Australian Stock Market Anomalies:
A Review and Re-examination of the January and Small Firm Effects

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INTRODUCTION
Since the early 1980s an extensive literature has arisen documenting the existence of so-called market anomalies. Empirical researchers are well versed in regularities like the January seasonal, the size effect, medium-horizon momentum and longer-horizon reversals. Australia is no exception with a sizeable empirical literature investigating common anomalies. While, in general, Australian equity markets display many of the features of global anomalies, there are also subtle distinctions and peculiarities.

The current study has several objectives. The first is to review the existing empirical evidence relating to two common market anomalies in the Australian equities market; specifically, the small firm and seasonality effects. Second, the paper reexamines these anomalies using the most recent data available. As such, the empirical analysis represents the most up-to-date results on these Australian market anomalies and serves as a reference point for comparison, verification and extension of future work.

The paper proceeds as follows. We first examine seasonal patterns in equity returns, with particular interest in January turn-of-the-year effects and July tax-related effects before then exploring the small firm effect, where low market capitalisation stocks seemingly outperform high market capitalisation stocks. Since prior research suggests interdependency between size effects and seasonality, the section on interactions between seasonality and size effect investigates a possible interaction/spillover of these anomalies.

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SEASONALITY

A number of seasonal patterns have been documented in equity returns. By far the most notable is the so-called January (or turn of the year) effect. Rozeff and Kinney (1976) document a January seasonal effect in monthly returns to US stocks; specifically, over long periods of time, average returns in January are significantly higher than average returns in other months. Subsequent studies show that the January effect is pervasive in most international equity markets (see Bouman and Jacobsen, 2002).

Attempts to explain the January effect center on tax-loss selling. Given the December tax year end in the United States, it is plausible that stocks that have declined during that year are sold off prior to the tax year end to establish capital losses for income tax purposes. This selling pressure may lead to December returns being low or negative. However, in the new year, stocks that have been sold off the previous month recover to equilibrium levels and generate large positive returns.1

There are some obvious ways to test the tax-loss selling explanation. First, the January “bounce” is most likely to occur for stocks that suffered a decline in the previous year. However, Reinganum (1983) reports high January returns for all stocks, including those that experienced a capital gain in the prior year. Second, the tax loss selling explanation has no basis in countries whose tax year differs from the US (Australia, for example). As we report below, existing evidence suggests that there is a strong January effect in Australia.

Australian evidence

Several early papers established the presence of seasonalities in Australian equities. On a limited data set, Praetz (1973) reported peaks in January-February and July-August, and troughs in March-April and November-December. Officer (1975) reaches similar conclusions over the 1958-1970 period. With a 30 June tax year end, Brown, Keim, Kleidon, and Marsh (BKKM) (1983) note that there is no reason to expect an Australian January effect on the basis of tax laws. Like US studies, however, BKKM report a large January seasonality in Australian equities over the 1958-1981 period. In addition, and arguably consistent with tax explanations, BKKM find a large positive seasonal effect in July. Gaunt, Gray, and McIvor (GGM) (2000) confirm the existence of January and July seasonalities across the 1974-1997 period, although there is a suggestion that the result is driven by the first half of that period.

Current findings

Before presenting our seasonality results, it is instructive to first consider some of the defining characteristics of the data that will be employed in the current paper. Empirical results relating to seasonality and size effects are based on the Australian Graduate School of Management (AGSM) Center for Research in Finance (CRIF) database. The CRIF database contains monthly data for all Australian Stock Exchange (ASX) listed stocks from January 1974 through December 2006 (396 monthly observations).

In addition to individual stock data, CRIF supplies both equally weighted (EW) and value weighted (VW) market indices. Since the Australian equity market is dominated by a relatively small number of large market cap stocks, the VW index can be viewed as reflecting the Top 100 (or arguably Top 200) listed stocks.2 As such, results pertaining to the VW index might be viewed as more genuinely attainable (the stocks that drive the VW market are large, highly visible, and frequently traded). In contrast, small stocks have a disproportionate effect on any EW market index and this is particularly true in the Australian market. One does not have to move too far out of the Top 200 or 300 stocks to encounter problems relating to non-trading and market microstructure issues.

Table 1 Panel A reports summary statistics for the VW and EW market indices. Over the 1974-2006 period, the average monthly return to VW and EW indices was 1.26 per cent and 2.20 per cent respectively. On an annualised basis, this implies average compounded returns of around 16 per cent and 30 per cent on the VW and EW indices respectively. While the former is plausible, it is difficult to believe that one could genuinely capture returns of 30 per cent per annum consistently over a thirty-year period. We will make further comments on this shortly.

These stylised facts from the Australian equity market are important in the context of any examination of market anomalies. We highlight them early in our review because, as subsequent analysis shows, the characteristics of the various market indices can have a major impact on apparent “evidence” of common anomalies.

Turning now to seasonality in market returns, Table 2 Panel A reports average returns by month to the VW and EW market indices. A graphical depiction appears in Figure 1. Considering the VW index first, it is difficult to conclude that either a January or July seasonality exists. Average returns in January and July are amongst the highest, but April and December are also strong. Similar conclusions can be found in McIvor (1998) and, to a lesser extent, BKKM (1983). June stands out as the worst performing month on average.

Having said this, it is dangerous to draw conclusions by simply eye balling the data. Despite the apparent seasonalities in the VW index, an F-test of the equality of mean returns across all months cannot be rejected (F = 1.08). To help understand this, Figure 2 plots all VW market returns over the 1974-2006 period, grouped by month. While average returns in months like January and July are high, it is obvious from Figure 2 that there is considerable return variation in these months (the high standard deviations in Table 1 confirm this). As a result of this variation, there is no statistical evidence that average VW market returns differ across months.

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1 This recovery could simply be due to the absence of intense selling pressure experienced in the prior month. In addition, investors might even re-purchase these stocks if they are viewed as long-term prospects.

2 As at December 2006, the Top 20, Top 50, Top 100, and Top 200 stocks accounted for 45 per cent, 64 per cent, 78 per cent and 89 per cent of the total market cap respectively. Accordingly, the remaining stocks outside the Top 200 (approximately 1600 stocks) contribute very little to the VW market index. The similarity of summary statistics in Table 1 for the VW market and the largest decile portfolio confirm this conjecture.
Table 2 Panel A and Figure 1 suggest that seasonality is more
prominent in the average returns to the EW index. Clear
seasonal effects appear in January and July (and possibly August),
yet the April and December effects suggested by VW market
returns are absent. Nonetheless, while standard deviations
on average EW returns are again relatively high, the F-test of
equal mean returns across all months is rejected. Thus, there
is statistical support for the existence of seasonal effects in EW
market returns. The findings for the EW index are consistent
with those reported by McIvor (1998), with BKKM (1983) not
examining the EW index.

In summary, despite the graphical “evidence” of apparent
seasonality in market returns, statistical support exists only in
relation to the EW market index. Since this index is dominated
by small cap stocks, this suggests that seasonality may be
limited to small stocks. This possibility is explored further in
Section 4.

SIZE EFFECT

The size effect (or small firm effect) was discovered by Banz
(1981). In testing the CAPM’s prediction that beta was
sufficient to explain cross-sectional variation in stock returns,
Banz reported a negative relationship between average returns
and firm size, even after controlling for beta risk. That is, small
(large) stocks exhibit returns higher (lower) than their beta risk
justifies. The size effect has been confirmed in many subsequent
studies, including Reinganum (1983), Brown, Kleidon and

Explanations of why small stocks earn seemingly excessive
returns are based on the notion that small firms have additional
risks not captured by the traditional beta measure (for example,
a distress factor or an illiquidity premium). Nonetheless, its
magnitude and consistency has had a clear effect on asset
pricing and investment practice. For example, one of the priced
risk factors in the Fama and French (1993) three-factor model
relates to the differential between average returns on small and
large market cap stocks. Further, in practice, we have seen the
relatively recent advent of small cap funds that rely (in part) on
the size effect.

Australian evidence

The Australian equity market contains a disproportionate
number of small stocks and it comes as no surprise that a clear
size effect has been documented in Australian equity returns.
BKKM (1983) report average monthly returns to the decile of
smallest (largest) stocks of 6.75 per cent (1.02 per cent) over the
the existence of a size effect over the 1974–1984 period, and
report that it is remarkably robust to a variety of data and
econometric issues (eg. calculation of abnormal returns, new
issue bias, survivorship bias, portfolio reconstitution). McIvor
(1998) re-enforces the magnitude of the size effect in Australia.
Similar to BKKM, McIvor reports an average monthly return
of 8.8 per cent to the smallest decile of stocks over the 1974–
1997 period. The second decile averages 4.8 per cent per
month and the returns decrease (near) monotonically through
to the decile of largest stocks which average 1.3 per cent per
month. GGM (2000) also document a clear size effect, after
controlling for differences in share price (which are expected
to have a separate effect).

Current findings

To examine the size effect, individual stocks are grouped into
ten size portfolios, determined by each stock’s relative market
capitalisation. Specifically, starting December 1973, all stocks
are ranked by market cap and sorted into decile size portfolios.
Stocks remain in their designated portfolio for 12 months
and average returns to each size portfolio are calculated for
January–December 1974. At the end of December 1974, stocks
are re-ranked and size portfolios reformed. This procedure is
repeated each December throughout the full sample.

Table 1 Panel B reports summary statistics for returns to size
portfolios, while Figure 3 plots the same results. Examining
mean returns, a size effect is apparent – average monthly returns
are highest for the portfolio of small stocks (8.44 per cent),
and then decrease near monotonically as firm size increases. A
series of F-tests is performed on the null hypothesis of equal
mean returns across size portfolios. The null is convincingly
rejected on each test until the smallest three size portfolios are
excluded; the equality of mean returns on portfolios 4 through
10 cannot be rejected.

Arguably, focusing on median returns may be more appropriate
given the presence of some extreme outliers in the portfolios of
smaller stocks. For example, the maximum monthly return to
the small portfolio is 93 per cent, and naturally this influences
the mean. Examining median returns, Table 1 and Figure 3
still suggest a size effect, although the magnitude is reduced
compared to mean returns. Kruskal–Wallis tests on the null
of equal medians are rejected until the smallest two portfolios
are excluded.

Table 1’s average returns to size portfolios are not dissimilar
to previous findings. McIvor (1998) reports average returns to
the first four size portfolios of 8.8 per cent, 4.8 per cent, 3.1
per cent and 2.3 per cent respectively. Similarly, BKKM (1983)
report average returns of 6.75 per cent, 2.23 per cent, 1.74 per
cent and 1.32 per cent respectively.

3 This raises some interesting questions. Is there a plausible reason for why small cap stocks perform modestly in April and December? Or do large cap stocks perform particularly well in April and December?
4 Similarly, a Kruskal-Wallis test (not explicitly reported) for equality of median returns is rejected (accepted) for the EW (VW) indices.
5 Extreme returns are more likely to occur for small stocks, especially those with low share prices. For example, should a stock with a 5 cent share
price jump to 10 cents, the monthly return is 100 per cent. However, the extent to which such a return can be captured in practice is questionable,
since small stocks are notoriously thinly-traded in Australia.
6 Although not relevant to this paper’s examination of small firm and seasonal anomalies, Table 1 Panel B reports the betas of each size portfolio,
calculated relative to the VW and EW market indices. The difference is striking. Corporate finance professionals working with betas estimates in
cost of capital calculations should be wary of calculating betas relative to an EW market index.
From a practical perspective, an obvious question is whether average returns of 8 per cent per month are genuinely attainable by investing in the portfolio of smallest stocks on the ASX? After all, 8 per cent per month cumulates to over 150 per cent per annum and that defies belief. To answer such a question, more information is required about the characteristics of typical stocks assigned to deciles portfolios, especially the small market cap portfolios. Table 3 reports the market cap cutoffs for assignment to size portfolios at a selection of dates throughout the sample. For example, in December 1973, the smallest size portfolio contained stocks with market cap less than $220,000. Further, any stock with market cap exceeding $31m was classified in the largest market cap portfolio. These cutoffs change over time, but it is readily apparent that at least the first 5-6 decile size portfolios are populated by stocks that (by global standards) would be regarded as small stocks. Even in December 2006, a stock with only $77m market cap would be assigned to size portfolio 7 (amongst the “larger” stocks).

Given concerns over the “investibility” in small-stock portfolios, the feasibility of an investment strategy based on the size effect is explored as follows. The process of forming decile size portfolios is repeated using various subsets of the full population of stocks that might be regarded as more investible. For example, if size portfolios are formed using the Top 1000 stocks, does a size effect remain? Similarly, size portfolios can be formed using the Top 500 or Top 300 stocks (producing size portfolios each containing 50 and 30 stocks respectively). From an investment perspective, portfolios containing fewer stocks are more practical. Thin trading problems are also mitigated when only large cap stocks are considered.

Summary statistics are not reported, but Figure 4 shows the average return to decile size portfolios for four sets of stocks – all listed stocks, the Top 1000, the Top 500 and the Top 300 stocks by market capitalisation. The scale on the vertical axis is identical in each plot to facilitate comparison. The obvious conclusion is that, when the set of stocks examined is restricted to those that might feasibly be included in an investment strategy; there is no discernible size effect. For the Top 500 or Top 300, F-tests (not shown) cannot reject the null hypothesis that average returns are equal across size portfolios.

This finding is interesting in light of the explanations given for the size effect. Even restricting the analysis to the Top 500 stocks, the composition of the Australian equity market is such that the smallest decile still contains what would be regarded globally as small stocks. That no discernible size effect is present suggests that the apparent size effect in the full population may be driven by microstructure issues relating to extremely small stocks – stocks that are unlikely to be feasible in investment practice.

To summarise, using a typical approach of examining mean returns to decile portfolios formed on market capitalisation, there appears to be a clear size effect in Australian equities. The size effect is less pronounced when examining median returns, which are less sensitive to outliers. Further, restricting the focus to the subset of stocks that realistically might be considered investible, little evidence of a size effect remains.

INTERACTIONS BETWEEN SEASONALITY AND SIZE EFFECT

The size and January effects were discovered around the same time (early 1980s) and researchers were quick to explore interactions between them. Keim (1983) shows that the size effect is most pronounced in January, this suggests a possible spillover of the January anomaly to the size effect. Reinganum (1983) provides further support for this spillover.

Australian evidence

Examining the 1958-1981 period, BKKM (1983) find that the size effect exists across all months. They also show that the extent of the size effect is larger in January and July. McIvor (1998) clearly documents an interaction of size and seasonality in both raw and risk-adjusted returns. GGM (2000) also explore interactions between anomalies. Following a little known US study by Bhardwaj and Brooks (1992), GGM document that Australian returns are subject to separate small market cap and low share price effects. Naturally, stocks with relatively low share prices tend to also have relatively low market caps, therefore it is important to disentangle the two effects. GGM find that, controlling for difference in firm size, stocks with the lowest share prices earn the highest returns.

Throwing seasonality into this mix, GGM report some interesting results. While the size and price effects are prevalent throughout the year, there are some clear seasonabilities. For example, the portfolio containing stocks in the lowest market cap quintile and the lowest price quintile earns average monthly returns of 17.99 per cent in January, 22.50 per cent in July, and 9.46 per cent in other months.

Looking at other portfolios, the magnitude of these numbers diminishes as the market cap increases and/or the share price increases.
Current findings

To explore possible interactions between size and seasonal anomalies, Table 2 Panel B reports average returns to decile size portfolios (incorporating all listed stocks) by calendar month. Figure 5 reproduces the results graphically for easy analysis.

Examining Figure 5, the size effect is evident in virtually every month, but especially January, February, May, July and August. Even in June, where most size portfolios average negative returns, there is a small size effect between portfolios 1 and 2. Quantifying the size effect, Table 2 Panel B reports that returns to the smallest size portfolio in January and July average 16.99 per cent and 18.28 per cent respectively over the 1974-2006 period.

Reading down each column, the null hypothesis that average returns are equal across size portfolios for a given month is overwhelmingly rejected in every month except June, October and December. Given that suspicion exists over the large returns to small stocks, Table 2 also reports F-tests of equality of average returns across size portfolios 2 to 10, as well as 3 to 10. Removing the smallest portfolio, \( F_{2-10} \) detects a size effect only in January, February, July and August. Removing the smallest two portfolios, July and August are the only months with a size effect (see \( F_{3-10} \)).

Finally, we consider whether seasonality permeates the population of stocks, or is limited to small stocks. Recall that the results in Section 2 found signs of seasonality in the EW market index, but less clear evidence of seasonality in the VW market index. This suggests that seasonality is most likely to be found amongst smaller market cap stocks. Reading across each row of Table 2 Panel B (that is, controlling for differences in size), seasonality appears for most portfolios. F-tests of equal mean returns across calendar months are rejected for all but the largest two size portfolios.

CONCLUSIONS

We summarise the findings of this paper as follows. At the aggregate market level, it is difficult to conclude that seasonality exists. Despite apparent graphical “evidence”, there is no statistical evidence of differences across months in the VW market returns. While statistically significant seasonal patterns are reported in the EW market index, we are conscious of the disproportionate effect of small cap stocks in this index. Since small stocks are thinly traded and prone to microstructure bias when measuring returns, doubts exist over the economic significance of the observed seasonality.

With respect to the small firm anomaly, a clear size effect is evident when the entire population of Australian stocks is considered. The size effect is most pronounced for the bottom three market cap deciles. Again, questions exist over the investibility of stocks in these deciles. When the sample is truncated to stocks in the Top 500, little evidence of a size effect remains. This suggests that any attempt to profit from the small firm effect will require positions in stocks that may present severe liquidity constraints.

Further analysis suggests an interaction between size and seasonal anomalies. In the full sample, the size effect exists in most months (especially July). Similarly, seasonal patterns in returns are documented across all size portfolios, suggesting the existence of a seasonal effect independent of firm size.

REFERENCE LIST

### Table 1. Summary Statistics for Monthly Returns to Market Indices and Size Portfolios

Data are monthly returns from January 1974 through December 2006 (396 observations). AGSM supplies equally weighted (EW) and value-weighted (VW) market indices. Size portfolios are formed by ranking stocks annually into market capitalisation deciles. Betas for size portfolios are calculated relative to either the value weighted or equally weighted market index. F-tests (Kruskal-Wallis tests) are based on the null hypothesis that mean (median) returns across the indicated size portfolios are equal, with *** representing significance at the 1 per cent level.

#### Panel A: Market indices

<table>
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<tr>
<th>Summary statistics</th>
<th>Mean</th>
<th>Median</th>
<th>Std Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skew</th>
<th>Kurt</th>
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#### Panel B: Size portfolios

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<th>Mean</th>
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F-tests (Kruskal-Wallis tests) are based on the null hypothesis that mean (median) returns across the indicated size portfolios are equal, with *** representing significance at the 1 per cent level.

- $F_{10}$: 39***
- $F_{10}$: 12***
- $F_{5}$: 4***
- $F_{5}$: 1.58***
### Table 2. Average Monthly Returns to Market Portfolios and Size Portfolios (by Calendar Month)

Data are monthly returns from January 1974 through December 2006 (396 observations). AGSM supplies equally weighted (EW) and value weighted (VW) market indices. The standard deviation of monthly returns is reported in parentheses. Size portfolios are formed by ranking stocks annually into market capitalisation deciles. F-tests are for equality of mean returns, with ***, **, and * representing significance at 1 per cent, 5 per cent and 10 per cent levels.

#### Panel A: Market indices

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<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
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<th>Jul</th>
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<th>Nov</th>
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#### Panel B: Size portfolios

<table>
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<tr>
<th></th>
<th>X</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
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| F-test         | 9.35*** | 6.45*** | 3.25*** | 1.87* | 3.74*** | 1.33 | 13.88*** | 5.85*** | 3.31*** | 0.99 | 2.39** | 1.25 |
| **F2-10**      | 2.73*** | 2.01*** | 1.01 | 0.63 | 1.17 | 1.31 | 7.99*** | 2.58*** | 1.26 | 0.35 | 1.61 | 0.67 |
| **F3-10**      | 0.78 | 0.89 | 0.51 | 0.56 | 0.26 | 1.68 | 6.16*** | 1.65* | 0.37 | 0.25 | 1.13 | 0.32 |

### Table 3. Illustrative Market Cap Cutoffs for Decile Portfolios

Stocks are ranked by their market cap in December of the year indicated. Size portfolios are formed by assigning stocks into 10 portfolios. The numbers reported indicate the market cap cutoffs for decile portfolios for a range of years in the total sample.

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**FIGURE 1. SEASONALITY IN MARKET INDICES (1974-2006)**

**FIGURE 2. MARKET RETURNS BY MONTH (1974-2006)**

**FIGURE 3. MEAN AND MEDIAN RETURNS TO SIZE PORTFOLIOS (1974-2006)**
FIGURE 4. AVERAGE RETURNS TO SIZE PORTFOLIOS

FIGURE 4. INTERACTION OF SEASONALITY AND SIZE EFFECT (all asx stocks)