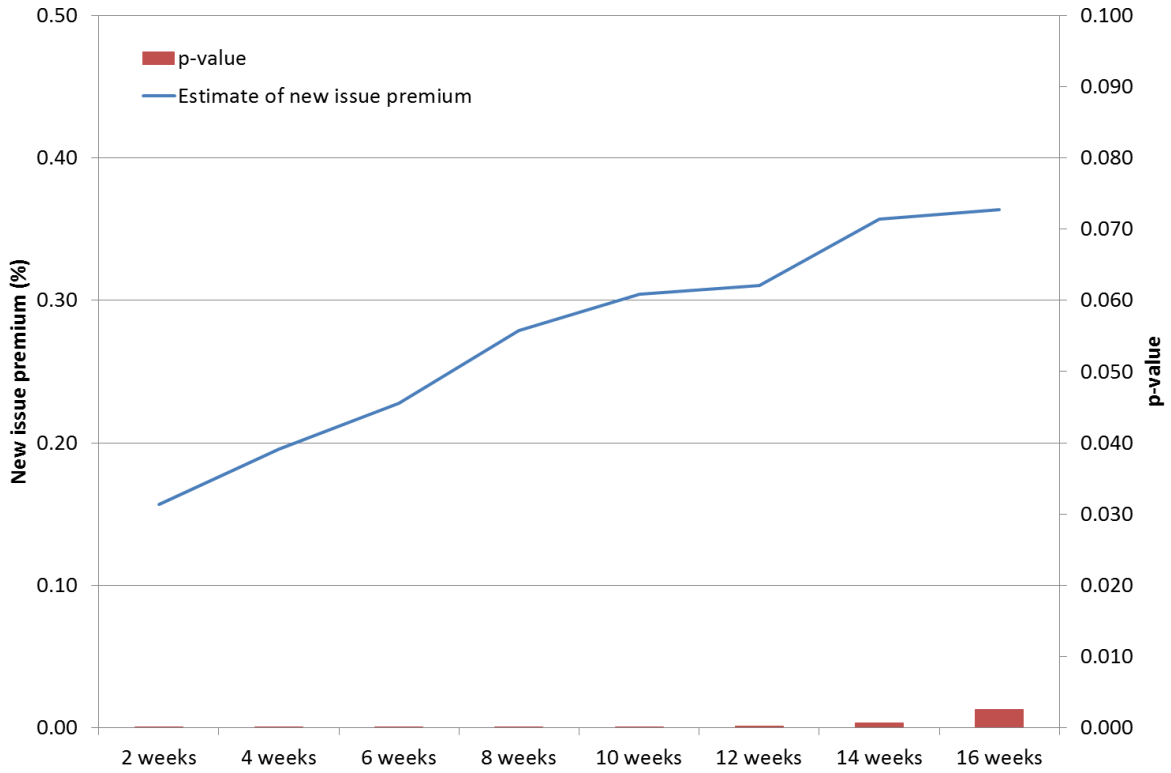
189. Figure 7 and Figure 8 below show how the estimated new issue premium and statistical significance varies with the period used to measure the new issue premium.

Figure 7: New issue premium measured against fair value yields on the core sample



Source: Bloomberg, CEG analysis.

Figure 8: New issue premium measured against swap yields on the core sample



Source: Bloomberg, CEG analysis.

190. The figures above show that the estimated new issue premium, measured against fair value yields or swaps, rises materially between 2 and 8 weeks. The rate of change lessens or stops as the measurement period increases further to 16 weeks. This pattern is consistent with the new issue premium being dissipated over a period of time and this being realised in increasing estimates of the new issue premium as it is measured over longer periods.

191. As discussed in the conceptual approach above, this suggests that estimates of the new issue premium at longer measurement periods, where they are statistically significant, are likely to be more robust than estimates at shorter measurement periods. We consider that the new issue premiums on the core sample can reasonably be represented as:

- 21bp measured against changes in fair value yields, being the simple average of the new issue premium estimates from 8 weeks to 16 weeks; and
- 32bp measured against changes in swap yields, being the simple average of the new issue premium estimates from 8 weeks to 16 weeks.

7.3 Best estimate of the new issue premium

192. Based on the analysis set out above, our best estimate of the new issue premium that is relevant to a benchmark debt management strategy of issuing 10 year BBB rated debt is 27bp. This is the simple average of the two preferred new issue premium estimates set out in section 7.2.2 above.

7.4 Sensitivities

7.4.1 Finance sector and fixed rate bonds

193. In section 5.6 we discussed the fact that the RBA explicitly excludes bonds issued by firms operating in the banking and finance sectors from the construction of its fair value curve and both the RBA and Bloomberg include only fixed rate bonds in the construction of their fair value estimates. We have therefore tested whether excluding bonds issued by firms operating in the banking and finance sectors from our own analysis or including only fixed rate bonds materially alters our conclusions.

194. On the same methodology as outlined above:[58]

- excluding firms operating in the banking and finance sectors (as defined by the RBA) reduces the new issue premium estimate by 1bp to 26bp;
- including only fixed rate bonds reduces the new issue premium by 3bp to 24bp.
- excluding banking and finance sector bonds and including only fixed rate bonds reduces the estimated new issue premium by 2bp to 25bp.

7.4.2 Weighting of bonds by issue size

195. It is also the case that the RBA weights bonds by issue size (giving more weight to larger bond issues). When we do the same thing to our core sample, using the same methodology as outlined above,[59] we estimate a weighted average new issue premium of 25bp. This rises to:

- 31bp if firms operating in the banking and finance sectors are excluded;
- 30bp if only fixed rate bonds are included; and
- 33bp if both changes are made to the sample.

[58] That is, taking a simple average of the 8 to 16 week estimates using both swaps and fair value curves to adjust for general movements in interest rates

[59] That is, taking a simple average of the 8 to 16 week estimates using both swaps and fair value curves to adjust for general movements in interest rates

7.4.3 New issue premium using immediate comparison to the fair value curve

196. We discuss in section 4.2 the fact that some of the older literature estimated the new issue premium by direct comparison of the yield on a bond at the time of issue less an estimate of the fair value for the same type of bond (e.g., same credit rating and maturity). In the same section we concluded that this was not our preferred basis for arriving at an estimate. Nonetheless, we report the estimated new issue premium using this method. The weighted/unweighted average of all observations in the core sample is 38bp/21bp. Applying the other sensitivities described above to this approach results in the following estimates of the weighted/unweighted average new issue premium:

- including only fixed rate bonds is 43bp/29bp;
- excluding firms operating in the banking and finance sectors is 31bp/11bp; and
- making both changes to the sample is 34bp/15bp.

Appendix A Description of individual papers

A.1 Cai, Helwege and Warga (2007)[60]

A.1.1 Methodology

197. The database used was corporate bonds issued between 1995 and 1999 listed in the Fixed Investment Securities Database (FISD).[61] The authors distinguish between initial public offers (IPO's are defined to exist where the company in question had no outstanding debt prior to 1995) and seasoned bond issues (an SBO is a bond issue that is not an IPO).[62]

198. Secondary bond pricing data was obtained from University of Houston-National Association of Insurance Commissioners (UH-NAIC) database. The UH-NAIC database, includes prices of all purchases and sales of publicly traded corporate bonds made by insurance companies.[63] The number of bonds that had such data available were 439 IPOs and 2,536 SBOs.[64]

199. "Underpricing" is measured as the average of traded prices over the 7 days after the IPO. They also find similar results (not reported) using 14 days. The authors restrict majority of analysis to first recorded trade.[65]

200. The authors adjust for general movement in rates using Lehman Brothers Corporate Indices as benchmarks and select for comparability based on rating and maturity.[66]

A.1.2 Results

201. Univariate analysis suggests the new issue premium is greater and more significant for:

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60 Cai, N., Helwege, J. and Warga, A. (2007) "Underpricing in the Corporate Bond Market", *The Review of Financial Studies,* Vol. 20, No. 6, p. 2021-2046

61 Ibid, p. 2024

62 Ibid, p. 2024

63 Ibid, p. 2024

64 Ibid, p. 2026

65 Ibid, p. 2027

66 Ibid, p. 2026

- IPO (37bp) vs SBO (2.7bp) – both statistically significant at the 5% level.[67]
- Low credit rating vs high credit rating. Investment grade (as a group) is not statistically significantly different to zero.[68] However, no attempt is made to distinguish between different types of investment grade bonds (e.g., A rated vs BBB rated).
- Long maturity bonds vs short maturity bonds. Long term bonds issues (both SBO and IPO are statistically significantly higher than zero at 99%) but short term SBOs are not (long term SBOs are).[69]
- The authors note that the distribution is skewed but the authors focus remains on the mean.

  Table 3 presents univariate comparisons of initial returns by rating, maturity, private/public status and offering size for the two samples. Note that the distribution of initial returns is quite skewed, regardless of the subsample examined, but this is true of equity IPOs as well (see Table 1, Panels (a) and (b) of Loughran and Ritter (2004)).[70]

202. A number of different multivariate regressions were undertaken. In general these found:

- dummies for IPOs were positive and significant;
- a dummy for maturity in excess of 10 years was not significant; and
- dummies for below investment grade were positive and significant.

A.1.3 Authors' conclusion

203. Cai et al conclude:[71]

> *We examine underpricing on corporate bonds and find it averages 47 bp for speculative-grade IPOs, substantially more than the bid-ask spread. And, while much smaller, speculative-grade SBOs also exhibit underpricing on average. Our evidence suggests that underpricing is not related to subsequent trading or other measures of market liquidity. Given that trading in the corporate bond market is infrequent, perhaps it is not surprising that investors who rarely trade do not require a*

67 Ibid, p. 2029, Table 1

68 Ibid, p. 2034, Table 3

69 Ibid, p. 2034, Table 3

70 Ibid, p. 2033

71 Ibid, p. 2044

premium for liquidity risk. Underpricing appears to be related to information problems. It is especially high among private firms' bond IPOs, which are the first public security offerings ever by the firm. Firms that only recently changed from private to public equity status have unusually high underpricing. Our two proxies for asymmetric information, how long the firm has been issuing in the market and whether it is subsequently downgraded, largely support this view. However, the variables are not always statistically significant. We also find that underpricing is lower if the firm recently completed a bond offering, suggesting that underpricing is related to the bookbuilding process. In contrast, we do not find any evidence favoring the Rock model, as the small subset of bonds that involve large retail investor participation do not exhibit higher underpricing.

A.2 Conard and Frankena (1969)[72]

A.2.1 Methodology

204. This study looks at Aa corporate bonds from 1952-1962. It relies on new and seasoned issue series prepared by Moody's Investors Service, The Bankers Trust Company, Mortimer Kaplan of the Federal Housing Administration, and Sidney Homer of Saloman Brothers and Hutzler. Conard and Frankena (1969) uses five series for the yields on new issues, three series for the yields on seasoned issues, plus two modified versions of two of the seasoned issue series.[73]

205. The "yield spread", i.e. new issue premium, is measured as the yield on newly issued bonds minus the yield on seasoned bonds, using Moody's Aa corporate yield series for both new issues and seasoned bonds.

A.2.2 Results and conclusions

206. Between 1952 and 1963, the average new issue premium is 16.7bp.[74]

207. Time for seasoning: For several sub-periods, it took two to three months, on average, for the new issue premium to be eliminated.[75]

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72 Conard, J.W. and Frankena, M.W. (1969) "The Yield Spread between New and Seasoned Corporate Bonds" *Essays on Interest Rates*, Vol. 1, National Bureau of Economic Research: New York, pp, 143-222.

73 Ibid, p. 149

74 Ibid, p. 147

75 Ibid, p. 190

208. The difference in coupon rates was the only bond characteristic which is consistently important in determining new issue premiums.[76] Differences between the average coupon rate on newly issued bonds and seasoned bonds account for roughly half the recorded new issue premium.[77] Adjusting for coupon rate, there was a 9bp new issue premium in the Moody and Homer series, compared to a new issue premium of 16.7bp in the Moody's series. Other yield-determining characteristics such as industrial classification, term to maturity, average length of refunding deferment, and sinking fund provisions appear to have relatively little effect on new issue premiums.[78]

209. Holding coupon rates constant, 60-70% of the remaining variance in new issue premium is explained by the change in new issue yields for the twelve months preceding the month of observation.[79]

A.3 Datta, Iskandar-Datta and Patel (1997)[80]

A.3.1 Methodology

210. The adjusted bond return is calculated as the return for each firm minus the return over the same period for the maturity- and credit rating-matched Treasury bond. A period of 60 to 130 days after the first trading day is used. Daily accrued coupon interest is added to the price change to calculate each bond's return.

211. Corporate straight bond initial public offerings made between January 1976 and 1988 were obtained from the Securities and Exchange Commission's *Registered Offerings Statistics (ROS)* tape. Bond initial public offerings made from 1989-1992 were obtained from the *Calendar of New Offerings* section of *Standard & Poor's Bond Guide*. In both cases, bonds were cross-checked to ensure the offering firm did not have outstanding public straight debt. Daily prices for the 50 bonds in the sample were obtained from *Data Resources Inc. (DRI)* or the *Dow Jones Tradeline* database for six months after the first day of trading of the bond IPO.

76 Ibid, p. 162

77 Ibid, p. 144

78 Ibid, p. 145

79 Ibid, p. 145

80 Datta, S., Iskandar-Datta, M. and Patel, A. (1997) "The Pricing of Initial Public Offers of Corporate Straight Debt", *The Journal of Finance*, Vol. 52, No. 1, pp. 379-396

A.3.2 Results and conclusions

212. While positive the new issue premium for the first day of trading for the entire sample was not statistically different from zero.[81] Underwriters do not, on average, under-price IPOs of straight debt.[82] This is consistent with findings from IPO models which predict no under-pricing when informational asymmetry across investor groups is low.[83] Datta *et al.* find this result to be consistent with the bond market being efficient.[84]

213. "[T]he degree of under-pricing for bond IPOs, like stock IPOs, is inversely related to the reputation of the investment bank".[85] Speculative grade debt IPOs are under-priced like equity IPOs, investment grade IPOs are overpriced.[86] The degree of under-pricing is also related to market listing. It is found to be lower for NYSE/AMEX firm bonds compared to OTC firm issued bonds. Datta *et al.* find this to be consistent with market listing providing certification for bond IPOs.[87]

A.4 Ederington (1974)[88]

A.4.1 Methodology

214. Ederington (1974) uses a sample of 611 nonconvertible public utility issues offered through competitive bidding between January 1, 1964 and March 1, 1971. They are rated Baa or better by Moody's and had a maturity of 15 years or more. Data was obtained from *Moody's Bond Survey* and the *Weekly Bond Buyer*.[89]

215. The new issue premium is calculated as the yield on the new issue less Moody's average for outstanding utility bonds of the same rating on the offering date.

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81 Ibid, p. 381

82 Ibid, p. 386

83 Ibid, p. 394

84 Ibid, p. 395

85 Ibid, pp. 394-395

86 Ibid, p. 382

87 Ibid, p. 395

88 Ederington, L (1974) "The Yield Spread of New Issues on Corporate Bonds", *The Journal of Finance,* Vol. 29, No. 5, pp. 1531-1543

89 Ibid, p. 1536

A.4.2 Results and conclusions

216. The average new issue premium for 1964-1961 was 30.9 basis points, with a spread from -91 to +139 bp.[90] Erderington reports that in 1967, 1968 and 1969 Moody's average of offering yields on new public utility offerings rated Aa is 40 basis points above the yields for similar utility debt in the secondary market.[91]

217. Every 10 basis point difference in coupon rates results in a yield spread difference of 2.1 basis points.

218. Ederington concludes that this suggests that differences between the bonds issued and the benchmark explain part, but not all, of the new issue premium.[92]

A.5 Weinstein (1978)[93]

A.5.1 Methodology

219. This study is based on random samples of 412 outstanding bonds and 179 newly issued bonds during any period from June 1962 to July 1974. It looks at holding period returns (coupon plus capital gain) instead of yields to maturity.

220. The new issue premium is measured as the return on a bond during a month less the return on a portfolio of bonds with the same credit rating during the same month. New issue premiums are calculated over the initial month (or part of month from date of issue to end of calendar month) and over the subsequent 6-month period.

A.5.2 Results and conclusions

221. The new issue premium for the first month after issue is 38 basis points, which is not statistically significant.[94] However, due to its quantum, Weinstein considers this provides some evidence of initial under-pricing. However, Weinstein found no evidence that there is an extended seasoning process. He finds that while bonds are

90 Ibid, p. 1536

91 Ibid, p. 1531

92 Ibid, p. 1538

93 Weinstein, M. (1978) "The Seasoning Process of New Corporate Bond Issues", *The Journal of Finance*, Vol. 33, No. 5, pp. 1343-1354

94 Ibid, p. 1354

issued at prices below equilibrium, prices reach equilibrium by the end of the month.[95]

A.6 Carayannopoulos (1996)[96]

A.6.1 Methodology

222. Carayannopoulos (1996) studies the pricing of new 3-, 5-, 10-, and 30-year Treasury notes and bonds which were issued during the United States Treasury's regular refunding operation. It looks at the difference between the prices on these notes and bonds and prices on portfolios of Treasury strips.

223. Treasury strips are either zero coupon bonds (principal strips) or individual coupons (coupon strips). Carayannopoulos used coupon strips to develop strip portfolios which exactly replicated the cash flows of the bond or note being studied.

224. The pricing difference is calculated as the price of the security less the value of an equivalent strip portfolio. The study also compares this to the difference between seasoned bond and note prices and equivalent strip portfolio prices.

225. Monthly closing prices for new Treasury issues are obtained from the University of Milwaukee's fixed-income database. Monthly closing bid and ask strip prices for the same period are collected from the Wall Street Journal.

A.6.2 Results and conclusions

226. The price of a Treasury bond exceeds the value of the equivalent strip portfolio. This is a negative new issue premium. The mean difference at the end of the issue month is -62bp.

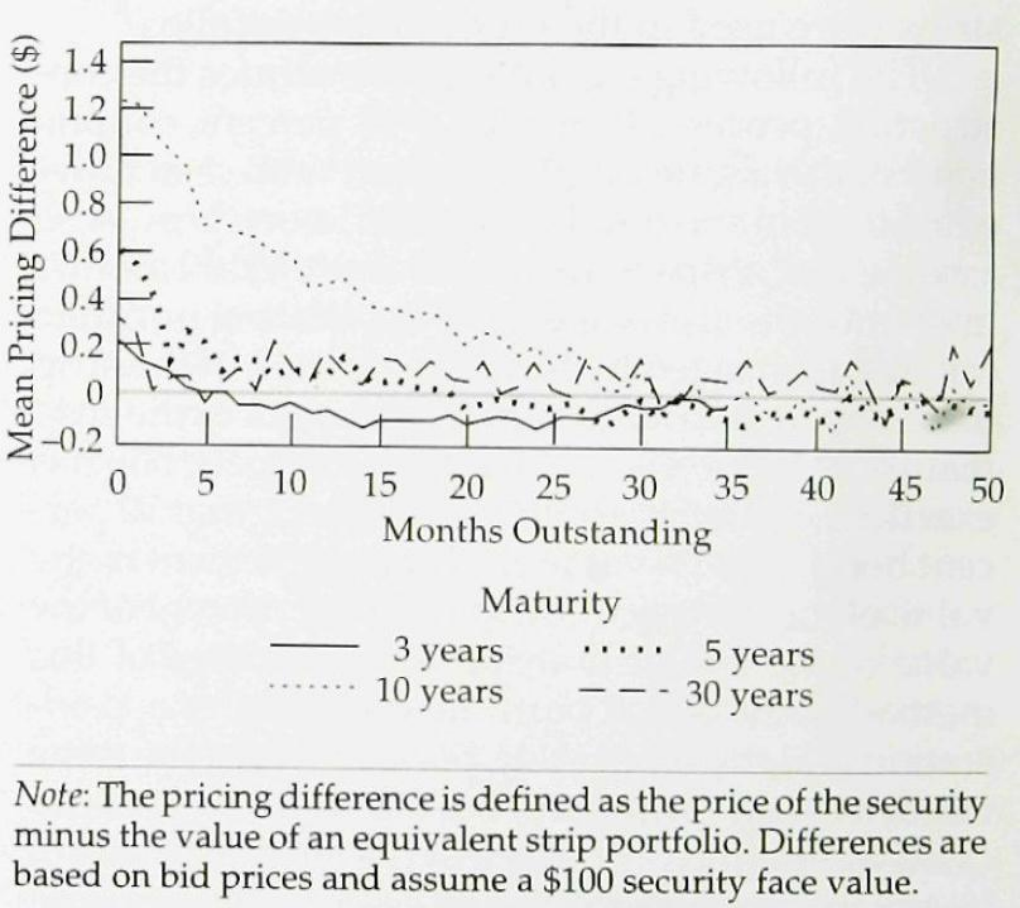
227. The degree of overpricing for 10-year notes is significantly higher than for 3-, 5- and 30-year issues and the seasoning process is much longer. At the end of the month of issue, initial mean overpricing on 10-year Treasury notes was $1.26, compared to $0.22 and $0.59 for 3- and 5-year notes and not significantly different from the overall mean of $0.11 for 30-year bonds.[97] For the 3-, 5- and 30-year issues, the seasoning process is around 2 to 3 months. For 10 year notes, the seasoning process takes approximately 20 months. The degree of overpricing and length of seasoning process are shown in Figure 9. Carayannopoulos was unable to explain this phenomenon.

95 Ibid, p. 1353

96 Carayannopoulos, P. (1996) "A Seasoning Process in the U.S. Treasury Bond Market: The Curious Case of Newly Issued Ten-Year Notes", *Financial Analysts Journal*, Vol. 52, No. 1, pp. 48-55

97 Ibid, pp. 50-51.

Figure 9 Mean pricing difference by original maturity: bid prices



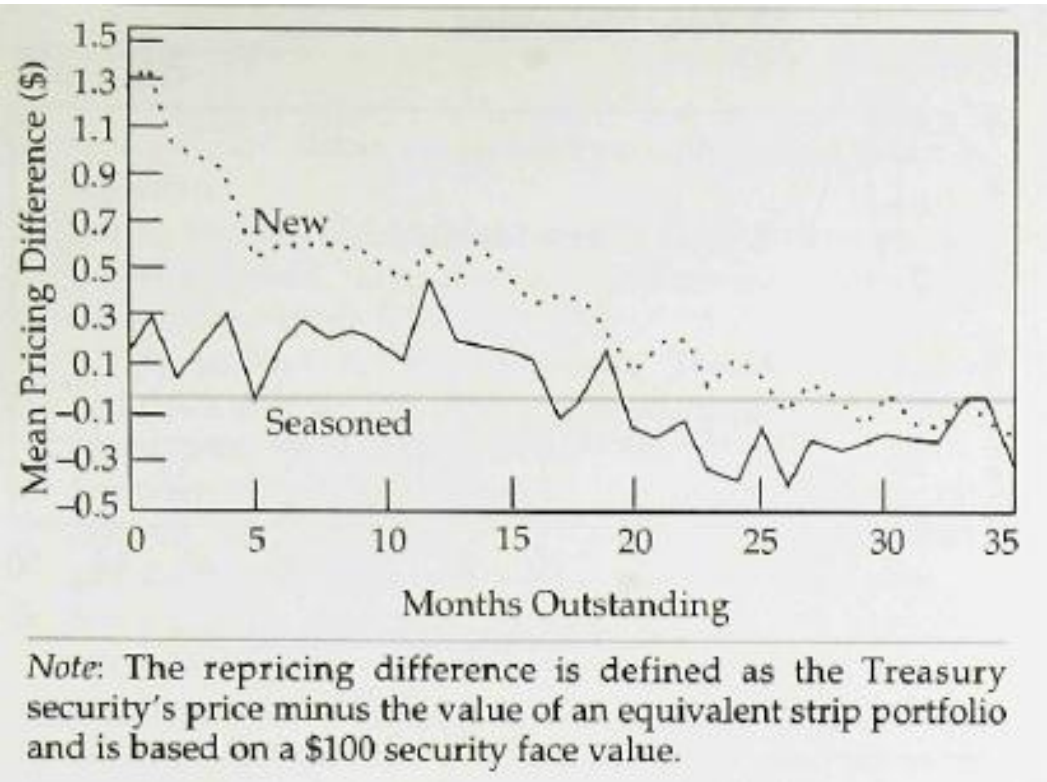
Note: The pricing difference is defined as the price of the security minus the value of an equivalent strip portfolio. Differences are based on bid prices and assume a $100 security face value.

Source: Carayannopoulos (1996), p. 50

228. The difference between new issue prices for Treasuries and strip portfolio prices for 10 year issues is initially higher than the difference between seasoned bond prices and strip portfolio prices. This difference gradually erodes as new issues became seasoned (see Figure 10).[98]

[98] Ibid, p. 52

Figure 10 Mean pricing differences: seasoned and new issues



Note: The repricing difference is defined as the Treasury security's price minus the value of an equivalent strip portfolio and is based on a $100 security face value.

Source: Carayannopoulos (1996), p. 53

229. Carayannopoulos concludes that there is persistent overpricing of ten-year Treasury notes and that there is initial overpricing for 3-, 5- and 30-year Treasury issue that adjust downward over the first couple of months.[99]

A.7 Lindvall (1977)[100]

A.7.1 Methodology

230. Lindvall (1977) used two Salomon Brothers' series to proxy a new issue yield series and a seasoned bond yield series that he considered were comparable with each other. Lindvall acknowledges that the series are at times based on Salomon Brother's judgement rather than actual trades.[101] The series is based on bonds issued by electric, gas and water companies which were rated Moody's Aa or

99 Ibid, p. 54

100 Lindvall, J.R. (1977) "New Issue Corporate Bonds, Seasoned Market Efficiency and Yield Spreads", *The Journal of Finance*, Vol. 32, No. 4, pp. 1057-1067

101 Ibid, p. 1060

Standard and Poor's Aa, had maturities of between 25 and 35 years and were at least $10 million in size. Only first mortgage bonds protected from call for at least 5 years were included.[102]

A.7.2 Results and conclusions

231. Lindvall reports a range of new issue premiums from 45.3bp (in periods of rising yields) to -8.0bp (in periods of falling yields). However, Lindvall's academic focus is on how new issue and secondary market yields equilibrate. He finds that changes in yields on seasoned bonds lag behind changes in the new issue yield.[103]

A.8 Ronn and Goldberg (2013)[104]

A.8.1 Methodology

232. Ronn and Goldberg (2013a) use a sample of 1,494 non-finance investment grade bonds newly issued from 2008 to January 2012. Bond information was obtained from Bloomberg and TRACE. Merrill Lynch's composite index for investment grade non-finance companies, CFOX, was used to adjust for movements in the overall market.[105] Weekly changes in yields adjusted for movements in the overall market were calculated over 4 to 8 weeks.[106]

233. Ronn and Goldberg also develop a model to calculate the average required new issue premium on the basis of bearing unsystematic risk and the information uncertainty associated with the primary distribution process.

A.8.2 Results and conclusions

234. The average new issue premium is 22.5bp, with a skew in the positive direction.[107]

235. The study calculates the average new issue premium of 12.9bp, consisting of 4.5bp for unsystematic risk and 8.4b for information uncertainty.[108] The required premium is around half of the observed new issue premium (22.5bp).

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102 Ibid, pp. 1065-1066

103 Ibid, p. 1065

104 Ronn, E.I. and Goldberg, R.S (2013a) "Quantifying and Explaining the New-Issue Premium in the Post-Glass–Steagall Corporate Bond Market", *The Journal of Fixed Income*, Vol. 23, No. 1, pp. 43-55

105 Ibid, pp. 45

106 Ibid, p. 45

107 Ibid, p. 48

236. Using regression analysis, Ronn and Goldberg find that tenor has a negative impact on the new issue premium and the Treasury spread at issuance has a positive impact on the new issue premium.

[108] Ibid, p. 54

COMPETITION ECONOMISTS GROUP

Appendix B Statistical tests

B.1 The core sample

Table 4: Summary new issue premium statistics for full sample

Estimation period (weeks)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Observations	328	336	327	343	343	339	327	325
Maximum	3.54	2.76	2.33	3.03	2.22	2.27	2.83	4.16
75th percentile	0.17	0.20	0.22	0.23	0.23	0.26	0.24	0.23
Median	0.04	0.02	0.03	0.02	-0.01	0.02	-0.01	-0.05
25th percentile	-0.07	-0.10	-0.11	-0.12	-0.17	-0.18	-0.18	-0.26
Minimum	-0.86	-1.00	-1.26	-1.71	-2.63	-2.16	-2.42	-2.62
Mean	0.07	0.06	0.08	0.08	0.06	0.05	0.05	0.00
Stdev of the sample	0.31	0.34	0.38	0.43	0.44	0.46	0.52	0.56
Standard error of the mean	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
p-value	0.000	0.001	0.000	0.000	0.019	0.041	0.109	0.999
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Observations	332	340	331	348	348	344	332	330
Maximum	3.78	3.17	2.91	3.81	3.20	3.35	4.16	4.67
75th percentile	0.18	0.22	0.28	0.29	0.29	0.33	0.33	0.31
Median	0.06	0.07	0.09	0.09	0.09	0.10	0.12	0.08
25th percentile	-0.04	-0.06	-0.07	-0.06	-0.07	-0.09	-0.08	-0.13
Minimum	-0.74	-0.60	-1.19	-1.70	-1.72	-1.65	-1.83	-1.64
Mean	0.10	0.11	0.14	0.15	0.15	0.16	0.17	0.14
Stdev of the sample	0.32	0.35	0.40	0.46	0.46	0.51	0.60	0.66
Standard error of the mean	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Bloomberg, CEG analysis

Table 5: Summary new issue premium statistics for core sample

Estimation period (weeks)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Observations	72	70	70	72	70	68	67	67
Maximum	1.88	1.98	1.90	2.55	2.22	2.27	2.83	4.16
75th percentile	0.19	0.23	0.28	0.30	0.38	0.39	0.41	0.43
Median	0.08	0.09	0.07	0.10	0.09	0.11	0.12	0.03
25th percentile	-0.02	-0.06	-0.06	-0.09	-0.08	-0.11	-0.10	-0.17
Minimum	-0.21	-0.32	-0.33	-0.39	-0.52	-0.67	-0.76	-0.81
Mean	0.13	0.15	0.16	0.20	0.19	0.21	0.23	0.21
Stdev of the sample	0.29	0.35	0.36	0.49	0.47	0.53	0.63	0.75
Standard error of the mean	0.03	0.04	0.04	0.06	0.06	0.06	0.08	0.09
p-value	0.000	0.001	0.001	0.001	0.001	0.002	0.003	0.022
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Observations	74	72	72	74	72	70	69	69
Maximum	2.02	2.07	2.07	3.81	3.20	3.35	4.16	4.67
75th percentile	0.21	0.26	0.36	0.37	0.39	0.43	0.46	0.48
Median	0.11	0.11	0.17	0.18	0.16	0.17	0.18	0.18
25th percentile	0.02	0.00	0.02	0.01	0.01	-0.01	-0.03	-0.09
Minimum	-0.30	-0.38	-0.37	-0.32	-0.28	-0.70	-1.09	-0.98
Mean	0.16	0.20	0.23	0.28	0.30	0.31	0.36	0.36
Stdev of the sample	0.30	0.36	0.38	0.56	0.58	0.66	0.83	0.96
Standard error of the mean	0.04	0.04	0.04	0.06	0.07	0.08	0.10	0.12
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003

Source: Bloomberg, CEG analysis

Table 6: Summary new issue premium statistics for bonds in the full sample but not in the core sample

Estimation period (weeks)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Observations	256	266	257	271	273	271	260	258
Maximum	3.54	2.76	2.33	3.03	1.56	1.61	1.82	1.67
75th percentile	0.16	0.18	0.20	0.20	0.19	0.20	0.19	0.15
Median	0.03	0.01	0.01	0.00	-0.02	0.01	-0.03	-0.08
25th percentile	-0.08	-0.12	-0.12	-0.14	-0.18	-0.20	-0.21	-0.28
Minimum	-0.86	-1.00	-1.26	-1.71	-2.63	-2.16	-2.42	-2.62
Mean	0.06	0.04	0.05	0.05	0.02	0.01	0.00	-0.06
Stdev of the sample	0.31	0.33	0.39	0.41	0.42	0.44	0.48	0.49
Standard error of the mean	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03
p-value	0.004	0.069	0.028	0.034	0.416	0.640	0.951	0.068
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Observations	258	268	259	274	276	274	263	261
Maximum	3.78	3.17	2.91	3.49	2.21	2.23	2.55	2.24
75th percentile	0.17	0.20	0.26	0.26	0.25	0.30	0.31	0.28
Median	0.05	0.07	0.08	0.07	0.06	0.08	0.10	0.07
25th percentile	-0.05	-0.08	-0.09	-0.09	-0.08	-0.12	-0.11	-0.16
Minimum	-0.74	-0.60	-1.19	-1.70	-1.72	-1.65	-1.83	-1.64
Mean	0.08	0.09	0.11	0.12	0.11	0.12	0.12	0.08
Stdev of the sample	0.32	0.35	0.40	0.43	0.42	0.46	0.52	0.53
Standard error of the mean	0.02	0.02	0.03	0.03	0.02	0.03	0.03	0.03
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016

Source: Bloomberg, CEG analysis

Table 7: Welch's t-test applied to core sample and remaining sample

Estimation period (weeks)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Difference in means (core – other)	0.07	0.12	0.10	0.15	0.17	0.19	0.23	0.27
Std.err of the difference in mean	0.04	0.05	0.05	0.06	0.06	0.07	0.08	0.10
Degrees of freedom	123	104	115	99	100	92	87	81
p-value	0.075	0.015	0.039	0.024	0.006	0.006	0.005	0.006
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Difference in means (core – other)	0.08	0.11	0.12	0.16	0.20	0.19	0.24	0.28
Std.err of the difference in mean	0.04	0.05	0.05	0.07	0.07	0.08	0.10	0.12
Degrees of freedom	125	109	119	98	90	87	82	79
p-value	0.054	0.023	0.027	0.022	0.008	0.024	0.026	0.021

Source: Bloomberg, CEG analysis

B.2 Australian dollar and foreign currency bonds

Table 8: Summary statistics for core sample, Australian dollar bonds only

Estimation period (weeks)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Observations	33	31	33	33	31	30	29	29
Maximum	1.88	1.98	1.90	2.39	2.22	2.27	1.70	1.74
75th percentile	0.16	0.23	0.36	0.42	0.38	0.39	0.45	0.39
Median	0.06	0.09	0.04	0.11	0.16	0.02	0.16	0.00
25th percentile	-0.02	-0.04	-0.05	-0.09	-0.08	-0.08	-0.11	-0.17
Minimum	-0.21	-0.32	-0.33	-0.38	-0.52	-0.67	-0.65	-0.81
Mean	0.14	0.17	0.20	0.23	0.22	0.19	0.20	0.14
Stdev of the sample	0.37	0.44	0.43	0.52	0.51	0.56	0.48	0.55
Standard error of the mean	0.06	0.08	0.08	0.09	0.09	0.10	0.09	0.10
p-value	0.038	0.034	0.013	0.017	0.024	0.069	0.033	0.172
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Observations	33	31	33	33	31	30	29	29
Maximum	2.02	2.07	1.98	2.45	2.34	2.40	1.96	2.14
75th percentile	0.18	0.22	0.36	0.43	0.37	0.36	0.44	0.43
Median	0.05	0.08	0.12	0.18	0.20	0.14	0.20	0.18
25th percentile	-0.01	0.00	0.02	0.02	0.02	0.00	0.04	-0.02
Minimum	-0.23	-0.10	-0.11	-0.09	-0.10	-0.28	-0.32	-0.57
Mean	0.16	0.19	0.25	0.29	0.30	0.28	0.30	0.27
Stdev of the sample	0.39	0.41	0.40	0.46	0.47	0.50	0.45	0.52
Standard error of the mean	0.07	0.07	0.07	0.08	0.08	0.09	0.08	0.10
p-value	0.025	0.014	0.001	0.001	0.001	0.005	0.001	0.009

Source: Bloomberg, CEG analysis

Table 9: Summary statistics for core sample, foreign currency bonds only

Estimation period (weeks)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Observations	39	39	37	39	39	38	38	38
Maximum	0.83	1.06	1.35	2.55	1.78	1.87	2.83	4.16
75th percentile	0.20	0.22	0.27	0.27	0.32	0.37	0.38	0.45
Median	0.10	0.09	0.09	0.08	0.08	0.15	0.10	0.09
25th percentile	-0.01	-0.06	-0.06	-0.08	-0.10	-0.11	-0.10	-0.15
Minimum	-0.16	-0.22	-0.32	-0.39	-0.42	-0.55	-0.76	-0.73
Mean	0.12	0.14	0.12	0.18	0.17	0.22	0.26	0.27
Stdev of the sample	0.20	0.27	0.29	0.48	0.43	0.51	0.72	0.87
Standard error of the mean	0.03	0.04	0.05	0.08	0.07	0.08	0.12	0.14
p-value	0.001	0.004	0.015	0.027	0.019	0.011	0.034	0.067
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Observations	41	41	39	41	41	40	40	40
Maximum	1.00	1.31	2.07	3.81	3.20	3.35	4.16	4.67
75th percentile	0.22	0.28	0.36	0.30	0.44	0.45	0.46	0.58
Median	0.13	0.15	0.17	0.20	0.16	0.20	0.18	0.17
25th percentile	0.04	0.00	0.03	-0.01	0.00	-0.03	-0.06	-0.17
Minimum	-0.30	-0.38	-0.37	-0.32	-0.28	-0.70	-1.09	-0.98
Mean	0.15	0.20	0.21	0.27	0.31	0.34	0.40	0.43
Stdev of the sample	0.22	0.32	0.37	0.63	0.67	0.76	1.03	1.19
Standard error of the mean	0.03	0.05	0.06	0.10	0.10	0.12	0.16	0.19
p-value	0.000	0.000	0.001	0.009	0.005	0.008	0.020	0.028

Source: Bloomberg, CEG analysis

Table 10: Welch's t-test applied to core sample, Australian dollar v. foreign currency bonds

Estimation period (weeks)	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
Control for general movements in interest rates	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*	*Fair value*
Difference in means	0.02	0.04	0.08	0.05	0.05	-0.03	-0.06	-0.12
Std.err of the difference in mean	0.07	0.09	0.09	0.12	0.12	0.13	0.15	0.17
Degrees of freedom	48	48	55	66	59	60	64	63
p-value	0.764	0.673	0.385	0.679	0.665	0.836	0.701	0.484
Control for general movements in interest rates	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*	*Swaps*
Difference in means	0.00	-0.01	0.03	0.02	-0.02	-0.06	-0.09	-0.16
Std.err of the difference in mean	0.08	0.09	0.09	0.13	0.13	0.15	0.18	0.21
Degrees of freedom	48	56	66	72	70	67	57	57
p-value	0.958	0.944	0.727	0.866	0.910	0.701	0.623	0.457

Source: Bloomberg, CEG analysis

Appendix C Curricula vitae