

# Predicting Australian stock market annual returns

In view of the current volatility in global equity markets, the outlook for Australian equities returns is a significant issue for funds managers and investors. There is strong evidence that returns in the Australian market are predictable from past US returns (two years earlier). In addition, Australian growth stocks are shown to be more influenced by the 'two-year' effect than are value stocks.



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THE PREDICTABILITY of stock market returns from past returns is a topic that has been investigated extensively, particularly in the United States. The landmark articles by Fama and French (1988) and Poterba and Summers (1988) created considerable interest and controversy. While the early US mean-reversion studies had mixed results, a recent paper by Bornholt (2008) identifies a strong form of predictability in the US market called the 'two-year effect'. Those calendar years that follow a low market return two years earlier have much higher average returns than those years that follow a high average return two years earlier. This two-year effect implies that US market upswings and downswings that have lasted only one calendar year tend to continue, while those that have lasted two or more calendar years tend to reverse. Thus the US market return from two years earlier is a contrarian indicator of the coming year's return.

The existence of the US two-year effect raises two questions of interest for the Australian market. Firstly, since we know that the US and Australian markets are contemporaneously correlated, can we also predict the Australian market return from the US return from two years earlier? Secondly, is there an Australian two-year effect? That is, does the Australian market return from two years earlier have any predictive ability? As we will see, while the answer to the latter question is negative, there is strong evidence that the Australian market return is predictable from past US returns. In addition, Australian growth stocks are shown to be more influenced by the two-year effect than are value stocks.

## The US two-year effect

Bornholt (2008) employs a simple two-mean model to identify a strong form of non-linear predictability in US market returns. At the start of each calendar year, the year is classified as either a Low<sub>-2</sub> year or High<sub>-2</sub> year. The year is designated as a Low<sub>-2</sub> year if the Centre for Research in Security Prices (CRSP) US value-weighted market index (VW) return from two years earlier is less than the current threshold value, otherwise the year is designated a High<sub>-2</sub> year. There are two methods used to calculate the current threshold value. The first uses the trailing 10-year moving average (m.a.) return as the threshold value, while the second uses the median of the sample that remains after excluding the most recent two years. The latter value splits the classified years into two equal-sized groups.

For the period 1936–2005, Bornholt (2008) reports that Low<sub>-2</sub> years have an average VW return of 18.7%. In contrast, High<sub>-2</sub> years have an average VW return of just 7.1%. The resulting spread of 11.6% is both economically and statistically significant. A strategy of tilting asset allocations towards equity following a low return two years earlier (and away from equity following a high return two years earlier) is shown to yield substantial economic

benefits. Other key findings are that the US two-year effect is not concentrated in January, nor is it a small-cap effect. In addition, the VW return from two years earlier can be used to predict both US small-cap returns and large-cap returns. Although the two-year effect has been a feature of the US market since the 1880s, its cause remains a puzzle.

## Data and methodology

The approach in this paper is to investigate whether Australian equity returns tend to be larger in Low<sub>2</sub> years than in High<sub>2</sub> years. Initially, years are classified as either Low<sub>2</sub> or High<sub>2</sub> using CRSP US value-weighted market index returns as described in the previous section.<sup>1</sup> Table 1 provides these returns for 1926–2008. It also lists the Low<sub>2</sub> years and High<sub>2</sub> years, as determined by the US VW returns from two years earlier and the two alternative threshold estimation methods. (Note that column four of Table 1 uses a 14.4% threshold because the 1926–2006 median VW return equals 14.4%. This value splits the

classified years 1928–2008 into two equal-sized groups.) For example, 1936 is classified as a Low<sub>2</sub> year according to the 10-year m.a. method because the 4.2% return for 1934 is less than the 1926–35 average return of 9.2%. Similarly, 1936 is classified as a Low<sub>2</sub> year according to the 14.4% threshold because the 4.2% return for 1934 is less than 14.4%.

If Australian market returns are predictable because of the US two-year effect then the average Australian market return in Low<sub>2</sub> years will be significantly higher than the average market return in High<sub>2</sub> years. The spread between average returns in Low<sub>2</sub> years and average returns in High<sub>2</sub> years is the relevant test statistic. Statistical significance is determined by the two-sided Fisher randomisation test described in Bornholt (2008). This test is more robust than the standard test for the difference between two means because it gives correct critical values in the presence of non-normality and non-constant volatility.

A number of Australian return series are used in the analysis that follows. Each is composed of annual returns.

TABLE 1: US CRSP VW Index returns and year classifications

Classifications based on				Classifications based on				Classifications based on			
Year	VW Return	10yr m.a.	14.4%	Year	VW Return	10yr m.a.	14.4%	Year	VW Return	10yr m.a.	14.4%
1926	0.096			1954	0.503	Low <sub>2</sub>	Low <sub>2</sub>	1982	0.204	High <sub>2</sub>	High <sub>2</sub>
1927	0.333			1955	0.253	Low <sub>2</sub>	Low <sub>2</sub>	1983	0.227	Low <sub>2</sub>	Low <sub>2</sub>
1928	0.389		Low <sub>2</sub>	1956	0.085	High <sub>2</sub>	High <sub>2</sub>	1984	0.032	High <sub>2</sub>	High <sub>2</sub>
1929	-0.147		High <sub>2</sub>	1957	-0.104	High <sub>2</sub>	High <sub>2</sub>	1985	0.314	High <sub>2</sub>	High <sub>2</sub>
1930	-0.287		High <sub>2</sub>	1958	0.448	Low <sub>2</sub>	Low <sub>2</sub>	1986	0.156	Low <sub>2</sub>	Low <sub>2</sub>
1931	-0.444		Low <sub>2</sub>	1959	0.126	Low <sub>2</sub>	Low <sub>2</sub>	1987	0.018	High <sub>2</sub>	High <sub>2</sub>
1932	-0.085		Low <sub>2</sub>	1960	0.012	High <sub>2</sub>	High <sub>2</sub>	1988	0.176	Low <sub>2</sub>	High <sub>2</sub>
1933	0.575		Low <sub>2</sub>	1961	0.269	Low <sub>2</sub>	Low <sub>2</sub>	1989	0.284	Low <sub>2</sub>	Low <sub>2</sub>
1934	0.042		Low <sub>2</sub>	1962	-0.103	Low <sub>2</sub>	Low <sub>2</sub>	1990	-0.061	High <sub>2</sub>	High <sub>2</sub>
1935	0.448		High <sub>2</sub>	1963	0.209	High <sub>2</sub>	High <sub>2</sub>	1991	0.337	High <sub>2</sub>	High <sub>2</sub>
1936	0.322	Low <sub>2</sub>	Low <sub>2</sub>	1964	0.163	Low <sub>2</sub>	Low <sub>2</sub>	1992	0.091	Low <sub>2</sub>	Low <sub>2</sub>
1937	-0.346	High <sub>2</sub>	High <sub>2</sub>	1965	0.144	High <sub>2</sub>	High <sub>2</sub>	1993	0.116	High <sub>2</sub>	High <sub>2</sub>
1938	0.281	High <sub>2</sub>	High <sub>2</sub>	1966	-0.087	High <sub>2</sub>	High <sub>2</sub>	1994	-0.008	Low <sub>2</sub>	Low <sub>2</sub>
1939	0.021	Low <sub>2</sub>	Low <sub>2</sub>	1967	0.286	High <sub>2</sub>	High <sub>2</sub>	1995	0.357	Low <sub>2</sub>	Low <sub>2</sub>
1940	-0.075	High <sub>2</sub>	High <sub>2</sub>	1968	0.142	Low <sub>2</sub>	Low <sub>2</sub>	1996	0.212	Low <sub>2</sub>	Low <sub>2</sub>
1941	-0.096	Low <sub>2</sub>	Low <sub>2</sub>	1969	-0.108	High <sub>2</sub>	High <sub>2</sub>	1997	0.303	High <sub>2</sub>	High <sub>2</sub>
1942	0.163	Low <sub>2</sub>	Low <sub>2</sub>	1970	0.001	High <sub>2</sub>	Low <sub>2</sub>	1998	0.223	High <sub>2</sub>	High <sub>2</sub>
1943	0.280	Low <sub>2</sub>	Low <sub>2</sub>	1971	0.162	Low <sub>2</sub>	Low <sub>2</sub>	1999	0.253	High <sub>2</sub>	High <sub>2</sub>
1944	0.214	High <sub>2</sub>	High <sub>2</sub>	1972	0.173	Low <sub>2</sub>	Low <sub>2</sub>	2000	-0.111	High <sub>2</sub>	High <sub>2</sub>
1945	0.385	High <sub>2</sub>	High <sub>2</sub>	1973	-0.188	High <sub>2</sub>	High <sub>2</sub>	2001	-0.113	High <sub>2</sub>	High <sub>2</sub>
1946	-0.059	High <sub>2</sub>	High <sub>2</sub>	1974	-0.279	High <sub>2</sub>	High <sub>2</sub>	2002	-0.208	Low <sub>2</sub>	Low <sub>2</sub>
1947	0.034	High <sub>2</sub>	High <sub>2</sub>	1975	0.374	Low <sub>2</sub>	Low <sub>2</sub>	2003	0.331	Low <sub>2</sub>	Low <sub>2</sub>
1948	0.023	Low <sub>2</sub>	Low <sub>2</sub>	1976	0.268	Low <sub>2</sub>	Low <sub>2</sub>	2004	0.130	Low <sub>2</sub>	Low <sub>2</sub>
1949	0.200	Low <sub>2</sub>	Low <sub>2</sub>	1977	-0.030	High <sub>2</sub>	High <sub>2</sub>	2005	0.073	High <sub>2</sub>	High <sub>2</sub>
1950	0.300	Low <sub>2</sub>	Low <sub>2</sub>	1978	0.086	High <sub>2</sub>	High <sub>2</sub>	2006	0.162	High <sub>2</sub>	Low <sub>2</sub>
1951	0.208	High <sub>2</sub>	High <sub>2</sub>	1979	0.244	Low <sub>2</sub>	Low <sub>2</sub>	2007	0.073	Low <sub>2</sub>	Low <sub>2</sub>
1952	0.133	High <sub>2</sub>	High <sub>2</sub>	1980	0.332	High <sub>2</sub>	Low <sub>2</sub>	2008	-0.383	High <sub>2</sub>	High <sub>2</sub>
1953	0.004	High <sub>2</sub>	High <sub>2</sub>	1981	-0.040	High <sub>2</sub>	High <sub>2</sub>	2009		High <sub>2</sub>	Low <sub>2</sub>

'AllOrds' is an annual return series for 1926–2008 derived from the All Ordinaries Index monthly average prices downloaded from Wren Research. Thus the AllOrds annual returns exclude dividends. Although the exclusion of dividends reduces average returns, it has almost no effect on spreads because Low<sub>-2</sub> years and High<sub>-2</sub> years have almost the same average dividend yields. 'Core' is the standard MSCI Australian Core index. This is a large-cap total return index with annual returns from 1970. Essentially, MSCI picks stocks for inclusion in the Core index that have the largest market cap and greatest liquidity in each industry group, with the aim to include 85% of free float-adjusted market capitalisation in each industry group.

'Value' and 'Growth' are the standard MSCI Australian Value and Growth indices. These indices have annual returns beginning with 1975. They are constructed from the constituents of the standard MSCI Australia Core index, and each target 50% of the free float-adjusted market capitalisation of the Core index.<sup>2</sup> All these MSCI indices are local currency total return series that were downloaded from Datastream.

## Results

This section presents the results of the investigation into the predictability of the various Australian index series.

### Applying the US two-year effect

The results for the AllOrds and MSCI Core index are presented in Table 2. Panel A reports average returns in Low<sub>-2</sub> years and in High<sub>-2</sub> years, and the resulting spreads. The standard deviations of returns are listed in parentheses. Note that the classification of the years as either Low<sub>-2</sub> or High<sub>-2</sub> in Panel A is the US VW classification listed in Table 1 for the 10-year moving average method of threshold estimation. Given the existence of the US two-year effect, if the Australian market is sufficiently contemporaneously correlated with the US market then Australian returns should be higher on average in US Low<sub>-2</sub> years than in US High<sub>-2</sub> years.

For the AllOrds over the period 1936 to 2008, the average of the Low<sub>-2</sub> returns is 13.15%, whereas the average of the High<sub>-2</sub> returns is just 2.79%. This produces a remarkable spread of 10.36% that is significant at the 5% level. Interestingly, the higher average return in the

TABLE 2: Australian index spreads

Predicted Portfolio Years	Low <sub>-2</sub> years		High <sub>-2</sub> years		Spread (%)
	Av. Return %	N	Av. Return %	N	
<b>Panel A: Classification using VW returns and 10yr m.a. thresholds</b>					
AllOrds 1936–2008	13.15 (17.4)	33	2.79 (19.5)	40	10.36**
AllOrds 1970–2008	16.20 (20.7)	17	2.08 (23.9)	22	14.11*
MSCI Core 1970–2008	20.02 (23.4)	17	6.51 (24.1)	22	13.51*
<b>Panel B: Classification using VW returns and 14.4% threshold</b>					
AllOrds 1928–2008	13.74 (17.4)	40	1.01 (18.6)	41	12.74***
AllOrds 1970–2008	16.22 (22.2)	19	0.65 (22.4)	20	15.57**
MSCI Core 1970–2008	19.61 (24.7)	19	5.55 (22.8)	20	14.06*
<b>Panel C: Sub-period AllOrds spreads, 14.4% threshold</b>					
1928–37	16.38	6	-9.87	4	26.25**
1938–47	1.75	4	4.71	6	-2.96
1948–57	9.49	5	-1.19	5	10.68
1958–67	11.61	5	7.71	5	3.90
1968–77	13.24	6	-11.55	4	24.78**
1978–87	45.04	4	0.68	6	44.36***
1988–97	3.95	5	13.03	5	-9.08
1998–2008	11.91	5	-0.53	6	12.44

Note: Return standard deviations are presented in parentheses. One, two and three asterisks denote significance at the 10, 5 and 1% levels, respectively.

Low<sub>-2</sub> years is not accompanied by higher volatility. The standard deviation in the Low<sub>-2</sub> years of 17.4% is slightly less than the 19.5% standard deviation in the High<sub>-2</sub> years. This suggests that there is no simple risk-based explanation for the higher average returns in Low<sub>-2</sub> years. The next row in Table 2 looks at the most recent half of this sample. Although not significant at the 5% level, the 1970–2008 spread of 14.11% suggests that the second half of the 1936 to 2008 data contributes at least as much to the observed predictability as does the first half. The MSCI Core spread of 13.51% for 1970–2008 is very similar to the corresponding AllOrds spread. (Note, however, that MSCI average returns are larger than the corresponding AllOrds averages, partly due to the exclusion of dividends in the AllOrds returns.)

The 14.4% threshold in Panel B produces larger and more significant spreads than those in Panel A. The AllOrds spread of 12.74% over 1928 to 2008 is significant at the 1% level. While capital gains average 13.74% in Low<sub>-2</sub> years, they only average a tiny 1.01% in High<sub>-2</sub> years. This means that for the 40 High<sub>-2</sub> years, investors are effectively receiving dividends but no capital growth. The AllOrds 15.57% spread for 1970–2008 is significant at the 5% level, while the MSCI Core 14.06% is not. Overall, Panels A and B show that Australian equity returns are predictable from the CRSP US value-weighted return from two years earlier.

Making use of this form of predictability does not come without risk. A fund manager who wishes to take advantage of the two-year effect by tilting allocations towards equity in Low<sub>-2</sub> years (and away in High<sub>-2</sub> years) will not outperform in every period. Panel C of Table 2 gives average returns and spreads by decade for the years 1928–97, and for the 11 years from 1998 to 2008. Although significance is indicated in some cases, there should not be

any expectation of statistically significant results because these spreads involve only 10 observations. Since two out of the eight spreads in Panel C are negative, it is clear that market timing strategies based on the US two-year effect will produce periods of underperformance even if they are profitable in the long term.

### *Does Australia have its own two-year effect?*

Given the existence of the US two-year effect, it is worth testing whether Australia has its own two-year effect. This possibility is investigated in this section by testing whether the All Ordinaries Index return from two years earlier has any predictive ability. For the purposes of this analysis, the definition of Low<sub>-2</sub> and High<sub>-2</sub> years is determined by the AllOrds return from two years earlier. That is, the year is designated as a Low<sub>-2</sub> year if the AllOrds return from two years earlier is less than the current threshold value, otherwise the year is designated a High<sub>-2</sub> year.

The results are as follows. If the 10-year moving average threshold method is used, the 1936–2008 AllOrds spread is an insignificant 2.58%. If we use the 1926–2006 AllOrds median return (7.21%) as the threshold, the 1928–2008 AllOrds spread is an insignificant 5.75%. A number of other threshold estimation methods were also tried, and none produced either large or significant spreads. Consequently, at this stage there is no significant evidence that Australia has its own two-year effect.

### *Value and Growth predictability*

Given that growth stocks tend to be more difficult than value stocks to value, we expect that growth stocks are more susceptible to market upswings and downswings. Since there is no evidence of a significant Australian two-year effect, this section investigates the extent to which Australian growth and value stocks are predictable from

TABLE 3: 1975–2008 Australian MSCI index spreads

Predicted Portfolio Years	Low <sub>-2</sub> years		High <sub>-2</sub> years		Spread (%)
	Av. Return %	N	Av. Return %	N	
<b>Panel A: Classification using VW returns and 10yr m.a. thresholds</b>					
MSCI Value	21.91 (25.9)	15	14.71 (24.1)	19	7.20
MSCI Core	22.16 (23.8)	15	11.22 (22.5)	19	10.94
MSCI Growth	22.97 (25.5)	15	7.60 (22.5)	19	15.37*
<b>Panel B: Classification using VW returns and 14.4% threshold</b>					
MSCI Value	23.15 (25.4)	16	13.21 (23.9)	18	9.94
MSCI Core	23.99 (23.6)	16	8.99 (21.4)	18	15.01*
MSCI Growth	25.10 (25.0)	16	4.85 (20.8)	18	20.25**

Note: Return standard deviations are presented in parentheses. One, two and three asterisks denote significance at the 10, 5 and 1% levels, respectively.

the US market return from two years earlier. The analysis uses the MSCI Growth and Value indices to represent Australian growth and value stocks. For these indices, the available annual returns cover the years 1975 to 2008. As there are only 34 observations to be split into two groups, only very large spreads can be expected to have statistical significance. Table 3 results are for the years 1975–2008, while its Low<sub>-2</sub> and High<sub>-2</sub> years are the US VW classifications of years as Low<sub>-2</sub> or High<sub>-2</sub> from Table 1. Panel A of Table 3 is based on 10-year moving average thresholds. Although the MSCI Growth spread is remarkably large (15.37%), it is only statistically significant at the 10% level. As expected, the Growth spread of 15.37% is considerably larger than the MSCI Value spread of 7.20%. Neither the Value nor the Core spreads are statistically significant, even though the Core spread is large (10.94%) enough to be economically significant.

Panel B of Table 3 is based on the 14.4% threshold for determining whether the US market return from two years earlier is low or high. All Panel B spreads are larger than the corresponding spreads in Panel A. The extremely large Growth spread of 20.25% is significant at the 5% level. The MSCI Core spread is large (15.01%) but only weakly significant. On the other hand, the Value spread of 9.94% is not statistically significant. Overall, Table 3 shows that Australian growth stock returns over the period 1975–2008 are more influenced by the US two-year effect than are value stocks.

## Conclusion

This paper has three main findings. Firstly, there is strong evidence that Australian equity market returns can be predicted from US market returns from two years earlier. Secondly, the Australian market return from two years previously has little predictive ability. As a consequence, it appears that the observed Australian predictability is the result of the US two-year effect combined with the contemporaneous correlation between the US and Australian equity markets. The third finding is that Australian growth stocks are more influenced by the two-year effect than are value stocks.

**Making use of this form of predictability does not come without risk. A fund manager who wishes to take advantage of the two-year effect by tilting allocations towards equity in Low<sub>-2</sub> years (and away in High<sub>-2</sub> years) will not outperform in every period.**

The outlook for Australian equities in 2009 is currently of particular interest. As the final entry in Table 1 indicates, the two competing methods for determining the threshold give conflicting classifications (High<sub>-2</sub> and Low<sub>-2</sub>) for 2009. This conflict arises because the 7.3% VW return in 2007 is high relative to the 1999–2008 moving average return, but is low relative to the 14.4% threshold. Since a 7.3% VW return is not a high VW return from an historical perspective, and since the 14.4% threshold has produced larger spreads in the past than has the 10-year moving average method, 2009 should be viewed as a Low<sub>-2</sub> year. This suggests a positive 2009 outlook for equity markets both in Australia, and in the United States.

There are many ways that fund managers and investors could modify their investing strategies to take advantage of the influence of the US two-year effect. Balanced funds could adopt a strategy of increasing their allocations to equity in Low<sub>-2</sub> years and reducing their equity allocations in High<sub>-2</sub> years. Bornholt (2008) reports substantial economic benefits from applying a similar approach in the US market. Similarly, investors that use covered call writing strategies could also modify their current practices to take advantage of the differing upside potential in Low<sub>-2</sub> years and High<sub>-2</sub> years. Of course, such modifications presuppose that the US two-year effect will continue in the future, and that it will continue to influence the Australian market. ☺

## Notes

- 1 These VW returns can be derived from the market excess returns and the risk-free returns freely available on Kenneth French's website.
- 2 Rules for inclusion in the Growth and Value indices have evolved over time and are now based on a two-dimensional multifactor approach.

## References

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