REVIEW OF SHORT-RUN PERFORMANCE OF INITIAL PUBLIC OFFERINGS IN AUSTRALIA

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Abstract

This study investigates the short-run performance of initial public offerings in Australia. Based on sources from the Morningstar DatAnalysis database, we analyzed 211 Australian publicly traded initial public offerings (IPO) listed on the Australian stock exchange between January 2011 and December 2015 using multiple regression analysis with dummies to represent industry and listing year. According to our analysis, total market return indicates an IPO underpricing phenomenon whereas secondary market shows an overpricing scenario. Moreover, this analysis supports the contention that short-run performance fluctuations were based on the listing year and industry settings. This study contributes to the literature by analysing the short-run performance of both the primary and secondary markets.

Keywords: Initial Public Offering, Total Market Return, Short-Run Performance, Australia

1. INTRODUCTION

The evaluation of the market performance of IPOs (initial public offerings) has been the focus of finance and accounting studies. It can be evaluated as three phenomena (Ritter, 1991): short-run market phenomenon (IPO underpricing); long-run market phenomenon (IPO underperformance); and "hot-issue" market phenomenon. Underpricing is generally measured "as the percentage difference between the price at which the shares were sold to investors during the offering period and the price at which the shares trade afterward on the secondary market" (Killins, 2019, p. 102). Over the last three decades, IPO underpricing is a burning issue in emerging as well as the developed financial market around the world. Newly established firms in the market tend to issue IPO for raising capital, though the management of the new company are less skilled and experienced in leading the IPO process. Then, firms turned on intermediaries which raises agency costs, and eventually this involuntarily prone to the issue of underpricing (Lowry, Michaely, & Volkova, 2017).

The short-run IPO underpricing phenomenon was first documented by Logue (1973) and Ibbotson (1975). They discovered that the share's first-day closing price is significantly higher than the offer price. Since then, prior studies have emphasized the high level of underpricing of IPOs in various

markets, although the extent of this seems to differ greatly across markets (Autore, Boulton, Smart, & Zutter, 2014; Engelen & van Essen, 2010). Dimovski and Brooks (2004) found that any variation in the underpricing across IPOs is largely explained by market sentiment, earnings per share yield, offer price, and underwriting status.

The evidence on underpricing in Australia dates back to the early study by Finn and Higham (1988) who found an average underpricing of 29.2% when examining 93 IPOs for the period from 1966 to 1978. Historically, the initial average return of Australian IPOs is around 11% to 107%. However, since 1995, Australian IPOs have displayed a more consistent average return of between 19% to 35% (Finn & Higham, 1988). According to Bird and Ajmal (2016), the pricing behavior of the Australian IPOs issued from 1995 to 2013 can be examined over three event windows. The period is the return on the first day, which is typically taken as a measure of underpricing or short-run performance. In this study, we aim to evaluate the short-run performance of IPOs and their determinants in the Australian market using the most recent data (2011 to December 2015). Additionally, the majority of studies on IPO underpricing in Australia measure the first-day return based on first-day closing price and issue price. This research goes further by measuring the short-run performance of both primary and secondary markets.

Considering the above facts, further investigation on the short-run market performance of Australian IPOs using the latest data is necessary to provide valuable results and findings for investors, analysts, researchers, Australian Securities Exchange (ASX), and IPO companies alike. This study aims to broaden this knowledge and fill the void in the current IPO literature by providing important information on pricing, determinant, industry, and relevant firm performance of Australian IPOs. This study aims to: 1) investigate the short-run performance of IPOs issued in the Australian market; 2) identify the potential causes of the short-run performance of Australian IPOs, and 3) examine whether the short-run IPO market performance varies by industry, and listing year covering five-year period from January 2011 to December 2015 inclusive. The findings of this study can also serve as a guideline for firms to determine the initial price offering. Investors would also benefit from the outcomes since a better understanding of the IPO can ensure their investment is profitable. The analysis found that primary and total market Australian IPOs were underpriced in the short-run where the secondary market analysis indicates that the Australian IPOs were overpriced.

The remainder of this study is arranged into five sections. Section 2 is the literature review. Section 3 covers the data and methodology, followed by data analysis and conclusion in Sections 4 and 5, respectively.

2. LITERATURE REVIEW

Researchers in the fields of finance and accounting have always been interested in IPOs. The high initial return on IPOs is known as IPO underpricing (Mehmood, Mohd-Rashid, & Tajuddin, 2020a). There is a number of theories or models to explain

the IPO underpricing phenomenon. Ljungqvist (2007) classified the theories of underpricing into four broad segments: asymmetric information, institutional, control, and behavioral. The asymmetric information model assumes that one of the parties in an IPO transaction (i.e., issuing firm, underwriter, and investors) has more information than the others, resulting in information friction that causes underpricing to occur. Institutional theories focus on the impact of litigation, banks' price-stabilizing activities once the trading starts, and taxes are set on the price of IPOs. Control theories state that underpricing is used as a method to reduce intervention by outside shareholders once the company goes public. Finally, the behavioral models argued that IPO underpricing is a measure to reduce the presence of "irrational" investors who bid up the price of IPO shares beyond their true value. In order to test the theories of IPO underpricing, researchers use a number of proxies to support the conjecture. Dimovski and Brooks (2004) introduced 13 financial and non-financial characteristics, while Perera and Kulendran (2014) introduced 22 issue-specific, firm-specific, and market-specific characteristics. Whilst there are several characteristics and theories that may contribute and explain the IPO underpricing phenomenon, all studies in this area conclude there is no single theory that can perfectly explain the underpricing observed across time and location. Each theory may be relevant depending on the circumstances surrounding the IPOs observed.

Many justifications have been offered in the developed market to identify the determinants of underpricing in the global context. For instance, Perera and Kulendran (2016a, 2016b, 2016c) investigated short-run IPO performance in Australia and suggested that IPOs in Australia are underpriced by 25.47% and 23.11% based on the market-adjusted average abnormal return (hereafter, AAR) in the primary and total market, individually. Nevertheless, this scenario is the opposite for the secondary market, which is 1.55% overpriced based on AAR. Further analysis, Perera, and Kulendran (2016a) concluded that short-run performance analysis needs to contemplate in both first-day and post-listing returns, hence, primary and post-listing short-run performance investigation show that the chemical and materials industry is less striking than industrial industry to investors perspectives. Further, Perera and Kulendran (2016b, 2016c) found that market volatility and total net proceeds ratio including IPO period, listing delays, listing time, issue prices, share option have a substantial effect on short-run IPO performance and underpricing. Furthermore, emphasises on IPO determinants of the Australian market advised that issue and market characteristics are more critical than firm characteristics (Mehmood et al., 2020a). In another research, Dimovski, Philavanh, and Brooks (2011) suggested that there is a relation between share options, total capital raised, high underpricing, prestigious underwriters, market sentiment, and underwriter options.

Logue (1973) and Ibbotson (1975) documented that when companies go public, their share price tends to jump substantially high on the first day of trading. According to Lee, Taylor, and Walter (1996) the IPO underpricing phenomenon is internationally

pervasive, but nevertheless, the degree of underpricing varies across countries and time. Loughran, Ritter, and Rydqvist (1994) analysed the short-run IPO market performance of 25 countries to explain the inter-country patterns of IPO underpricing. Their empirical research has found that all 25 selected countries including Australia, the United States, Europe, and some Asian countries experienced short-run underpricing. Nevertheless, the degree of underpricing varies enormously between countries and depends on the contractual mechanism and composition of firms going public. In 2015, they updated their empirical results to include the most recent data (Table 1). However, the findings in their initial investigation in 1994 are still relevant using the new sample. According to Ljungqvist (2007), since the 1960s the high short-run return of IPOs has averaged around 19% in the United States. The degree of underpricing changes over time, averaging 12% in the 1970s, 16% in the 1980s, 21% in the 1990s, and 40% in the four years since 2000 (reflecting mostly the tail-end of the late 1990s internet boom). Further investigation into the concept of underpricing by Loughran and Ritter (2004) suggested that it can be attributed to two things: firstly, changes in the risk composition of the firms going public; and secondly, the realignment of incentives towards reducing IPO underpricing.

A study by Moshirian, Ng, and Wu (2010) examined the post-issue stock price performance of IPO from emerging Asian market settings. Their findings suggest that Asian IPOs are underpriced and long-run underperformance for the Asian IPOs influences enormously the method used for testing. Using 1069 firms from the Chinese stock exchange, Li, Liu, Liu, and Tsai (2018) examined the effect of IPO underpricing pre- and post-2008 financial crisis and found that IPOs are less underpriced in the post-financial crisis period. They further suggested that finding that small firms experienced less IPO underpricing than large firms after the financial crisis. Perera and Kulendran (2014) examined 254 Australian IPOs listed from 2006 to 2011 in an effort to compare the market performance in the short- and long-terms. Their investigation saw that primary market IPOs were underpriced by 25.47% while the secondary market security issue was overpriced by 1.55%. Nevertheless, when the whole market was examined, they found that IPOs were underpriced by 23.11% which is similar to what other studies documented. Extensive research on the Australian market over the past 50 years found that the average initial return of IPOs ranges from 11.96% to 107.18% depending on the sample size, sample period, and industry examined. Finance literature reported that industrial sector IPOs were underpriced by 29.2% and 19.74%, respectively (How, Izan, & Monroe, 1995), and mining and energy IPOs were underpriced by 17.93% (Dimovski & Brooks, 2004). However, when all sectors were analysed, Lee et al. (1996) and Perera and Kulendran (2012) reported that on average, all sector IPOs are underpriced by 19.8% and 24.11%, respectively. Most of the higher underpricing levels were reported due to the smaller sample size. Although underpricing is reported as an omnipresent event in the IPO literature, there is much inequality in the context of underpricing in Australia across time. Moreover,

there are variations in the significance of the determinants of IPO underpricing depending on the sample tested.

Many researchers and practitioners who attempted to examine the degree of underpricing in different countries worldwide mostly found evidence in favor of IPO underpricing. The study of IPO underpricing by Ritter (1991) laid the foundation for all subsequent studies. The study was based on a sample of 1,526 IPOs covering 1975-1984 and results revealed that in the 3 years after going public these firms significantly underperformed their closing price on the first day of public trading. In Loughran et al.'s (1994) study of short-run IPO market performance of 25 countries, it was shown that inter-country patterns of IPO underpricing existed. Their empirical research found that all observed 25 countries experience short-run underpricing when issuing new IPOs. Brau, Cicon, and McQueen (2016) examined the influence of behavioural information from the USA listed IPOs and documented that IPO strategic tone positively related to high first-day return because positive or negative strategic behaviours tend to more IPO underpricing in the USA. Dimovski, Ratcliffe, and Keneley (2017) suggested the positive relation between IPO higher IPO underpricing and higher underwriting cost from USA real estate investment trust. They further noted that high underpricing increases due to raising a higher volume of capital requirement. Except for these reasons, recent IPO literature suggests that tone of media impact on IPO underpricing. Such as positive media tones influence IPO underpricing (Bajo & Raimondo, 2017). Moreover, it is found that the existence of obscure and doubtful information in IPOs prospectus is positively associated with IPO underpricing (Park & Patel, 2015). In the USA, Guo, Wang, Seng, and Hung (2017) found a negative relationship between strategic alliances with underpricing which IPO prospectus does not provide the obvious picture to investors. In a nutshell, information and nature of signal to the market and investors impact of IPO underpricing in the short run IPO performance.

Using Canadian IPO market data from 2010-2017, Killins (2019) found that the Canadian IPO market is a minimal underpriced market around the world, where underpriced are reported by 1.45% during the sample period and this smaller magnitude of Canadian IPOs underperform the market in their 1-month, 6-month, and 12-month holding periods. Further, this research contributes to the signaling theory by providing evidence that restricted voting share offerings are more like to be underpriced and represent the weak performance during the short-term period. Abrahamson, Jenkinson, and Jones (2011) suggested that the short-run IPO underpricing in Europe mean (median) is comparatively half the level of underpricing in the USA, however, European IPO pricing is approximately 3% lower, which is much more inconstant, and dropping over time. Though, Asian IPO's average initial returns are relatively higher than the USA market average initial returns (Ritter, 2003). Banerjee, Dai, and Shrestha (2011) conducted a study based on 36 countries and as stated in their study, the degree of underpricing is not specifically a country-specific issue but is in fact a general phenomenon. In particular, initial

underpricing in Asian countries is comparatively higher than in other economies (Moshirian et al., 2010). Perera and Kulendran (2014) examined 254 Australian IPOs listed from 2006 to 2011 to compare the market performance of primary and secondary markets security issues in the short- and long-run. Their investigation documented that primary market IPOs were underpriced by 25.47% while the secondary market issue was overpriced by 1.55%. Based on the previous studies we have developed our research questions in order to further examine IPO underpricing.

Our first research question examines the current situation on the short-run performance of IPOs:

RQ1: What is the current situation on IPO in an Australian market?

Through our research, we intend to understand the level of underpricing in different industries. This was done to determine whether the sample period, industry, state of the economy, nature of the market affect the IPOs of the issuing firm. Even though underpricing is the common outcome of IPO, different industries have their own characteristics and scenarios, which lead to our second research question:

RQ2: Do different industries receive different outcomes on their IPO?

By addressing this second question, we intend to identify different variables that might cause the price of IPOs to change in the short-run.

RQ3: What determines the Australian IPOs' performance in the short-run?

Our third research question is based on the relationship between the determinants, the listing, and the issuing year of the IPOs. Specifically, we intend to identify, if the listing year is changed does the determinant change accordingly? That is:

RQ4: How are the major determinants affected by the listing and issuing year of the IPO?

Company performance is another perspective that an investor examines before investing in a business. This leads us to the question of how a firm's performance is linked to the IPOs of that company. Lastly, the growth of the company may also impact the price of the firm's IPO:

RQ5: Does the firm's performance affect the price of the IPO?

RQ6: Does the firm's growth performance affect the price of the IPO?

Our investigation will attempt to prove that IPO underpricing is a continuing trend in the Australian IPO market. Elements of IPO underpricing are being used to back up the short-run performance theories in the finance literature. Finance studies have adopted different proxies to examine the causes for underpricing, such as financial and non-financial characteristics (as a determinant related to issue, firm- and market-specific characteristics) (Dimovski & Brooks, 2004; Perera & Kulendran, 2014). Nevertheless, Ritter and Welch (2002) contended there is no single theory or characteristic that can completely explain IPO underpricing from country to country, or in time and market conditions. The market performance of IPO is affected by the factors surrounding the market environment including the scenario for the listing year and the IPO issuer industry. The listing year will affect the degree of underpricing as the state of the market

(i.e., market downturn) during the year would influence domestic and international investors' desire for a risky investment. Moreover, the issuer industry would also indicate the level of riskiness of the IPO as some industries, such as technology have a larger information asymmetry between the issuer, underwriter, and investors. This study investigates whether the IPO market performance varies by industry and listing year.

3. DATA AND METHODOLOGY

Followed by an introduction and literature review in Sections 1 and 2 respectively, this section discusses the data and methodology of the study.

This study examines the behaviour of the first-day return of listed IPO and the causes of the pricing behaviour. The primary source of data is the Morningstar DatAnalysis database[1]. The sample consists of all 211 Australian publicly traded IPO listed on the ASX during the period 1 January 2011 to 31 December 2015[2]. This covers seven sectors based on the GICS[3] industry criterion, namely: resources, chemical/materials, industrials, consumer discretionary/staples, information technology, telecommunication, and utilities. Following prior IPO research (Dimovski & Brooks, 2004; Perera & Kulendran, 2012; Perera & Kulendran, 2014) we have applied these sectors. Further, within the Australian IPO context, the sample period chosen was not used in prior research.

In line with prior literature, we excluded IPOs originating from property and equity trust and financial sector IPOs from the sample (Dimovski & Brooks, 2004; Perera & Kulendran, 2012; Perera & Kulendran, 2014). This is because their financial information is not comparable with non-financial companies. Moreover, their annual reports are normally prepared according to different and more stringent statutory requirements. Hence, the exclusion of the financial sector from the sample helped to improve the accuracy of the generalization of our findings to the target sectors of the study and avoid the possible misleading conclusion. Companies undergoing merger, takeovers and restructuring schemes were also eliminated from the sample because the decision will have an impact on the company's IPO performance. The analysis of the sample shows that the chemicals/materials sector has the largest number of IPOs issued at 31% but only gives 7% of the total sample proceeds. Consumer discretionary/staples on the other hand give the highest sample offer proceeds at 47% and produced 25% of the sample listing, which is the second-highest producer of IPOs. The information technology sector offers the highest value for money when compared with all other industries. On average, the market price of the information technology industry is higher than the other sectors.

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[1] The Morningstar DatAnalysis is the most prominent data source for company specific data in Australian Securities Exchange (ASX) which includes corporate history and listing details, substantial shareholders' trading history, industry comparison, price history and graphs, ASX announcements from 1998, etc. for all the listed companies.
[2] Due to the non-availability of data, this study is based on 2011-2015 IPOs. However, the period covered in the study is sufficient to examine short run performances of IPOs in Australia.
[3] GICS or Global Industry Classification Standard is a joint effort by Standard & Poor's, and Morgan Stanley Capital in streamlining the definition of industry. This has been done to make possible an easy comparison of countries' industrial performance.

The negative value of money left in the utilities and chemical/materials industry reveals that these industries' capacity to increase investor wealth is much less than other industries.

Following previous scholars, this study measured short-run market performance based on stock return which can be evaluated based on the raw return (RR), and market-adjusted abnormal return (MAR). To measure the market performance of the IPOs and determine their causes, this study selected the first day adjusted (adjusted prices are those prices that were adjusted for any dilution factors such as bonus issues, rights issues, and options) opening and closing market price from the Morningstar DatAnalysis database. The market-adjusted price is superior to the raw return because the market performance has been adjusted for dilution factors such as bonus issues, rights issues, and options. Additionally, to better understand the behaviour of the first-day market return, this study

further divided the first listing day into two: primary market (PRIM) and secondary market (SECON). This method has been used widely to study the USA market performance but is considerably new in Australia. Only two studies have adopted this method, these being Perera and Kulendran (2014) and Perera and Kulendran (2012).

Based on two main reasons, Barry and Jennings (1993) initially proposed to split the opening price performance into two: PRIM (offer-to-open) and SECON (open-to-close) market returns. The given reasons or justification were the: 1) significant price variation at the beginning and closing of the first trading day; and 2) evaluation of short-run market performance based on first listing day total return. This closing price performance does not provide a clear answer as to who will benefit more from the short-run underpricing of IPOs. Figure 1 below depicts the relationship between the first-day total, primary, and secondary market returns.

Figure 1. The nexus between TR, PRIM, and SECON
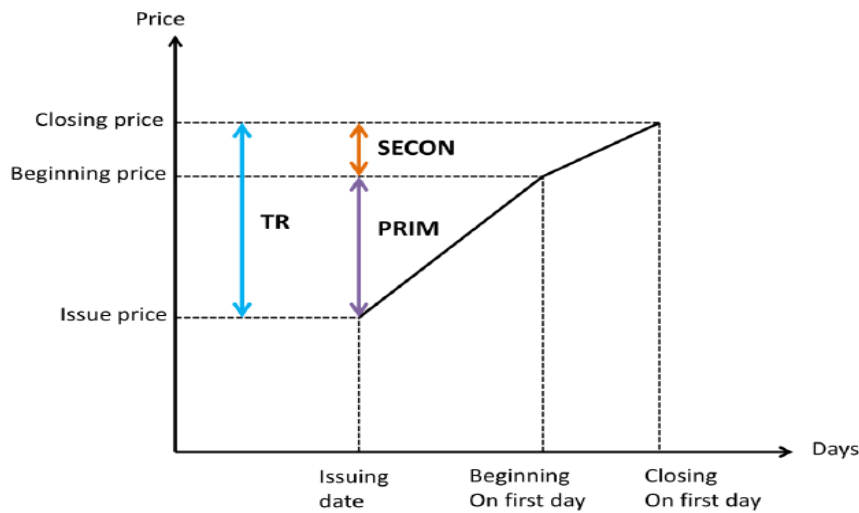
The first listing day *PRIM*, *SECON*, and total market returns (*TR*) are calculated using the following equations:

$$PRIM_i = \frac{P_{i,b} - P_{i,o}}{P_{i,o}} \qquad (1)$$

where, $PRIM_i$ is the first listing day primary market return for security i, which measures the price difference between the issue price and beginning of the first listing day price; $P_{i,b}$ is the first listing day beginning price of the security i; and $P_{i,o}$ is the initial offering price security i:

$$SECON_i = \frac{P_{i,c} - P_{i,b}}{P_{i,b}} \qquad (2)$$

where, $SECON_i$ is the first listing day secondary market return for security i which measures the price difference between the beginning price and closing price of the first listing day; $P_{i,c}$ is the first listing day closing price of the security i; and $P_{i,b}$ is the first listing day beginning price of security i:

$$TR_i = \frac{P_{i,c} - P_{i,o}}{P_{i,o}} \qquad (3)$$

where, TR_i is the first listing day total market return for security i which measures the price difference between the issue price and the closing of the first listing day price; $P_{i,c}$ is the first listing day closing price of the security i; and $P_{i,o}$ is the initial offering price security i.

Subsequent to the above raw return for *PRIM*, *SECON*, and *TR*, the market-adjusted return is also applied to measure the short-run performance of IPO. The market-adjusted return is superior to raw returns because it adjusts for any dilution factors in the market such as share splits, bonus issues, rights issues, etc. The same formula was used to calculate the market-adjusted abnormal return, but the price was changed from the raw market price listed in Morningstar DatAnalysis to adjusted market price in the same database.

To determine whether the average raw and abnormal returns are statistically significant, this study uses the following t-statistics:

$$t(AR) = AR_t \times \frac{\sqrt{n}}{\sigma_t} \qquad (4)$$

where, AR_t is the average return (raw or adjusted return); and σ_t is the standard deviation of the return.

This study applied the multiple regression model to discover the causes regarding the short-run market performance of IPOs. The issue-specific characteristics and firm-specific characteristics are the main categories of explanatory variables in the model. Issue-specific were identified as offer-related characteristics, such as offer price and offer size. Whereas firm-specific characteristics are factors that are specific to the firm issuing the security, such as underwriter availability, firm age, firm size, and auditor reputation. Connect 4 and Data Analysis databases were accessed to gather issue- and firm-specific characteristics. Table 1 shows the explanatory variables of the model together with their measurements and expected signs.

Table 1. Variables of the study

Explanatory variable	Variable in the model	Variable measure	Expected sign
Issue-specific characteristics			
Issue price	*PRICE*	The offer price of the issue	(-)
Offer size	*ln(OS)*	The number of offered shares multiplied by the issue price	(-)
Firm-specific characterises			
Underwriter availability	*UWA*	Dummy variable, which denotes 1 for "underwritten IPOs" and 0 for "otherwise"	(+)
Auditor reputation	*AUDIT*	Dummy variable, which denotes 1 for "Big 4 auditors" and 0 for "otherwise"	(+)
Firm age	*ln(FAGE)*	Number of years between the year of creation and listing	(-)
Firm size	*ln(SIZE)*	Total assets at the end of the year preceding IPO of an issuing firm	(-)

To test the industry and year effect, the industry and listing year variables were also tested in the model together with the model's explanatory variables. The regression analysis identifies the linear relationship between the short-run market performance and independent variables (explanatory variables) including issue characteristics, firm characteristics, industry dummies, and listing year dummies. The following regression equation was used for the analysis:

$$R_i = \alpha + \sum_{j=1}^{m} \beta_j D_{i,j} + \varepsilon_i \qquad (5)$$

where, R_i is the short-run return; β_j is the coefficient of the explanatory variables; $D_{i,j}$ is the explanatory variables (independent variables); and ε_i is the error term of the model. Subsequent to the above regression equation, the following short-run regression equation was developed:

$$ln[R_i] = \alpha + \beta_1 ln(OS_i) + \beta_2 PRICE_i + \beta_3 UWA_i + \beta_4 AUDIT_i + \beta_5 ln(1+FAGE)_i + \beta_6 ln(FSIZE_i) + \sum_{i=1}^{6} \beta_i D_i + \sum_{i=1}^{5} \beta_i DY_i \qquad (6)$$

where, R_i is the short-run return; $ln(OS_i)$ is the natural log value of the offer size of the firm i; $PRICE_i$ is the value of the offer price of the firm i; UWA_i is the underwriter availability of firm i; $AUDIT_i$ is the auditor's reputation for the firm i; $ln(1 + FAGE)_i$ is the natural log value of the number of years between the year of creation and listing; $ln(FSIZE_i)$, is the natural log value of the total assets at the end of the year preceding the IPO; and ε_i is the error term of the model. D_1 = dummy for the resources industry, D_2 = dummy for chemicals/materials industry, D_3 = dummy for the industrial sector, D_4 = dummy for consumer discretionary/staples industry, D_5 = dummy for the information technology industry, and D_6 = dummy for utilities industry. The telecommunications industry is captured in the intercept term, consistent with the findings reported by Perera and Kulendran (2014). DY_1 = dummy for the listing year 2011, DY_2 = dummy for the listing year 2012, DY_3 = dummy for the listing year 2013, DY_4 = dummy for the listing year 2015. The listing year 2014 is captured in the intercept term.

The above multiple regression model helps to estimate: 1) first-day primary market model, 2) secondary market model, and 3) total market model. The PRICE, dummy variables for the telecommunications industry, and the 2014 listing year were not considered in these models due to multicollinearity.

4. ANALYSIS OF DATA AND DISCUSSION

The previous section discussed the data and methodology of the study. This section focuses on data analysis and discussion. The first part of the section presents descriptive statistics of the short-run returns based on the first listing day. As explained in the previous section, this was calculated using both raw and market-adjusted abnormal returns. This is followed by the short-run market performance in sub-section 4.2. The investigation of Australian IPO markets (underpriced or over-priced) will be mainly based on this short-run performance analysis. Moreover, industry-specific and listing year-based short-run market performance analysis is used to identify any variations in the short-run market performance across diverse industry sectors and time periods. The regression analysis examines what causes the short-run market performance. This is followed by the conclusion in the final section.

4.1. Summary statistics

Table 2 below presents the summary statistics of short-run return measures. The table shows the first listing day returns under primary, secondary, and total market scenarios, respectively. The period from issuing date up to the beginning of the first listing date comes under the primary market, where the secondary market follows on from that to the first listing date's closing. The total market covers both primary and secondary market periods.

Table 2. Summary statistics of short-run return measures

Dependent variables		N	Mean	Median	SD	Kurtosis	Skewness	Minimum	Maximum
Primary market: the period from the issuing date to the beginning of the first listing date.	RR	211	0.1531	0.0500	0.6092	99.0948	9.1242	-0.5600	7.3250
	MAR	211	0.2072	0.0400	0.8574	39.9584	5.9295	-0.5940	7.3250
Secondary market: the period from the first listing day time of beginning to the time of closing.	RR	211	-0.0150	0.0000	0.0999	2.9527	-0.4110	-0.4133	0.3023
	MAR	211	-0.0149	0.0000	0.0998	2.9256	-0.4047	-0.4095	0.3023
Total market: the period from the issuing date to the closing time of the first listing date.	RR	211	0.1353	0.0500	0.5929	108.6402	9.1971	-0.5600	7.4000
	MAR	211	0.1734	0.0200	0.7509	48.5190	6.1770	-0.6900	7.4000

Note: N = Sample size; RR = Raw return; MAR = Market-adjusted abnormal return; SD = Standard deviation.

As shown in Table 2 above, primary and total markets have positive mean and median values while the secondary market has negative values. Furthermore, it is shown that the mean values of primary market raw returns (0.1531) and market-adjusted returns (0.2072) are higher than that of total market returns (RR = 0.1353 and MAR = 0.1734). The median values for raw return measures of primary market and total market are similar at 0.05. However, there the median values for market-adjusted abnormal return vary from 0.04 to 0.02 for the primary market and total market, respectively. Both the mean and median values for raw and market-adjusted abnormal return with reference to the secondary market are similar at -0.015 and 0, respectively.

According to the table above, higher standard deviation values are noted in the primary and the secondary market. Nevertheless, it is below 1 in all three marker scenarios. High peakedness in primary and total market return measures were found based on the kurtosis statistic. Nonetheless, the raw return measures for both the total market and primary market are higher than the market-adjusted return market under both market scenarios. According to Perera and Kulendran (2014), the high peakedness for the return distributions was expected for stock market returns.

4.2. Analysis of short-run market performance

As explained at the outset of Section 4, the following analysis evaluates whether the Australian IPOs were underpriced or overpriced in the short-run. The positive returns of the IPOs measured underpricing while the negative returns calculated the overpricing of IPOs. The calculated first listing day returns under each market scenario helped to investigate underpricing or overpricing.

Table 3. First listing day returns for primary, secondary, and total market

Sample classification	N	Primary		Secondary		Total	
		AAR	t-stat	AAR	t-stat	AAR	t-stat
All sample companies	211	0.207	3.51***	-0.015	-2.174***	0.173	3.355*
By industry							
Resources	28	0.210	1.344	-0.041	-1.764	0.127	1.078
Chemicals/materials	65	0.198	1.598	-0.020	-1.593	0.153	1.509
Industries	19	0.115	2.442	-0.025	-1.145	0.092	1.536
Consumer discretionary/staples	52	0.100	3.856	0.004	0.363	0.110	3.242
Information technology	37	0.236	2.072	-0.008	-0.458	0.185	2.562
Telecommunication	6	0.204	1.273	-0.015	-0.379	0.188	1.103
Utilities	4	1.904	1.053***	-0.014	-0.822	1.904	1.039*
By listing year							
2011	51	0.060	0.718	-0.012	-0.844	0.059	0.633
2012	28	0.282	1.807	-0.005	-0.214	0.230	2.045
2013	32	0.425	1.743	-0.052	-2.576**	0.267	1.637
2014	45	0.219	1.343	-0.013	-1.259	0.208	1.255*
2015	55	0.169	4.848	-0.003	-0.195	0.168	4.204

*Note: Positive return indicates underpricing while negative return shows overpricing. N = Sample size, AAR = Market-adjusted abnormal return. * Statistically significant at the 10% level, ** statistically significant at the 5% level, *** statistically significant at the 1% level.*

The empirical findings of the study are discussed in the following sub-sections. Here the analyses of findings for first listing day market-adjusted abnormal returns are discussed separately for each market scenario. The results for all three market conditions are given in Table 3 above.

4.2.1. Primary market

As reflected in Table 3, all sample companies' market-adjusted average abnormal returns are positive and statistically significant (at the 5% level) which indicates underpricing is occurring at 20.7% in the primary market. This outcome is consistent with

Perera and Kulendran (2014) where the Australian primary market IPOs were underpriced by 25.47% from 2006 to 2011. This study is also comparable with the US findings documented by Bradley, Gonas, Highfield, and Roskelley (2009) who reported that US primary market IPOs were underpriced by 27.5%.

Industry analysis

Based on the industry-wise analysis, in the primary market, the utilities sector has the highest level of underpricing (190%) based on market-adjusted abnormal returns. This underpricing level is statistically significant at the 1% level. Nevertheless, because the number of samples in the utilities industry is only 4 (2% of the total sample), we would question this finding and it should be investigated further. The information technology, resources, and telecommunications industries all are underpriced at 23.6%, 21%, and 20.4%, respectively. These underpricing levels – although not statistically significant are comparable with studies done by Perera and Kulendran (2014). According to them, the underpricing level for those industries are 14.14%, 16.64%, and 23.88%, respectively. The findings by Perera and Kulendran (2014) reveal that the level of underpricing in resources and telecommunications is statistically significant at 1% and 10%, respectively.

Listing year analysis

According to the analysis of IPOs based on the listing year, the highest level of underpricing in the market-adjusted abnormal primary market returns occurred in 2013 where the IPOs are underpriced by 42.5%. However, this is not statistically significant. The lowest level of underpricing occurred in 2011 where the IPOs were underpriced by 6%. All the IPOs listed in the other years, i.e., 2012, 2013, and 2015 are all underpriced at 28.2%, 21.9%, and 16.9%, respectively.

4.2.2. Secondary market

Table 3 shows that the IPOs were overpriced in the closing price secondary market by 1.5%. It is interesting to observe that on average the returns on IPOs in the secondary market are overpriced or earned negative returns. This statistically significant finding is consistent with the work done by Perera and Kulendran (2014) on Australian IPOs listed during 2006 to 2011 where they found that IPOs are overpriced by 1.55% in the secondary market. According to Perera and Kulendran (2014), this overpricing phenomenon is common in the secondary market. This overpricing occurred as a result of investors who sold their shares to the secondary market after obtaining the underpricing premium in the primary market; it caused the return of IPOs to flip the other way. However, this study's outcome turns out to be inconsistent with the findings of Bradley et al. (2009) who reported that the US IPOs were further underpriced in the secondary market by 2.35%.

Industry analysis

When examining the IPOs by industry, in the secondary market only the consumer discretionary/staple industry has a positive average abnormal return of 0.4%. This level of underpricing is not statistically significant. The IPO returns for the remaining six industries were all overpriced with the highest average overpricing level being observed in the resources industry. This industry's IPOs were overpriced by 176%. Nevertheless, this level of overpricing is not statistically significant.

Listing year analysis

This shows that IPOs were overpriced in all years observed. The highest level of overpricing occurred in 2013 by 5.2% and the outcome is statistically significant at the 5% level. The lowest overpricing was 0.5% which occurred in 2012 despite it the fact it is not statistically significant at the 5% level.

4.2.3. Total market

Table 3 shows the first-day total market-adjusted abnormal return. As shown in the table all the companies in the selected sample were underpriced by 17.3% and the result is statistically significant at 10% level. The underpricing phenomenon found in this study on the total market returns is consistent with previous studies on the Australian market as listed in Table 3. Nevertheless, the level of underpricing varies between studies depending on the sample chosen.

Industry analysis

The industry-based analysis revealed that the utilities sector has the highest level of underpricing where the market-adjusted abnormal returns are underpriced at 190%. Similar to the findings in the primary market, the result presented by the utilities industry, while it is statistically significant, still warrants further investigation. The lowest level of underpricing is captured by the industrials sector at 9.2%. The level of underpricing is not statistically significant.

Listing year analysis

The analysis of IPOs based on listing year discovered that the highest underpricing level is reported in 2013 at 26.7%. In contrast, the lowest level of underpricing is reported in 2011 at 5.9%. These results are not statistically significant. In the listing year 2014, the IPOs were underpriced at 20.8% and this finding is statistically significant at the 10% level.

4.2.4. Causes of short-run market performance

This sub-section intends to explore the causes of the short-run Australian market performance of IPOs. Based on the literature, this study mainly focused on issue-specific characteristics (offer-related characteristics such as offer price and offer size) and the firm-specific characteristics (factors that are unique to the firm issuing the IPOs such as firm size, firm age, and underwriter availability). The dummy variables representing industries were tested to examine the industry effect. As explained at the outset, the same market classifications and performance measures were used in the regression model.

Regression model

The regression model examines the relationship between market-adjusted abnormal returns in different markets (dependent variable) and issue-specific characteristics and the firms' specific characteristics (independent variables). The issue-specific characteristics examined are the offer size (OS) and the offer price (PRICE). Meanwhile, the firm-specific characteristics checked here are the firm age (FAGE), firm size (FSIZE), underwriter availability (UWA), and auditor's reputation (AUDIT).

Summary statistics

Table 4 presents the summary statistics of the variables in the regression model.

Table 4. Summary statistics

Particulars	ln(OS)	PRICE	ln(1 + FSIZE)	ln(FSIZE)	UWA	AUDIT
Mean	16.55	0.79	0.99	16.84	0.27	0.35
Standard error	0.11	0.06	0.06	0.12	0.03	0.03
Median	16.14	0.25	0.69	16.56	0.00	0.00
Mode	15.61	0.20	0.00	0.00	0.00	0.00
Standard deviation	1.61	0.91	0.87	1.71	0.45	0.48
Sample variance	2.60	0.84	75.00	2.91	0.20	0.23
Kurtosis	-0.31	7.69	-90.00	1.38	-0.98	-1.59
Skewness	0.70	2.28	0.47	0.09	1.02	0.65
Range	7.36	6.17	2.89	11.69	1.00	1.00
Minimum	13.59	0.20	0.00	10.25	0.00	0.00
Maximum	20.95	6.37	2.89	21.94	1.00	1.00
Sum	3491.96	167.44	209.83	3552.69	58.00	73.00
Count	211	211	211	211	211	211

The mean for issue price is positive at 0.79 while the mean for natural log value of the offer size is 16.55. The mean for natural log values for firm age and firm size are 0.99 and 16.84, respectively. The values for underwriter availability and audits are 0 and 1 depending on if it meets certain criteria mentioned. Both variable means are below 0.5 which means more firms do not meet the criteria so they return 0 for these variables. The means for natural log of offer size, firm age, and firm size are closer to those means at 16.14, 0.69, and 16.56, respectively. It is suggested here that the distribution of the variable is somewhat normalized as shown in their small skewness values of 0.7, 0.47, and 0.09, respectively.

Correlation results

In order to ensure regression models, do not suffer from a multicollinearity problem, highly correlated explanatory variables are excluded from the model. Table 5 shows the correlation between variables in the model which helps identify the linear relationship between variables.

Table 5. Correlation matrix

Variable	ln(OS)	PRICE	ln(1 + FAGE)	ln(FSIZE)	UWA	AUDIT
ln(OS)	1					
PRICE	0.789	1				
ln(1 + FAGE)	0.159	0.151	1			
ln(FSIZE)	0.649	0.57	0.084	1		
UWA	0.377	0.31	-0.003	0.254	1	
AUDIT	0.618	0.539	0.121	0.497	0.311	1

According to Table 5, *PRICE* and *ln(OS)* are highly correlated. This is expected because *OS* is calculated as *PRICE * number of issued shares*. *PRICE* is excluded from the multiple regression models to negate the multicollinearity effect. Most of the variables have a positive correlation which each other which indicates that they move in the same direction. For example, for every increase of *ln(OS)*; *PRICE*, *ln(1 + FAGE)*, *ln(FSIZE)*, *UWA*, and *AUDIT* also increase in the same direction. Nevertheless, underwriter availability (*UWA*) is negatively correlated with *ln(1 + FAGE)*. This indicates that as firm age, they might decide not to undertake an underwriter for their IPOs. This might be true to a certain extent where older firms have a better understanding of their business and financial risk. Consequently, they may decide to not rely on the underwriter to construct their offerings to the public.

Regression result

Table 6 depicts the results for estimated multiple regression models for identified 3 markets. According to the results in the table, we found that *ln(OS), ln(1 + FAGE), ln(FSIZE),* and *UWA* are significant variables in the model. Moreover, the utilities industry (D_6) dummy is the only statistically significant industry dummy in the multiple regression model. The following section analyzes in detail the regression model based on the three market classifications.

Table 6. Estimated multiple regression model

Short-run market performance	Estimated multiple regression model for the period from January 2011 to December 2015
Primary market	$MAR = 0.939 - 0.176 [ln(OS)] + 0.119 [ln(FSIZE)] + 1.53 [D6]$ 　　　　　　　　(0.002)***　　　(0.010)***　　　　(0.005)*** $N = 211; F = 2.890; Prob. (F) = 0.001; R^2 = 0.138; Adj. R^2 = 0.085$
Secondary market	$MAR = 0.297 - 0.018 [ln(1 + FAGE)] - 0.012 [ln(FSIZE)] - 0.032 [UWA]$ 　　　　　　　　(0.034) **　　　(0.025) **　　　　　　(0.074) * $N = 211; F = 1.938; Prob. (F) = 0.032; R^2 = 0.097; Adj. R^2 = 0.042$
Total market	$MAR = 0.133 - 0.171 [ln(OS)] + 0.095 [ln(FSIZE)] + 1.593 [D6]$ 　　　　　　　　(0.0004)***　　(0.0174)**　　　(0.0007)*** $N = 211; F = 3.615; Prob. (F) = 0.0001; R^2 = 0.167; Adj. R^2 = 0.115$

Note: Negative sign indicates an inverse relationship between explanatory variables and dependent variables whereas the positive sign shows a direct relationship between these. MAR = Market-adjusted abnormal return; ln(OS) = Natural log of offer size; ln(1 + FAGE) = Natural log of firm age; ln(FSIZE) = Natural log of firm size; UWA = Underwriter availability; D6 = Dummy variables for the utilities industry; F = F-statistics; Prob. (F) = Significance level of F-statistics. The figure in brackets indicates the significance levels. * Statistically significant at the 10% level, ** statistically significant at the 5% level, *** statistically significant at the 1% level.

Primary market model

In this model, the primary market abnormal return from issuing date to the beginning of the listing date was calculated. In this calculation, it is considered the first-day beginning price and the offer price. Based on Table 6, except for the utilities industry dummy (D_6) which is significant at the 1% level the only explanatory variables that are significant in the primary market are *ln(OS)* and *ln(FSIZE)*. Moreover, the overall model significance (at the 1% level) shows that the model best fits with the data and we can use it to examine how primary market returns, *PRIMs* (dependent variable) depend on the explanatory variables (independent variables) in the model. Nevertheless, the regression model reported a relatively low adjusted R^2 value. As stated in Perera and Kulendran (2014), this does not mean that the model is misspecified. Moreover, the researchers stated that low R^2 is acceptable if the model only tests a theory or estimates a causal relationship, rather than forecasting trend.

It is a common finding in studies that used economic time-series data to document company-level section time-series data. Previous IPO studies on the Australian market have indicated low R^2 values for their estimated multiple regression model (Dimovski & Brooks, 2004; Perera & Kulendran, 2012; Perera, 2014). The regression model in Table 6 shows that *ln(OS)* is negatively and significantly (at the 1% level) associated with the primary market return. This result indicates that IPOs with lower offer price were more underpriced compared with IPOs at a higher offer price. The size of the IPO offer is a measure of associated risk with the issuing firm. According to Perera (2014), larger IPOs are usually offered by large and well-known companies having a good track record. Thus, a lower financial risk will cause their IPOs to be less underpriced and this is consistent with the expected sign in Table 1.

Apart from *ln(OS), ln(FSIZE)* is also significant at the 1% level. Firm size is positively related to the primary market returns which is not consistent with the expected sign. According to Ljungqvist (2007), the firm size is an indication of the firms' ex-ante uncertainty, the higher the ex-ante uncertainty, the higher level of underpricing because there is a higher level of information asymmetry among the investors. The significant (1% level) utilities industry dummy shows a positive relationship with the primary market abnormal return. As per the primary market return analysis, the utilities industry contributed the highest return of 190% for its initial investors compared to the other industries in the selected sample.

Secondary market model

The secondary market abnormal adjusted returns covered the period on the first day from the beginning to the end and are used in this model. The abnormal returns were calculated using the first-day opening price and closing price. Table 6 shows there are three explanatory variables that are significant in the secondary market: *ln(1 + FAGE), ln(FSIZE),* and *UWA*. Unlike in the primary market model, the industry dummies are not statistically significant at any level in this model. However, the overall mode is significant at the 5% level, showing a significant linear relationship between the secondary market-adjusted abnormal returns and the dependent variables. The R^2 for the secondary market model is poorer than the primary market model.

The secondary market model in Table 6 shows that there is an inverse relationship between underpricing and *ln(1 + FAGE)* and *ln(FSIZE)*. Both firm age and firm size indicate the firm's ex-ante uncertainty. Newer-formed companies and smaller companies experience more uncertainty because they have lower historical and financial information available for investors who want to ascertain their level of riskiness. Behavioural finance theory documents that the investment decision on the financial market is driven by the psychological attitude of investors (He, He, & Wen, 2019). Investors' behaviour was found to be the most prominent determinant in financial market investment decisions (He et al., 2019). Mehmood, Mohd-Rashid, and Ahmad (2020b) suggested that heterogeneity of investors' opinions is more likely to increase the demand for an IPO in response. In another research, Mehmood, Mohd-Rashid, Che-Yahya, and Ong (2020c) suggested that investors' behaviour concerning IPO investment is strongly guided by oversubscription, financial leverage, pricing mechanism, the risk of IPO, and overall political steadiness of the issued country. Neupane, Paudyal, and Thapa (2014) found that retail investors' judgement participates in IPO guided by market sentiment, though, institutional investors' decision dominated by the quality of the firm, even for transparent and non-asymmetric information existing market. As a result, it contributed to higher information asymmetry among

the investors which causes a higher IPO underpricing. This result is consistent with what was reported by Ljungvist (2007).

As per the model, underwriter availability (*UWA*) is also a significant variable and the result indicates a negative relationship between underpricing and underwriter availability. This relationship is statistically significant at the 10% level. Based on this eventuality, we can conclude that if an issue has an underwriter, the IPO will have a lower level of underpricing. This is inconsistent with the expected sign. According to a study conducted by Dimovski et al. (2011) on the Australian IPO market, there is a positive relationship between the level of prestige of underwriters and the level of underpricing, which is mainly due to the reason that highly prestigious underwriters choose only high-quality offerings.

5. CONCLUSION

We find that Australian IPOs are underpriced in the short-run IPO performance and this confirms that IPO underpricing performance in an ongoing process, one that is consistent with the findings from most countries. On the other hand, the secondary market reveals a different result where the security issue is overpriced by 1.5%. This is consistent with Perera (2014) who found that Australian secondary market issues are overpriced by 1.55%. This study concludes that the short-run performance varied based on the industry and listing year. The analysis of the regression model in this study helps to explore how short-run market performance varies based on the market classification.

The analysis of the research confirmed that the Australian IPOs, listed during 2011-2015, were underpriced in the short-run. We have also investigated the causes of IPO under-pricing. Below, we have discussed the findings from short-run market performance and the causes of short-run market performance separately. We find that these are, firstly, the primary and total market Australian IPOs were underpriced in the short-run and confirmed that the IPOs short-run underpricing phenomenon is a widely accepted fact. Secondly, the secondary market analysis suggests that the Australian IPOs were overpriced. Thirdly,

the industry analysis showed that the all-sector IPOs were underpriced in the primary and total market to the varying level of underpricing. The utilities sector underpricing is statistically significant in the primary and total markets at 1% and 10%, respectively. Fourthly and finally, the year analysis revealed that from 2011 to 2015, all IPOs were underpriced in the primary and total markets. The total market IPOs listed in 2014 were statistically significant at the 10% level.

The findings on the causes of the short-run market performance are 1) the main determinants of the short-run market performance in Australia were offer size [*ln(OS)*], firm age [*ln(1 + FAGE)*], firm size [*ln(FSIZE)*] and underwriter availability (*UWA*); 2) the determinants of the short-run market performance varied according to market – primary, secondary or total; 3) the R^2 for the models are significantly low but the result is acceptable for theory testing and determining the acceptable independent variables. Our study makes a good contribution to the literature on the short-run market performance of Australian IPOs. Furthermore, it offers vital information to diverse types of stakeholders including equity investors, security analysts, listed companies, and researchers. One of the limitations of the study is that our study is based only in the Australian context. Hence, to fill that paucity prospective researchers can gather data for a few different country contexts and conduct comparative analyses to identify whether there are key differences from country to country. Furthermore, researchers can expand the period of study and examine the changes of the factors considers in this study.

The listing period, share option, exchange requirements, prospectus language, and market sentiment are considered as the determinants of short-run IPO performance in most of the existing literature. Moreover, they focus mainly on established firms in the market. Furthermore, prospective researchers can expand their target beyond the established firms. Hence, based on the review of the literature and the findings, this study recommends examining the importance of corporate governance structure, management role, and share ownership as a determinant and influences of short-run IPO performance, and encourage further research along this dimension.

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