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# A RE-EXAMINATION OF THE HISTORICAL EQUITY RISK PREMIUM IN AUSTRALIA

Tim Brailsford  
John C. Handley  
Krishnan Maheswaran

# Purpose

- *“The equity premium is perhaps the single most important number in financial economics”*  
– Welch (2000)
- Basic Research Question:
  - What is the historical equity risk premium in Australia?

# Motivation

- Given that historical estimates are typically used for ex-ante purposes, then the historical estimate should be the best available
- Dimson, Marsh and Staunton (2002,2003) found serious limitations with prior estimates of the UK equity premium → could a similar situation exist in Australia ?
- What has been the impact of imputation ?

# Our Philosophy

- *“Good data is the key to understanding history”*  
– DMS (2002)
- It is not necessarily true that the longer the estimation period the better:  
  
*“there is also the more mundane non-stationarity problem that 50 year old equity premia may have little relevance to the world today”*  
– Welch (2000)

# Our Approach

- We use the best available data on:
  - Stock returns – sourced from the ASX
  - Bond returns – sourced from the RBA
  - Bill returns – sourced from the RBA
  - Inflation – sourced from the ABS
- We examine the quality of each data series to assess the reliability of estimates based thereon

# Data Quality Concerns

- Stock price index data prior to 1957 was constructed retrospectively by Lamberton in 1958
- Although much care was exercised it suffers from:
  - (Probable) survivorship/hindsight bias
  - Narrow coverage (eg excludes the financial sector and has only a small number of stocks prior to 1936)
  - Incorrect weight scheme
  - Government stock price controls operated from 11/41 to 2/47:

*“it proved necessary to fill some gaps in the price records”*

– Lamberton (1958)

# Data Quality Concerns

- Dividend yield series prior to 1961 was constructed retrospectively by Lamberton in 1958 and the SSE in 1961
- Although much care was exercised it suffers from:
  - Unweighted simple average
  - Includes dividend paying stocks only
  - Different composition to stock price index:

*“the list of shares included in the share price index differs for that entering the yield computation”* – Lamberton (1961)

- These concerns are not new:

*“unsatisfactory features of the monthly figures of ordinary share yields which was being published”*

– Young, Harris and Cruise (1973)

# Data Quality Concerns

- Bill return data from 1929 to 1959 represents the yield on Treasury Bills (as distinct from Treasury Notes)
- Treasury Bills were non marketable securities used as security for short term borrowings/overdraft facilities from the trading/central banks with a yield not necessarily representative of the true cost of funds
- From 1942 to 1952, maximum rates of interest over a wide field were fixed by the Commonwealth Bank under the National Security (Economic Organisation) Regulations

# Critical Breaks in Data Quality

- 1883            Earliest year data is available
- 1937            Data first available on both a broad stock price index (the SSE All Ordinaries index) and “marketable” short term government securities
- 1958            SSE All Ordinaries index is calculated daily (rather than retrospectively) and approximately Treasury Notes first issued
- 1980            ASX All Ordinaries accumulation index is calculated daily (rather than retrospectively)
- 1988            First full year of imputation (not a quality issue)

# Methodology

- *“Unfortunately there is neither a uniformly accepted precise definition nor agreement on how the equity premium should be computed”*

– Welch (2000)

- Consistency and clarity is critical - for example DMS (2002, 2003) use the geometric difference of risky and riskfree returns
- We use: discrete returns, arithmetic and geometric averaging, simple differencing of risky and riskfree returns, bills and bonds, nominal and real

# Methodology

- Multiple estimation periods:

1883 – 2005

1937 – 2005

1958 – 2005

1980 – 2005

1988 – 2005

- We stress that these periods are not arbitrary but rather reflect clearly identifiable and material changes in the underlying data

# Results

## Historical Equity Risk Premium 1883-2005

Period	Years	Nominal				Real			
		AM p-value	SD	GM	JB statistic p-value	AM p-value	SD	GM	JB statistic p-value
1883–2005	123	0.062 0.000	0.160	0.049	2.772 0.250	0.061 0.000	0.151	0.050	1.873 0.392
1937–2005	69	0.058 0.014	0.191	0.040	0.248 0.883	0.056 0.011	0.178	0.041	0.483 0.765
1958–2005	48	0.063 0.054	0.220	0.040	1.180 0.554	0.061 0.044	0.205	0.041	1.526 0.466
1980–2005	26	0.060 0.171	0.217	0.038	0.619 0.734	0.057 0.162	0.203	0.038	0.716 0.699
1988–2005	18	0.051 0.168	0.150	0.040	0.152 0.927	0.050 0.163	0.145	0.040	0.085 0.958
1883–1987	105	0.064 0.000	0.162	0.051	2.533 0.282	0.063 0.000	0.153	0.052	1.787 0.409
1900–2000 (simple diff)	101	0.062 0.000	0.168	0.048	1.649 0.438	0.061 0.000	0.158	0.049	1.385 0.500
1900–2000 (geometric diff)	101	0.059 0.000	0.155	0.047	1.273 0.529	0.059 0.000	0.155	0.047	1.273 0.529
1883–1957	75	0.061 0.000	0.106	0.056	26.438 0.000	0.061 0.000	0.106	0.056	34.801 0.000
t statistic p-value		0.050 0.961				0.007 0.994			
F statistic p-value			4.337 0.000				3.746 0.000		

# Results

## Historical Equity Risk Premium 1883-2005 (Grossed-up for the Value of Imputation Credits assuming Credits are Fully Valued)

Period	Years	Nominal				Real			
		AM p-value	SD	GM	JB statistic p-value	AM p-value	SD	GM	JB statistic p-value
1883–2005	123	0.065 0.000	0.160	0.052	2.712 0.258	0.064 0.000	0.152	0.053	1.874 0.392
1937–2005	69	0.063 0.008	0.191	0.045	0.221 0.895	0.061 0.006	0.178	0.046	0.468 0.791
1958–2005	48	0.070 0.032	0.220	0.047	1.214 0.545	0.068 0.026	0.205	0.048	1.553 0.460
1980–2005	26	0.073 0.098	0.218	0.052	0.608 0.738	0.070 0.090	0.203	0.051	0.716 0.699
1988–2005	18	0.070 0.066	0.151	0.060	0.101 0.951	0.069 0.064	0.147	0.059	0.055 0.973
1883–1987	105	0.064 0.000	0.162	0.051	2.533 0.282	0.063 0.000	0.153	0.052	1.787 0.409
1900–2000 (simple diff)	101	0.065 0.000	0.168	0.051	1.651 0.438	0.063 0.000	0.158	0.051	1.415 0.493
1900–2000 (geometric diff)	101	0.061 0.000	0.155	0.049	1.315 0.518	0.061 0.000	0.155	0.049	1.315 0.518
1883–1957	75	0.061 0.000	0.106	0.056	26.438 0.000	0.061 0.000	0.106	0.056	34.801 0.000
t statistic p-value		0.262 0.794				0.211 0.833			
F statistic p-value			4.345 0.000				3.755 0.000		

## Comparison With Existing Studies

Period	Officer (1989)	DMS (2002)	BHM (2006)
1883 - 1987	7.9%	-	6.4%
1900 - 2000 simple difference	-	7.5%	6.2%
1900 - 2000 geometric difference	-	8.0%	5.9%

- Equity premium relative to bonds (p.a.)
- Common estimate in practice is 6%
- Officer's data commences 1882
- Much of the data used in DMS is drawn from Officer
- Difference largely due to dividend yield series used in the retrospective construction of stock accumulation index prior to 1958

# Main Conclusions

- Residual concerns about data quality become increasingly important the further back in the past one looks
- Estimates based on data prior to 1958 should be treated with caution
- Relative to bonds (bills) the conventionally measured equity premium has averaged 6.3% (6.8%) over 1958 – 2005
- We do not take a view on the value of imputation credits (in this paper) but also provide grossed up estimates of the premium under different assumptions

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PLEASE EMAIL EITHER:**

[handleyj@unimelb.edu.au](mailto:handleyj@unimelb.edu.au)

[t.brailsford@business.uq.edu.au](mailto:t.brailsford@business.uq.edu.au)