

Report prepared for the  
Australian Energy Regulator

# **A Note on the Historical Equity Risk Premium**

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## **1. INTRODUCTION**

Pursuant to the National Electricity Rules, the Australian Energy Regulator (AER) is currently undertaking a review of the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and distribution network service providers. In this regard, the AER has sought advice on the following matters in relation to the expected market risk premium:

- an estimate of historical excess returns for the 1958-2007 period, relative to 10 year Commonwealth Government Securities (CGS) and bills, including gross up for a gamma of 0.5 and 1.0 and compare the results to those in Officer and Bishop (2008). Include standard errors and 95% confidence intervals;
- an estimate of historical excess returns to include “latest 2008 data available” and for a range of start dates (including 1883-2008, 1958-2008, 1988-2008), relative to 10 year CGS and bills, including gross up for a gamma of 0.5 and 1.0. Include standard errors and 95% confidence intervals;
- an estimate of historical excess returns based on 5 year CGS using the longest data available, including gross up for a gamma of 0.5 and 1.0. Include standard errors and 95% confidence intervals;
- the approach applied by Officer and Bishop (2008) to gross up historical excess returns to account for imputation credits; and
- the appropriateness of using an effective tax rate (instead of the statutory corporate tax rate) to gross up historical excess returns to account for imputation credits.

## **2. ESTIMATION OF HISTORICAL EXCESS RETURNS OVER THE PERIOD 1883 - 2007**

### **2.1 Data and Approach**

In this paper, estimates of historical excess returns (or equivalently, estimates of the historical equity risk premium) over the period 1883 to 2007 are based on the study by Brailsford, Handley and Maheswaran (2008). BHM (2008) present a set of estimates of the historical equity risk premium in Australia over a number of sample periods from January 1883 to December 2005.

Annual stock return, (10 year) bond return and bill return data for each calendar year from 1883 to 2005 and imputation credit yield data for each calendar year from 1988 to 2005 is sourced from BHM (2008).<sup>1</sup> This is supplemented with two years of additional data for the calendar years 2006 and 2007, using sources and methodologies consistent with BHM (2008). In particular:

- Stock Returns: daily closing values of the All Ordinaries Accumulation Index during 2006 and 2007 are obtained from the Australian Stock Exchange (via IRESS). The annual Historical Stock Accumulation Index Series of BHM (2008) is then extended for two years by setting the 2006 value of the series equal to the average value of the All Ordinaries Accumulation Index in December 2006 and setting the 2007 value of the series equal to the average value of the All Ordinaries Accumulation Index in December 2007. This leads to an annual series of (discrete) stock returns – attributable to dividends and capital gains/losses – for the 125 calendar years from 1883 to 2007.
- 10 Year Bond Returns: daily yields on 10 year Commonwealth Government treasury bonds during 2006 and 2007 are obtained from the Reserve Bank of Australia (RBA) website. The annual Historical Bond Return Series of BHM (2008) is then extended for two years by setting the 2006 value of the series

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<sup>1</sup> See BHM (2008) for details of data sources and return series construction.

equal to the yield at the end of December 2006 and setting the 2007 value of the series equal to the yield at the end of December 2007.

- Bill Returns: daily yields on 90 day Bank Accepted Bills during 2006 and 2007 are obtained from the RBA website. The annual Historical Bill Return Series of BHM (2008) is then extended for two years by setting the 2006 value of the series equal to the geometric average of the bill yields at the end of December 2005, March 2006, June 2006 and September 2006 and setting the 2007 value of the series equal to the geometric average of the bill yields at the end of December 2006, March 2007, June 2007 and September 2007. This reflects the annual return on a rolling investment in bills assuming reinvestment on a quarterly basis.<sup>2</sup>
- Imputation Credit Yields: average imputation credit yields on the All Ordinaries Index during 2006 and 2007 are sourced from the Australian Taxation Office (ATO) website. The annual imputation credit yield series of BHM (2008) is then extended for two years by setting the 2006 value of the series equal to (weighted) average imputation credit yield for the 12 months ending December 2006 and setting the 2007 value of the series equal to (weighted) average imputation credit yield for the 12 months ending December 2007.

In addition, a new 5 year historical bond return series is constructed along similar lines to the 10 year bond return series. Yields on 5 year Commonwealth Government treasury bonds appear to be first available from July 1969. For July 1969 to December 1971, the data is sourced from the RBA Statistical Bulletin.<sup>3</sup> For 1972–2007, data is sourced from the RBA website. An annual return series for the period 1969 to 2007 is constructed by taking the yields on the 5 year treasury bonds at the end of December of each calendar year.

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<sup>2</sup> As noted in BHM (2008, p.84), yields on 90 day Bank Accepted Bills have been used since the Commonwealth Government suspended issues of three month treasury notes in December 2002. Whilst these yields will contain some small default premium it will likely be small when averaged over the sample periods.

<sup>3</sup> Reserve Bank of Australia, Statistical Bulletin Financial Supplement, September 1972, page 67. There is some data dating back to 1937, relating to CGS with a maturity of between 5 years and under 10 but this has not been used here.

## 2.2 Results

Table 1 sets out various statistics of the historical equity risk premium in Australia over a number of sample periods from January 1883 to December 2007. The differing start dates of 1883, 1937, 1958 and 1980 correspond to periods of increasing data quality but decreasing sample size. The start date of 1969 reflects the availability of data on 5 year treasury bonds. The start date of 1988 reflects the introduction of the dividend imputation tax system in Australia. AM is the arithmetic mean, SE is the standard error, Low and High define the 95% confidence interval for the “true” but unobservable value of the mean, p-value is the (2-tail) significance level of AM and GM is the geometric mean. The equity premium is defined as the (simple) difference between the stock return and the relevant proxy for the risk free rate – bills in panel A, 10 year bonds in panel B and 5 year bonds in panel C. Calculations are based on nominal, discrete returns and the stock return takes into account cash dividends and capital gains/losses only.

Relative to 10 year bonds (bills), the equity risk premium has averaged 6.4% p.a. (6.7% p.a.) over 1883–2007.

BHM (2008) document concerns about data quality the further back into the past one looks and in particular suggest there are sufficient question marks over the quality of data prior to 1958 to warrant any estimates based thereon to be treated with caution.

Relative to 10 year bonds (bills), the equity risk premium has averaged 6.7% p.a. (7.2% p.a.) over 1958–2007, which is a period of relatively good data quality.

Relative to 5 year bonds, the equity risk premium has averaged 5.5% p.a. over 1969–2007. This compares to 5.4% p.a. (5.8% p.a.) relative to 10 year bonds (bills) over the same period – but all three estimates are statistically insignificant at the 5% level.

TABLE 1							
Historical Equity Risk Premium 1883 - 2007							
Assumed Value of Imputation Credits		0.00					
Panel A: Relative to Bills							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2007	125	0.067	0.014	0.039	0.095	0.00	0.055
1937 - 2007	71	0.067	0.022	0.023	0.111	0.00	0.050
1958 - 2007	50	0.072	0.031	0.012	0.133	0.02	0.050
1969 - 2007	39	0.058	0.036	-0.013	0.129	0.11	0.034
1980 - 2007	28	0.069	0.040	-0.013	0.152	0.10	0.048
1988 - 2007	20	0.064	0.033	-0.005	0.134	0.07	0.054
Panel B: Relative to 10 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2007	125	0.064	0.014	0.036	0.092	0.00	0.051
1937 - 2007	71	0.061	0.022	0.017	0.105	0.01	0.044
1958 - 2007	50	0.067	0.031	0.007	0.127	0.03	0.045
1969 - 2007	39	0.054	0.036	-0.017	0.125	0.13	0.030
1980 - 2007	28	0.068	0.040	-0.014	0.150	0.10	0.047
1988 - 2007	20	0.063	0.033	-0.005	0.132	0.07	0.053
Panel C: Relative to 5 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2007	..	..	..	..	..	..	..
1937 - 2007	..	..	..	..	..	..	..
1958 - 2007	..	..	..	..	..	..	..
1969 - 2007	39	0.055	0.036	-0.015	0.126	0.12	0.031
1980 - 2007	28	0.070	0.040	-0.012	0.152	0.09	0.049
1988 - 2007	20	0.065	0.033	-0.004	0.134	0.06	0.055
Note: Refer to report for data sources and variable definitions							
Estimates in Bold are significant at the 5% level using a 2-tailed test.							

Tables 2 sets out similar statistics of the historical equity risk premium in Australia assuming (distributed) imputation credits are valued at 50 cents in the dollar.<sup>4</sup>

Relative to 10 year bonds (bills), the grossed-up equity risk premium has averaged 6.5% p.a. (6.9% p.a.) over 1883–2007.

Relative to 10 year bonds (bills), the grossed-up equity risk premium has averaged 7.1% p.a. (7.6% p.a.) over 1958–2007, which is a period of relatively good data quality.

Relative to 5 year bonds, the grossed-up equity risk premium has averaged 6.0% p.a. over 1969–2007. This compares to 5.9% p.a. (6.3% p.a.) relative to 10 year bonds (bills) over the same period – but all three estimates are statistically insignificant at the 5% level.

Table 3 presents corresponding results assuming (distributed) imputation credits are fully valued.

The estimates over the period 1883–2007 are higher than the corresponding estimates over 1883–2005 that appear in BHM (2008) primarily due to the strong stock market performance during 2006 and 2007.

A plot of the annual series of historical equity risk premium from 1883 to 2007 appears in Chart 1. Of note is the well known substantial degree of volatility in the series.

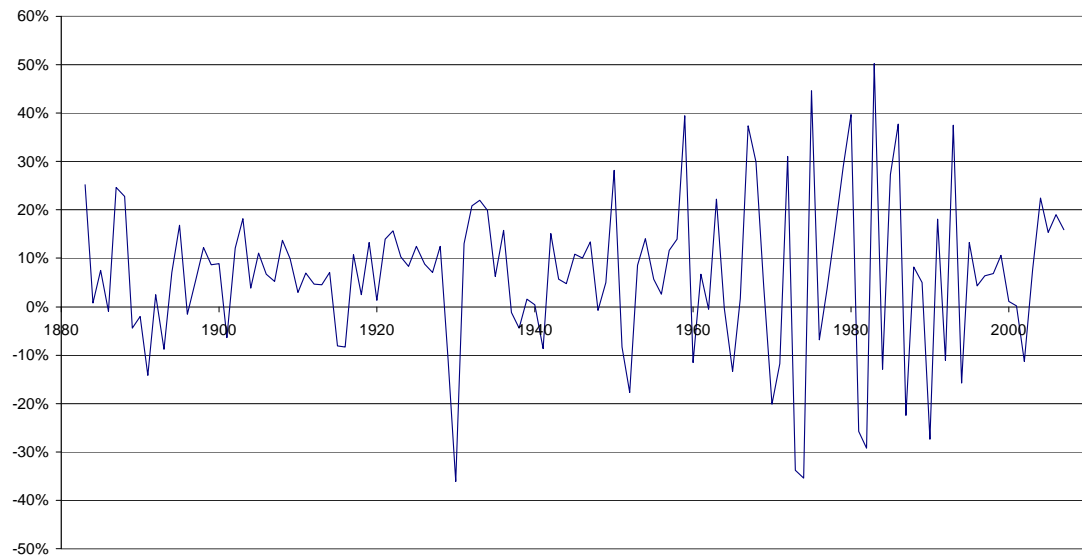
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<sup>4</sup> In this case, the stock return takes into account cash dividends, the value of imputation credits attached to those dividends and capital gains/losses.

TABLE 2							
Historical Equity Risk Premium 1883 - 2007							
Assumed Value of Imputation Credits		0.50					
Panel A: Relative to Bills							
Period	Years	AM	SE	95% Confidence Interval		p-value	GM
				Low	High		
1883 - 2007	125	<b>0.069</b>	0.014	0.041	0.097	0.00	0.056
1937 - 2007	71	<b>0.070</b>	0.023	0.026	0.114	0.00	0.052
1958 - 2007	50	<b>0.076</b>	0.031	0.016	0.136	0.01	0.054
1969 - 2007	39	0.063	0.036	-0.008	0.134	0.08	0.039
1980 - 2007	28	0.076	0.040	-0.006	0.159	0.07	0.055
1988 - 2007	20	<b>0.074</b>	0.033	0.004	0.143	0.04	0.063
Panel B: Relative to 10 year Bonds							
Period	Years	AM	SE	95% Confidence Interval		p-value	GM
				Low	High		
1883 - 2007	125	<b>0.065</b>	0.014	0.037	0.093	0.00	0.053
1937 - 2007	71	<b>0.064</b>	0.022	0.020	0.108	0.00	0.046
1958 - 2007	50	<b>0.071</b>	0.031	0.011	0.131	0.02	0.049
1969 - 2007	39	0.059	0.036	-0.012	0.130	0.10	0.035
1980 - 2007	28	0.075	0.040	-0.007	0.157	0.07	0.054
1988 - 2007	20	<b>0.073</b>	0.033	0.004	0.142	0.04	0.062
Panel C: Relative to 5 year Bonds							
Period	Years	AM	SE	95% Confidence Interval		p-value	GM
				Low	High		
1883 - 2007	..	..	..	..	..	..	..
1937 - 2007	..	..	..	..	..	..	..
1958 - 2007	..	..	..	..	..	..	..
1969 - 2007	39	0.060	0.036	-0.011	0.131	0.10	0.036
1980 - 2007	28	0.077	0.040	-0.005	0.158	0.07	0.056
1988 - 2007	20	<b>0.074</b>	0.033	0.005	0.143	0.04	0.064
Note: Refer to report for data sources and variable definitions							
Estimates in Bold are significant at the 5% level using a 2-tailed test.							

TABLE 3							
Historical Equity Risk Premium 1883 - 2007							
Assumed Value of Imputation Credits		1.00					
Panel A: Relative to Bills							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2007	125	0.070	0.014	0.042	0.098	0.00	0.058
1937 - 2007	71	0.072	0.023	0.028	0.116	0.00	0.055
1958 - 2007	50	0.080	0.031	0.020	0.140	0.01	0.058
1969 - 2007	39	0.068	0.036	-0.003	0.139	0.06	0.043
1980 - 2007	28	0.083	0.040	0.000	0.165	0.05	0.062
1988 - 2007	20	0.083	0.033	0.014	0.153	0.02	0.073
Panel B: Relative to 10 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2007	125	0.067	0.014	0.039	0.095	0.00	0.054
1937 - 2007	71	0.066	0.023	0.022	0.110	0.00	0.049
1958 - 2007	50	0.075	0.031	0.015	0.135	0.01	0.052
1969 - 2007	39	0.064	0.036	-0.007	0.135	0.08	0.039
1980 - 2007	28	0.082	0.040	0.000	0.164	0.05	0.061
1988 - 2007	20	0.082	0.033	0.013	0.151	0.02	0.072
Panel C: Relative to 5 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2007	..	..	..	..	..	..	..
1937 - 2007	..	..	..	..	..	..	..
1958 - 2007	..	..	..	..	..	..	..
1969 - 2007	39	0.065	0.036	-0.006	0.136	0.07	0.040
1980 - 2007	28	0.083	0.040	0.001	0.165	0.05	0.063
1988 - 2007	20	0.084	0.033	0.015	0.153	0.02	0.074
Note: Refer to report for data sources and variable definitions							
Estimates in Bold are significant at the 5% level using a 2-tailed test.							

**Chart 1**  
**Historical Equity Risk Premium in Australia**  
**1883 - 2007**



### **3. ESTIMATION OF HISTORICAL EXCESS RETURNS OVER THE PERIOD 1883 - 2008**

#### **3.1 Data and Approach**

Recent events in stock and bond markets suggest inclusion of returns for the 2008 calendar year in the estimation period will likely lead to lower estimates than those appearing in Tables 1, 2 and 3. Unfortunately, complete data for 2008 is not yet available. However, in order to obtain a preliminary indication of the impact of recent market events, the various return and yield series for 1883 to 2007 is supplemented by one additional “year” of data as follows:

- Stock Returns: daily closing values of the All Ordinaries Accumulation Index during 2008 to date are obtained from the Australian Stock Exchange (via IRESS). The annual stock return series from section 2.1 above is then extended by setting the 2008 value of the series equal to the average value of the All Ordinaries Accumulation Index over the month ending 15 October 2008.
- 10 Year Bond Returns: daily yields on 10 year Commonwealth Government treasury bonds during 2008 to date are obtained from the RBA website. The annual 10 year bond return series from section 2.1 above is then extended by setting the 2008 value of the series equal to the yield as at 15 October 2008.
- Bill Returns: daily yields on 90 day Bank Accepted Bills during 2008 to date are obtained from the RBA website. The annual bill return series from section 2.1 above is then extended by setting the 2008 value of the series equal to the geometric average of the bill yields at the end of December 2007, March 2008, June 2008 and September 2008.
- Imputation Credit Yields: average imputation credit yields on the All Ordinaries Index during 2008 to date are sourced from the ATO website. The annual imputation credit yield series from section 2.1 above is then extended by setting the 2008 value of the series equal to (weighted) average imputation credit yield for the 12 months ending June 2008 – the latest available.

It is stressed that estimates based on this extended 1883–2008 return series should be considered preliminary only and treated with caution as a complete set of data for 2008 will only become available at year end.

### **3.2 Results**

Tables 4, 5 and 6 sets out various statistics of the historical equity risk premium in Australia over a number of sample periods from January 1883 to 15 October 2008 corresponding to similar statistics presented in Tables 1, 2 and 3 for the period January 1883 to December 2007.

Relative to 10 year bonds (bills), the equity risk premium has averaged 6.1% p.a. (6.4% p.a.) over 1883–15Oct2008 and has averaged 6.0% p.a. (6.4% p.a.) over 1958–15Oct2008, which is a period of relatively good data quality. This assumes (distributed) imputation credits are valued at 0 cents in the dollar

Relative to 10 year bonds (bills), the grossed-up equity risk premium has averaged 6.2% p.a. (6.6% p.a.) over 1883–15Oct2008 and has averaged 6.4% p.a. (6.8% p.a.) over 1958–15Oct2008, which is a period of relatively good data quality. This assumes (distributed) imputation credits are valued at 50 cents in the dollar.

Relative to 10 year bonds (bills), the grossed-up equity risk premium has averaged 6.4% p.a. (6.7% p.a.) over 1883–15Oct2008 and has averaged 6.7% p.a. (7.2% p.a.) over 1958–15Oct2008, which is a period of relatively good data quality. This assumes (distributed) imputation credits are fully valued.

TABLE 4							
Historical Equity Risk Premium 1883 - 2008							
Assumed Value of Imputation Credits		0.00					
Panel A: Relative to Bills							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	126	<b>0.064</b>	0.014	0.036	0.092	0.00	0.051
1937 - 2008	72	<b>0.061</b>	0.023	0.017	0.106	0.01	0.043
1958 - 2008	51	<b>0.064</b>	0.031	0.003	0.125	0.04	0.041
1969 - 2008	40	0.048	0.037	-0.023	0.120	0.19	0.022
1980 - 2008	29	0.055	0.041	-0.029	0.140	0.19	0.032
1988 - 2008	21	0.045	0.037	-0.031	0.122	0.23	0.031
Panel B: Relative to 10 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	126	<b>0.061</b>	0.014	0.032	0.089	0.00	0.048
1937 - 2008	72	<b>0.056</b>	0.023	0.011	0.100	0.01	0.038
1958 - 2008	51	<b>0.060</b>	0.031	-0.001	0.121	0.05	0.036
1969 - 2008	40	0.045	0.036	-0.026	0.116	0.22	0.019
1980 - 2008	29	0.055	0.041	-0.028	0.138	0.19	0.032
1988 - 2008	21	0.045	0.036	-0.030	0.120	0.22	0.032
Panel C: Relative to 5 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	..	..	..	..	..	..	..
1937 - 2008	..	..	..	..	..	..	..
1958 - 2008	..	..	..	..	..	..	..
1969 - 2008	40	0.046	0.036	-0.025	0.118	0.20	0.021
1980 - 2008	29	0.057	0.041	-0.026	0.140	0.17	0.034
1988 - 2008	21	0.047	0.036	-0.028	0.122	0.20	0.034
Note: Refer to report for data sources and variable definitions							
Estimates in Bold are significant at the 5% level using a 2-tailed test.							

TABLE 5							
Historical Equity Risk Premium 1883 - 2008							
Assumed Value of Imputation Credits		0.50					
Panel A: Relative to Bills							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	126	<b>0.066</b>	0.014	0.037	0.094	0.00	0.053
1937 - 2008	72	<b>0.064</b>	0.023	0.019	0.109	0.01	0.046
1958 - 2008	51	<b>0.068</b>	0.031	0.007	0.129	0.03	0.044
1969 - 2008	40	0.053	0.037	-0.019	0.125	0.15	0.027
1980 - 2008	29	0.062	0.041	-0.022	0.147	0.14	0.039
1988 - 2008	21	0.055	0.037	-0.023	0.132	0.16	0.040
Panel B: Relative to 10 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	126	<b>0.062</b>	0.014	0.034	0.090	0.00	0.049
1937 - 2008	72	<b>0.059</b>	0.023	0.014	0.103	0.01	0.040
1958 - 2008	51	<b>0.064</b>	0.031	0.003	0.124	0.04	0.040
1969 - 2008	40	0.050	0.036	-0.022	0.121	0.17	0.024
1980 - 2008	29	0.062	0.041	-0.022	0.145	0.14	0.039
1988 - 2008	21	0.054	0.036	-0.021	0.130	0.15	0.041
Panel C: Relative to 5 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	..	..	..	..	..	..	..
1937 - 2008	..	..	..	..	..	..	..
1958 - 2008	..	..	..	..	..	..	..
1969 - 2008	40	0.051	0.036	-0.020	0.122	0.16	0.026
1980 - 2008	29	0.063	0.041	-0.020	0.147	0.13	0.041
1988 - 2008	21	0.056	0.036	-0.019	0.132	0.13	0.043
Note: Refer to report for data sources and variable definitions							
Estimates in Bold are significant at the 5% level using a 2-tailed test.							

TABLE 6							
Historical Equity Risk Premium 1883 - 2008							
Assumed Value of Imputation Credits		1.00					
Panel A: Relative to Bills							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	126	<b>0.067</b>	0.014	0.039	0.096	0.00	0.054
1937 - 2008	72	<b>0.067</b>	0.023	0.022	0.112	0.00	0.049
1958 - 2008	51	<b>0.072</b>	0.031	0.011	0.133	0.02	0.048
1969 - 2008	40	0.058	0.037	-0.014	0.130	0.11	0.032
1980 - 2008	29	0.069	0.041	-0.016	0.153	0.11	0.045
1988 - 2008	21	0.064	0.037	-0.014	0.141	0.10	0.049
Panel B: Relative to 10 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	126	<b>0.064</b>	0.014	0.035	0.092	0.00	0.051
1937 - 2008	72	<b>0.061</b>	0.023	0.016	0.106	0.01	0.043
1958 - 2008	51	<b>0.067</b>	0.031	0.007	0.128	0.03	0.044
1969 - 2008	40	0.055	0.036	-0.017	0.126	0.13	0.029
1980 - 2008	29	0.068	0.041	-0.015	0.152	0.11	0.046
1988 - 2008	21	0.064	0.036	-0.012	0.140	0.10	0.050
Panel C: Relative to 5 year Bonds							
				95% Confidence Interval			
Period	Years	AM	SE	Low	High	p-value	GM
1883 - 2008	..	..	..	..	..	..	..
1937 - 2008	..	..	..	..	..	..	..
1958 - 2008	..	..	..	..	..	..	..
1969 - 2008	40	0.056	0.036	-0.016	0.127	0.13	0.030
1980 - 2008	29	0.070	0.041	-0.013	0.153	0.10	0.047
1988 - 2008	21	0.066	0.036	-0.010	0.142	0.09	0.052
Note: Refer to report for data sources and variable definitions							
Estimates in Bold are significant at the 5% level using a 2-tailed test.							

### 3.3 Comparison of Results with Estimates in Officer and Bishop (2008)

A comparison of the estimates presented in sections 2.2 and 3.2 above with those appearing in Officer and Bishop (2008)<sup>5</sup> is set out in Table 7 below:

<b>TABLE 7</b>						
<b>Historical Equity Risk Premium 1883 – 2007</b>						
<b>(Relative to 10 year Bonds)</b>						
Period	Officer and Bishop (2008)			This Report		
	Years	AM	SE	Years	AM	SE
Assuming (distributed) imputation credits have no value						
1883-2007	125	7.5	1.5	125	6.4	1.4
1958-2007	50	6.7	3.1	50	6.7	3.1
Assuming (distributed) imputation credits are valued at 50 cents in the dollar						
1883-2007	125	7.6	n.a.	125	6.5	1.4
1958-2007	50	7.1	n.a.	50	7.1	3.1
Assuming (distributed) imputation credits are fully valued						
1883-2007	125	7.8	n.a.	125	6.7	1.4
1958-2007	50	7.4	n.a.	50	7.5	3.1

The results for the period 1958 to 2007 are consistent.

The difference in results for the period 1883 to 2007 is likely largely explained by differences between the pre-1958 annual stock return data used by BHM (2008) – on which estimates in this report are based – and the pre-1958 annual stock return data used by Officer (1989) – on which estimates in Officer and Bishop (2008) are based. In particular, BHM (2008 p.92) suggest the difference between their results and those of Officer (1989) is largely explained by their estimate of lower stock returns which in turn appears to be largely explained by differences in the dividend yield series used in the retrospective construction of the underlying stock accumulation index for the period prior to 1958.

<sup>5</sup> See Tables 6 and 7 of Officer and Bishop (2008).

Finally, the methodology used by Officer and Bishop (2008) to gross up historical stock returns (for a given assumed value of imputation credits) is generally consistent with that of BHM (2008) – both of which follows Officer’s (1994) general definition for a grossed-up return.<sup>6</sup> It is noted, however, that Officer and Bishop (2008) estimate an imputation credit yield for the entire 1988 to 2007 period. In comparison, in this report the series of (weighted) average imputation credit yields on the All Ordinaries Index, for each calendar year since 1998, is sourced from the ATO website.

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<sup>6</sup> In estimating imputation credit yields, the statutory corporate tax rate rather than the effective corporate tax rate is the appropriate rate to use since imputation credits represent tax paid by the company at the statutory rate.