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Do corporate directors ‘heap’ dividends? Evidence on dividend rounding and information uncertainty in Australian firms

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Abstract
In this study, we examine the extent of dividend heaping in Australian firms between 1976 and 2015. Our findings show that 27.39% of dividends greater than or equal to 2.5-cents are heaped in 2.5-cent intervals, while 70.90% of dividends less than 2.5-cents are heaped in 0.25-cent intervals. We find that the heaping phenomenon decreases over time and average dividend size increases. We also show that when establishing the likelihood of dividend heaping, stock return volatility and firm size are consistent with the information uncertainty hypothesis. Dividend heaping also appears to be influenced by firm-level characteristics that are inconsistent with the hypothesis. For instance, the likelihood of heaping increases with dividend size and firm age.

JEL Classification: G02, G35

Keywords
Behavioral, directors, dividends, heaping, management, rounding

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1. Introduction

Dividend policy has been at the forefront of firm decision making for over four centuries. Firm directors are regularly confronted with the decision on whether to pay out a portion of their profits as cash dividends to shareholders. Moreover, if dividends are paid to shareholders, how much of the firm’s profits do directors distribute and how often? In this study, we contribute to a line of literature that investigates cognitive biases that impact corporate dividend decision making. Specifically, we attempt to establish whether decisions relating to dividend distributions are influenced by a behavioral bias known as numerical rounding or ‘heaping’.

Lin et al. (2011) state that heaping is a phenomenon in which reported numbers tend to appear in intervals or increments. Turner (1958: 248) infers that individuals will heap or “[o]verreport digits which are multiples of the divisors of the base of the number system and underreport digits which are not multiples of the divisors of the base of the number system”. Moreover, individuals will round to a convenient heaped measure when they are unsure of the correct value, even though the precise result is desired (Lin et al., 2011; Turner, 1958). Heaping has been reported in various surveys/censuses regarding human behavior and generally occurs when individuals are requested to stipulate a particular point estimate (e.g. number of glasses of wine per month, number of cigarettes per week, age in years, weight in kilos, etc.) (Myers, 1940). In their response, individuals tend to round to a proximate data point because of uncertainty about the number/s they are stating (Houle et al., 2013; Huttenlocher et al., 1990).

While the majority of heaping research to-date focuses on behavioral biases in demography and other social sciences (e.g. economics, psychology, sociology, statistics, etc.), there are limited studies that examine heaping in a financial context, particularly those relating to dividend distributions. Further, there are no studies which examine dividend heaping in an Australian context. Given that
investors show a strong appetite for dividends in Australia as a result of dividend imputation (or franking) credits\(^1\) (Ainsworth et al., 2016), it is important to examine if firm directors display a behavioral bias towards dividend heaping. Building on the work of Aerts et al. (2008), Houle et al. (2013) and Jakob and Nam (2016), the aim of this paper is to examine the extent of dividend heaping in Australian firms from 1976 to 2015. We hypothesize that when making dividend decisions, firm directors heap on certain dividend amounts and that heaping is influenced by firm-level characteristics related to information uncertainty.

Our findings show that 27.39\% of dividends greater than or equal to 2.5-cents are heaped in 2.5-cent intervals, while 70.90\% of dividends less than 2.5-cents are heaped in 0.25-cent intervals. Despite dividend heaping being more pronounced in the early parts of our samples, we find that the heaping phenomenon decreases over time and average dividend size increases. We also show that when establishing the likelihood of dividend heaping, stock return volatility and firm size are consistent with the information uncertainty hypothesis. Dividend heaping also appears to be influenced by firm-level characteristics that are inconsistent with the information uncertainty hypothesis. For instance, the likelihood of heaping increases with dividend size and firm age in Australian firms.

To the best of our knowledge, this study is the first to examine dividend rounding heuristics in Australia; thus, adding to the work of prior rounding/heaping studies (Aerts et al., 2008; Houle et al., 2013; Jakob and Nam, 2016) and making a valuable contribution to the international dividend policy literature. Our study is both timely and important, as we establish methods for assessing whether firm-level characteristics influence dividend heaping in Australian firms over time. It suggests that cognitive biases may exist in dividend decision making. Dividends are often used in making predictions about firm value and behavioral biases need to be accounted for in these predictions. It also shows that

\(^1\) Depending on individual taxation circumstances and the rate of franking set by the company, franking credits allow shareholders to reduce income tax payable on dividends or receive a tax refund (Ainsworth et al., 2016; Heaney, 2009).
dividend decisions have become more precise over time. The remainder of the paper is structured as
follows: Section 2 offers a review of the literature and introduces the research hypothesis. Section 3
explains the samples, variables and methods employed. Section 4 presents our empirical findings.
Section 5 discusses the implications of our findings and proposes suggestions for future research.

2. Literature review and hypothesis development

There is a longstanding academic debate about whether dividend policy is an important aspect of firm
management (Baskin 1988; Lin et al., 2017). Subsequently, there has been a myriad of academic papers
(Baker and Wurgler, 2004; Bhattacharya, 1979; Black, 1990; Booth and Chang, 2011; Choi et al.,
2011; Easterbrook, 1984; Fama and French, 2001; Gordon, 1959; Lin et al., 2017; Lintner, 1956, 1962;
Long, 1978; Miller and Modigliani, 1961; Pathan et al., 2016; Shefrin and Statman, 1984; Thaler and
Shefrin, 1981) that attempt to understand the factors that influence dividend policy. Lintner (1956)
claims that managers deem the dividend decision to be an important factor in determining firm value.
Lintner infers that managers work towards a long-term payout ratio for their dividend distributions and
corporate dividend decisions are made conservatively. Further, dividend policy is based on the
management view that the majority of shareholders prefer a relatively stable dividend and the market
values dividend constancy or gradual growth. Conversely, Miller and Modigliani (1961) create a
theoretical framework for dividend policy and state that the dividend decision is irrelevant when
establishing firm value. Fama and French (2001) also contribute to the dividend policy irrelevance
argument by showing that an increasing number of United States (US) firms are not paying dividends.
They claim that changing characteristics of listed firms (e.g. smaller ‘growth-orientated’ firms) and a
lower predisposition to offer distributions to shareholders is resulting in fewer firms capable of paying
cash dividends.
Yet, there are also a number of theories to suggest that dividend policy decisions do matter. Miller and Modigliani’s (1961) dividend clientele hypothesis states that tax rate heterogeneity leads to a ‘dividend clientele effect’. For example, investors with low (high) marginal tax rates will be attracted to firms with high (low) dividend payout ratios. On the other hand, agency cost theory hypothesis indicates that the persistent distribution of cash (via dividends) to shareholders is a form of discipline for managers that can help reduce agency costs (Easterbrook, 1984). While the information signaling hypothesis suggests that managers employ dividends as a credible ‘signal’ to mitigate asymmetric information between management and investors in relation to the future prospects of the company (Bhattacharya, 1979; Gunasekara and Power, 2002; Michayluk et al., 2017). For instance, Michayluk et al. (2017) study the dividend history of Australian firms to establish whether dividend increase signaling power varies with the frequency of repetition. They find that the first three consecutive dividend increases are associated with significantly positive abnormal returns, with subsequent increases not being significant. The authors also claim that repeating a dividend increase will eventually lead to further increases and weaken the value of subsequent increases by way of disseminating management's private information.

Behavioral theories also try to explain dividend policy based on investor and managerial biases. For instance, Long (1978) shows that investors’ appetite for dividends changes over time, while Baker and Wurgler (2004) imply that the decision to pay dividends is guided by existing investor sentiment for dividend payers. Baker and Wurgler (2004) further add that managers accommodate investors by paying dividends when investors place a stock price premium on payers and not paying dividends when investors favor non-payers. Several papers also explore investor-based psychological biases and how they influence dividend policy. The ‘bird-in-the-hand’ argument (Gordon, 1959; Lintner, 1962) proposes that investors must attain wealth to consume and therefore prefer cash dividends over capital
gains. Further, Black (1990), Shefrin and Statman (1984) and Thaler and Shefrin (1981) infer that dividends are a self-control mechanism for investors. They claim that without dividends, investors are enticed to sell stocks for the purpose of consumption and that dividends can actually be used to help investors pace consumption. There is also evidence to suggest that price clustering is common in financial markets, with some prices being observed more often than others and certain digits seen to be more attractive than others (Aitken et al., 1996; Brooks et al., 2013; Brown et al., 2002; Christie and Schultz, 1994; Cooney et al., 2003; Goodhart and Curcio, 1991; Grossman et al., 1997; Harris, 1991; Niederhoffer, 1966). Brooks et al. (2013: 683) claim that “[i]n sophisticated financial markets such clustering behavior is explained by either cultural/behavioral features or transaction cost explanations related to reducing negotiating costs or risks”.

In more recent times, financial studies (Bamber et al., 2010; Dechow and You, 2012; Herrmann and Thomas, 2005; Lin et al., 2011; Zhou, 2010) have explored the heaping or ‘rounding’ phenomena in earnings forecasts/reporting and dividend distributions. For instance, Lin et al. (2011) investigate the presence of heaping in monthly earnings reports for publicly listed firms in Taiwan and suggest that managers are susceptible to heuristic biases. They find that Taiwanese companies appear to report monthly earnings in increments of 5 in the first two digits of earnings numbers. In the US, Herrmann and Thomas (2005) and Zhou (2010) examine heaping in corporate earnings per share (EPS) forecasts and reveal that analyst forecasts of EPS occur in US$0.05 (or nickel) intervals at a higher frequency than actual EPS. Herrmann and Thomas (2005) also provide evidence that analysts who round their EPS forecasts to nickel intervals display traits of analysts who exercise less effort, are poorly informed, and have scarce resources. Also, heaped EPS forecasts are less accurate and the negative relationship between rounding and forecast accuracy increases as the interval rises from US$0.05 to US$0.10, US$0.25, US$0.50 and US$1.00.
Dechow and You (2012) also explore US analysts’ tendency to heap EPS forecasts. They show that analysts engage in heaping more often for larger earnings amounts where the US$0.01 interval of the forecast is of lower economic significance. By rounding, analysts reveal that their forecasts are not intended to be precise and that analyst incentives impact the likelihood of heaping. They also suggest that analysts exert less effort forecasting earnings for firms that generate less brokerage or investment banking business since such firms create less value for the analysts’ employers. As a consequence of this reduced effort and attention, the analyst will be more uncertain about the penny digit of the forecast and so will heap. Bamber et al. (2010) report a similar phenomenon with US corporate managers’ EPS forecasts. They find that managers are likely to heap EPS when: (1) there is more uncertainty surrounding earnings; (2) there are higher proprietary information costs associated with the firm; and (3) there are greater incentives to bias forecasts upwards, particularly when it is deemed problematic to assess the truthfulness of their forecasts. Bamber et al. (2010) indicate that heaping in EPS forecasts comes not only from a manager’s behavioral response to uncertainty, but also from strategic incentives.

In the case of dividend distributions, Aerts et al. (2008) suggest that observed quarterly dividend rounding in the US is due to the theory of cognitive reference points. Accordingly, a dividend per share (DPS) of US$1.00 will be regarded by investors as being significantly larger than a DPS of US$0.99, although the difference only amounts to a negligible US$0.01 (or penny). Namely, based on the expectancy that investors will generally place greater emphasis on the first digit of the DPS, managers will be enticed to set the DPS at or just above a cognitive reference point to make the DPS appear larger (or to be of greater value). Aerts et al. (2008) imply that prices in a supermarket are treated in a manner similar, but in the opposite direction to DPS. For instance, in the supermarket products are often priced at US$0.99 because a cognitive reference point suggests it looks smaller (or cheaper) to consumers than US$1.00.
Jakob and Nam (2016) also find evidence of quarterly DPS rounding in the US. They show that between 1926 and 2015, 51.40% of quarterly DPS are rounded in 2.5-cent intervals using a simple heaping behavioral bias and that heaping has declined over time. Managers who heap in 2.5 cent-intervals decide upon the size of their quarterly dividends based on the annual dividend amount rather than the actual quarterly dividend distribution. That is, managers appear to be using the behavioral heuristic of heaping at annualized 10-cent intervals for selecting their quarterly dividend size. Also, heaped dividends change less frequently than non-heaped dividends, and if there is a dividend change it is often an increase or decrease to another heaped amount. Jakob and Nam (2016) further claim that the likelihood of dividend heaping increases with information uncertainty (particularly in relation to metrics such as stock return volatility). We test this in the Australian context. Therefore, using an approach similar to Aerts et al. (2008), Houle et al. (2013) and Jakob and Nam (2016), we hypothesize that when making dividend decisions, firm directors heap on certain dividend amounts and that heaping is influenced by firm-level characteristics related to information uncertainty:

Hypothesis: The likelihood of dividend heaping is higher in smaller and younger Australian firms that have greater information asymmetry and pay smaller dividends.

3. Data and methods

3.1. Sample
Dividend, stock return and firm-level financial data are obtained from the Morningstar DatAnalysis database. We identify all Australian dollar cash dividends (including special dividends) paid by ASX-listed firms with ex-dividend dates between April 1976 and December 2015, providing us with a sample of 23,346 observations. For DPS greater than or equal to 2.5-cents, dividends are considered ‘heaped’ if their amounts are observed at 2.5-cent intervals ($0.025, $0.05, $0.075, $0.10, etc.). These heaped dividend observations are then split into three categories: (1) 2.5-cent increments ($0.025,
$0.075, $0.125, $0.175 etc.); (2) 5-cent increments ($0.05, $0.15, $0.25, $0.35, etc.); and (3) 10-cent increments ($0.10, $0.20, $0.30, $0.40, etc.). For DPS less than 2.5-cents, dividends are deemed to be heaped if their amounts are observed at 0.25-cent intervals ($0.0025, $0.005, $0.0075, $0.01, etc.). These heaped dividend observations are also divided into three categories: (1) 0.25-cent increments ($0.0025, $0.0075, $0.0125, $0.0175, and $0.0225); (2) 0.5-cent increments ($0.005 and $0.015); and (3) 1-cent increments ($0.01 and $0.02). Any DPS that do not fit into the above categories are considered ‘non-heaped’. Finally, due to the reported size differences between small and large DPS in Australia and the availability of firm-level data (e.g. January 1991 to December 2015), the full sample is further divided into two sub-samples. Sub-sample one consists of 13,369 DPS that are greater than or equal to 2.5-cents and sub-sample two is comprised of 3,442 DPS that are less than 2.5-cents.

3.2. Variables
The metrics employed are: (1) $1/DPS_{ijt}$, inverted dividend per share (DPS); (2) $Ret_{ijt+1}$, forward returns; (3) $Ret_{ijt-5,ijt-1}$, accumulated returns; (4) $1/MV_{ijt}$, inverted firm size; (5) $MTA_{ijt}$, firm growth; (6) $1/Age_{ijt}$, inverted firm age; (7) $Sigma_{ijt}$, stock return volatility; (8) $DivYield_{ijt}$, dividend yield; and (9) $DivPay_{ijt}$, dividend payout. Note: using an approach similar to Zhang (2006), we construct the metrics in such a way that a higher value corresponds to greater information uncertainty. Specifically, we invert DPS, firm size and firm age to remain consistent with this approach. The first measure, $1/DPS_{ijt}$, or inverted dividend size, is measured in Australian dollars and cents and exclusive of franking credits.

The second and third measures are based on stock returns. $Ret_{ijt+1}$ represents forward looking returns from month t+1 and $Ret_{ijt-5,ijt-1}$ signifies accumulated returns from months t-5 to t-1. Both variables are measured in percent. Note: we used log transformation and winsorising at p0.01 for the accumulated returns to make the variable less prone to large fluctuations. Also, unlike Zhang (2006), we chose a less restrictive estimation of accumulated returns. For instance, using Zhang’s approach would have
restricted our observations by 11 return observations. We changed this to allow for a minimum of five
return observations prior, which essentially provided more observations to work with. The fourth
measure, $1/MV_{ijt}$, or inverted firm size, represents the inverse of market capitalization (in ten thousands
of Australian dollars) on the ex-dividend date. Zhang (2006) claims that large firms have more
information available and are more diversified in general. Since investors may have fixed costs of
information acquisition, larger firms may be considered more attractive. Further, Dechow and You
(2012) argue that firm size has the potential to increase or decrease heaping.

The fifth measure, $MTA_{ijt}$, or firm growth, establishes growth opportunities by comparing a firm’s
market value to the book value of its assets. This variable is measured as the ratio of market
capitalization to the book value of assets and provides an indication of whether a firm is growth or
value orientated (Zhang, 2006). The sixth measure, $1/Age_{ijt}$, or inverted firm age, signifies the
difference between the ex-dividend date and the founding year of the firm. This variable is measured
in years and establishes whether older (newer) firms encounter less (greater) information uncertainty
(Zhang, 2006). The seventh measure is $\Sigma_{ijt}$, or stock return volatility, and is measured by the
standard deviation of monthly stock returns in the past year (Zhang, 2006). This variable is measured
in percent. The eighth measure is $DivYield_{ijt}$, or dividend yield, which indicates the Australian dollar
amount per share a company pays out in dividends each year relative to its share price. The ninth and
final measure is $DivPay_{ijt}$, or dividend payout, which measures the Australian dollar amount per share
a company pays out in dividends each year relative to earnings per share (EPS).

3.3. Methods
First, we establish the existence of dividend heaping as a pre-requisite condition of our hypothesis
testing. By including relevant firm-level metrics, we can then verify whether each metric helps to
explain the probability of heaping. To determine if dividend heaping is influenced by firm-level
characteristics related to information uncertainty, we use probit regressions with industry and year fixed effects (see Dechow and You, 2012):

\[
Prob(\text{Heaping Dummy}_{ijt} = 1) = F\left( \beta_0 + \beta_1 \frac{1}{\text{DPS}_{ijt}} + \beta_2 \text{Ret}_{ijt+1} + \beta_3 \text{Ret}_{ijt-11,ijt-1} + \beta_4 \frac{1}{\text{MV}_{ijt}} + \\
\beta_5 \text{MTA}_{ijt} + \beta_6 \frac{1}{\text{Age}_{ijt}} + \beta_7 \text{Sigma}_{ijt} + \beta_8 \text{DivYield}_{ijt} + \beta_9 \text{DivPay}_{ijt} + \eta_j + \delta_t + \epsilon_{ijt} \right) 
\]

where the independent variables are the firm-level metrics (as specified previously in Section 3.2 above) for firm \( i \) in industry \( j \) in time \( t \). The dependent variable is the greater than or equal to 2.5-cent heaping dummy (either 2.5¢ Interval, 2.5¢ Increment, 5¢ Increment or 10¢ Increment) or the less than 2.5-cent heaping dummy (either 0.25¢ Interval, 0.25¢ Increment, 0.5¢ Increment or 1¢ Increment). \( \eta_j \) is an industry fixed effect, \( \delta_t \) is a year fixed effect, and \( \epsilon_{ijt} \) is the unobservable error component.

4. Empirical findings

4.1. Dividend heaping

Our preliminary results (untabulated) show that 27.39% of DPS greater than or equal to 2.5-cents are heaped in 2.5-cent intervals from 1976 to 2015. Of these heaped DPS, 2.5-cent, 5-cent and 10-cent increments represent 25.37%, 43.47% and 31.16%, respectively. Consequently, the 5-cent and 10-cent increments collectively outweigh the 2.5-cent increments (74.63% versus 25.37%), with 5-cent increments demonstrating the greatest standalone heaping percentage over time. We also confirm that 70.90% of DPS less than 2.5-cents are heaped in 0.25-cent intervals from 1976 to 2015. Of these heaped DPS, 0.25-cent, 0.5-cent and 1-cent increments make up 12.89%, 26.26% and 60.85%, respectively. Here the 0.5-cent and 1-cent increments collectively outweigh the 0.25-cent increments (87.11% versus 12.89%), with 1-cent increments representing the largest standalone heaping percentage over time.
While dividend heaping is more pronounced in the early parts of each sub-sample, we reveal that dividend heaping decreases over time in Australian firms (see Figures 1 and 2). For instance, in 1977 50% of DPS observations in the greater than or equal to 2.5-cent sub-sample are heaped at 2.5-cent intervals, while 100% of DPS in the less than 2.5-cent sub-sample are heaped at 0.25-cent intervals. However, by 2015 the percentage of heaped DPS at 2.5-cent intervals falls to 20.42%, while heaped DPS at 0.25-cent intervals drops to 63.31%. Within the greater than or equal to 2.5-cent sample, we also show that heaped DPS at 2.5-cent increments fall over time, whereas 5-cent and 10-cent increments increase. In addition, the less than 2.5-cent sub-sample reveals that heaped DPS at 0.25-cent and 0.5-cent increments rise over time, whereas 1-cent increments become less popular. We also find that average DPS size increases over time. For example, in 1976 the average DPS is $0.06 for the greater than or equal to 2.5-cent sub-sample and increases to $0.31 by 2015. Similarly, in 1977 the average DPS is $0.01 for the less than 2.5-cent sub-sample and increases to $0.0128 by 2015. We also reveal in both sub-samples that dividend heaping by firm size and industry appears to be more prevalent in certain increments than others (see Tables 1 and 2).

[Insert Figure 1]

[Insert Figure 2]

(Insert Table 1)

(Insert Table 2)

Overall, the preliminary results show that dividend heaping, intentional or otherwise, is evident in Australian firms. Our next line of investigation is to examine whether firm-level characteristics related to information uncertainty influence the likelihood of dividend heaping.
4.2. Dividend heaping and information uncertainty

Table 3, Panels A-D contains descriptive statistics of the primary heaped dividend dummy variables (e.g. 2.5-cent and 0.25-cent intervals) and firm-level variables from 1991 to 2015. The descriptive statistics are grouped into the number and proportion of firms with non-heaped or heaped dividends across the intervals, respectively. The firm-level variables are also grouped accordingly. For DPS greater than or equal to 2.5-cents and heaped (Panel B), the mean DPS is approximately 28 cents. The mean monthly forward return is 1%, while the mean monthly accumulated return is 22%. Firm size ranges up to $131 billion, with a mean of $2.9 billion. Firm age ranges up to 134 years, with a mean of 26 years. Stock returns are volatile, as suggested by a mean Sigma of 8% per month. Annual dividend yield and payout are relatively high, with means of 5.6% and 89%, respectively. Annual mean firm growth is 1.2 times book value.

On the other hand, for DPS less than 2.5-cents and heaped (Panel D), the mean DPS is approximately 1.4 cents. The mean monthly forward return is 1.5%, while the mean monthly accumulated return is 24%. Firm size ranges up to $53 billion, with a mean of $409 million. Firm age ranges up to 111 years, with a mean of 16 years. Stock returns are also volatile, as indicated by a mean Sigma of 12% per month. Annual dividend yield and payout are also high, with means of 5.1% and 83%, respectively. Annual mean firm growth is 1 times book value. Table 4 shows correlation coefficients relating to the primary heaped dividend dummy and firm-level variables from 1991 to 2015. Dividend size, accumulated returns, firm age and stock return volatility are positively correlated with the 2.5-cent interval heaping dummy. On the other hand, stock return volatility, firm growth and dividend yield are negatively correlated with the 0.25-cent interval heaping dummy, while dividend size, firm size and firm age are positively correlated.

(Insert Table 3)

(Insert Table 4)
Table 5 reports the probit regression results of dividend heaping on firm-level variables for DPS greater than or equal to 2.5-cents from 1991 to 2015. The 2.5-cent interval findings show that the likelihood of heaping increases with firm age and stock return volatility, but decreases with firm size. The coefficients are negative and statistically significant at the 1% level for inverted firm age, and positive and statistically significant at the 10% level or better for inverted firm size and stock return volatility. Comparing the coefficients, we show that firm age has the strongest relationship with the likelihood of heaping. The 2.5-cent increment results reveal that the likelihood of heaping increases with stock return volatility and decreases with firm size, firm growth and firm age. The coefficients are positive and statistically significant at the 10% level or better for inverted firm size, inverted firm age and stock return volatility, and negative and statistically significant at the 1% level for firm growth. Comparing the coefficients, we find that stock return volatility has the strongest relationship with the likelihood of heaping.

(Insert Table 5)

On the other hand, the 5-cent increment findings show that the likelihood of heaping increases with dividend size, firm age and stock return volatility, but decreases with firm size. The coefficients are negative and statistically significant at the 5% level or better for inverted dividend size and inverted firm age, and positive and statistically significant at the 10% level or better for inverted firm size and stock return volatility. Comparing the coefficients, we reveal that dividend size has the strongest relationship with the likelihood of heaping. The 10-cent increment results reveal that the likelihood of heaping increases with firm age and firm growth. The coefficients are negative and statistically significant at the 1% level for inverted firm age, and positive and statistically significant at the 1% level for firm growth. Comparing the coefficients, we find that firm age has the strongest relationship with the likelihood of heaping.
Table 6 reports the probit regression results of heaping on firm-level variables for DPS less than 2.5-cents from 1991 to 2015. The 0.25-cent interval findings show that the likelihood of heaping increases with firm age and dividend size, and decreases with firm growth and dividend yield. The coefficients are negative and statistically significant at the 10% level or better for inverted firm age, firm growth, inverted dividend size and dividend yield. Comparing the coefficients, we again show that dividend size has the strongest relationship with the likelihood of heaping. The 0.25-cent increment findings show that the likelihood of heaping decreases with dividend payout. The coefficient is negative and statistically significant at the 10% level for dividend payout. Comparing the coefficients, we reveal that none of the firm-level variables increase the likelihood of heaping.

(Insert Table 6)

The 0.5-cent increment findings reveal that the likelihood of heaping decreases with firm size and dividend yield. The coefficients are negative and statistically significant at the 10% level or better for dividend yield, and positive and statistically significant at the 10% level or better for inverted firm size. Comparing the coefficients, we reveal that none of the firm-level variables increase the likelihood of heaping. Finally, the 1-cent increment results show that the likelihood of heaping increases with firm age, dividend size and dividend payout, and decreases with firm size. The coefficients are negative and statistically significant at the 5% level or better for inverted firm age and inverted dividend size, and positive and statistically significant at the 5% level or better for inverted firm size and dividend payout. Comparing the coefficients, we again show that dividend size has the strongest relationship with the likelihood of heaping.

Overall, the findings suggest that dividend heaping is evident in Australia and appears to be influenced by certain firm-level characteristics. Across the intervals and increments examined in both sub-samples, the likelihood of heaping consistently increases with firm age, stock return volatility and
dividend size, but decreases with firm size. With the exception of stock return volatility and firm size, these results contradict our expectations. Therefore, we reject our Hypothesis. This is noteworthy, as dividend heaping could be driven by firm-level characteristics contrary to the information uncertainty hypothesis in Australia. However, to the extent that firms increase their DPS magnitude by a larger extent, they may find it difficult to set a precise number if not many of their peers are encountering such large increases in their DPS. Under this rationale, the Hypothesis has some support. There is also mixed (and less robust) evidence that shows the likelihood of heaping increases and/or decreases with dividend yield, dividend payout and firm growth.

5. Conclusions
In this study, we examine the extent of dividend rounding (or ‘heaping’) in Australian firms from 1976 to 2015. We hypothesize that when making dividend decisions, firm directors heap on certain dividend amounts and that heaping is influenced by firm-level characteristics related to information uncertainty. Our findings show that 27.39% of dividends greater than or equal to 2.5-cents are heaped in 2.5-cent intervals. Of these heaped dividends, 2.5-cent, 5-cent and 10-cent increments represent 25.37%, 43.47% and 31.16%, respectively. We also confirm that 70.90% of dividends less than 2.5-cents are heaped in 0.25-cent intervals. Of these heaped dividends, 0.25-cent, 0.5-cent and 1-cent increments make up 12.89%, 26.26% and 60.85%, respectively.

Despite dividend heaping being more pronounced in the early parts of each sub-sample, we reveal that the heaping phenomenon decreases over time in Australian firms. The reductions in heaping may be due to a decrease in information uncertainty faced by firm directors. Further, decreases in heaping could be attributable to more sophisticated technological tools and information systems (e.g. Enterprise Resource Planning (ERP) solutions) that allow firms to manage information uncertainty more effectively. A decrease in heaping further suggests that directors may have better forecasting abilities.
and capabilities to deal with financial complexity (Dechow and You, 2012; Jakob and Nam, 2016; Herrmann and Thomas, 2005; Zhang, 2006). Thus, with lower forecasting errors, they can be more accurate with their distribution decisions and heap less (Jakob and Nam, 2016).

Even though heaping has declined over the past four decades in Australia, firm directors still appear to be confronted with cognitive biases and behavioral barriers. This is evidenced by some directors using a heaping heuristic (intentionally or otherwise) when determining their dividend distributions. For example, in 2015 the percentage of heaped dividends at 2.5-cent intervals represented 20.42% of dividends greater than or equal to 2.5-cents, while heaped dividends at 0.25-cent intervals signified 63.31% of dividends less than 2.5-cents. Unlike Jakob and Nam (2016), we also show that average dividend size increases over time in Australian firms. Larger dividend sizes/payouts could be explained by: (1) low interest rates and a lack of suitable growth/investment opportunities for Australian firms (Business Insider, 2015); (2) dividend decisions being dictated by clientele effects (Miller and Modigliani, 1961), information signaling (Battacharya, 1979; Gunasekarage and Power, 2002; Michayluk et al., 2017) and/or agency costs (Easterbrook, 1984); and (3) Australian fund managers and investors having a distinct preference for dividends and franking credits over retained earnings due to favorable tax treatment, thus demonstrating behaviors consistent with investor sentiment theory (Ainsworth et al., 2016; Baker and Wurgler, 2004) and other investor-based psychological biases (Black, 1990; Gordon, 1959; Lintner, 1962; Shefrin and Statman, 1984; Thaler and Shefrin, 1981).

We also examine various firm-level metrics on dividend heaping across the respective sub-samples and find that the likelihood of heaping increases with stock return volatility and decreases with firm size. Our results also indicate that the likelihood of dividend heaping is influenced by firm-level characteristics that cannot be explained by the information uncertainty hypothesis. For instance, the likelihood of heaping increases with dividend size and firm age. These findings are inconsistent with
Aerts et al. (2008), Barry and Brown (1985), Jakob and Nam (2016) and Zhang (2006), and could be explained by the economic substance of dividends in Australia. For example, in 2015, the median dividend payout ratio for ASX 50 listed companies was 62% in Australia, while it was 50% and 29% in the United Kingdom (UK) and US, respectively. This represents a 58% increase in dividends for older/larger Australian companies over the last decade (Business Insider, 2015). On the other hand, smaller/younger firms in Australia may not be able to afford any imprecision in their distributions, as rounding up or down dividends would result in a substantial cash effect. That is, older/larger firms with more resources can perhaps afford to be imprecise, while smaller/younger firms cannot.

Despite studies (Booth and Chang, 2011; Choi et al., 2011; Lin et al., 2017; Pathan et al., 2016) claiming that older/larger firms should have more information available than their younger/smaller and more financially constrained counterparts, we show that the likelihood of heaping increases with dividend size and firm age in Australian firms. These findings could also be attributable to certain shareholder groups placing pressure on the directors of mature Australian firms to increase dividends and/or franking credits (Ainsworth et al., 2016; Grennan, 2018; Gunasekarage and Power, 2002). Such pressure could influence the behavior of directors of mature firms when setting their dividend distributions and ultimately increase the probability of dividend heaping.

This study provides an important contribution to the international dividend policy literature. Adding to the work of Aerts et al. (2008), Houle et al. (2013) and Jakob and Nam (2016), and being the first to examine the prevalence of dividend rounding heuristics in Australia, we establish a method for assessing whether firm-level characteristics related to information uncertainty influence dividend heaping in Australian firms over time. As corporate dividend policy appears to be influenced by a heaping heuristic this could have implications for the capital structures, growth potential and stock prices of Australian firms. Further, by observing dividend heaping, market participants can more
accurately measure the financial contribution of Australian firm directors. Dividend heaping is also relevant from an investment perspective, as inferences relating to dividend policy may help investors forecast the timing and magnitude of future dividend changes. For example, analysts could more accurately forecast dividends of older/larger firms by rounding to the nearest 5-cent interval. We anticipate our contribution to be of interest to firm directors, fund managers, the investing public, regulatory agencies, accounting and finance bodies, and academics who scrutinize dividend policy.

Using methods employed in this study, future research could explore the extent of dividend heaping across Australian sectors. This may reveal whether some sectors are more susceptible to heaping than others. Establishing if firm-level characteristics influence dividend heaping differently across sectors may also provide further insight. Future research could also investigate the signal of non-heaped dividends. Do non-heaped dividends convey precision to investors? That is, do dividends ending in a 2 or 3 appear more precise to an investor than those ending in a 5? Conversely, do investors view dividends ending in a 5 more favorably than they actually are because this implies rounding up to the next digit? Such research could provide a better understanding on whether directors are being imprecise or exploiting investor biases when it comes to setting their dividend distributions.

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