MISPRICING OF
Australian IPOs

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Much economic analysis has been undertaken on the well-known anomaly of the incidence of high returns on the first day that an initial public offering (IPO) is listed. This study focuses on the Australian market, which is one of the largest markets in the Asia-Pacific region and has several relevant institutional and regulatory features different from the US market.

The price behavior of the Australian IPOs issued during the period from 1995 to 2013 is examined over three event windows. The first period is the return on the first day, which is typically taken as a measure of underpricing. The second period examines the price behaviour from the end of the first day of trading to the end of the 60th day. During this period we see how prices behave over a period in which US IPOs are supported by their underwriters, which is not the case in Australia (Ellis et al. 2000). The third period examines the price behavior from the end of the first day to the end of the 250th day to measure the longer-term performance of IPOs; this has often been found to be negatively correlated with the first-day performance (Ritter and Welch 2002).

We find a significant positive average abnormal return on the first day of trading which continues to grow over the first year of trading. This suggests that the market views the average Australian IPO as being significantly underpriced. However, we also find that the distribution of the abnormal returns is heavily skewed to the right with only 16 per cent of IPOs realising an above-average abnormal return. If we repeat our analysis using median returns, the first-day return is reduced by two-thirds with performance remaining flat over the subsequent 12 months.

Previous studies

There are numerous studies that highlight the high level of underpricing of IPOs in various markets, although the extent of this seems to differ greatly across markets (Engelen and van Essen 2010; Autore et al. 2014). The evidence on underpricing in Australia dates back to the early study by Finn and Higham (1988) who find an average underpricing of 29.2 per cent when examining 93 IPOs over the period from 1966 to 1978. Subsequently, there have been several other studies examining different time periods which identify underpricing that ranges from 16.4 per cent (Lee et al. 1996) to 49.8 per cent (How and Howe 2001). Dimovski and Brooks (2004) find that variation in the extent of underpricing across IPOs is largely explained by market sentiment, earnings per share yield, offer price and whether the IPO is underwritten.

The general finding is that much of the large first-day returns dissipate over the remainder of the first year of listing with Mustow (1994) finding an underperformance of 9 per cent over the remainder of the first year, Lee at al. (1996) finding an underperformance of 13.5 per cent, and Bayley et al. (2006) finding an underperformance of 14.11 per cent.

Our study

Data

The data for the study were obtained from multiple sources. The list and the listing dates of 1,361 Australian IPOs issued during the 1995–2013 period were identified using the Morningstar Global Database. The offer prices of the IPOs were obtained from the IPOs' prospectus available on Thomson One Banker and the Australian Securities Exchange (ASX) websites. We used data from DataStream on the daily adjusted trading prices of the stocks included in our sample and in the ASX All Ordinaries Index, which is used as a benchmark for market performance. After eliminating certain IPOs from our analysis, due to the unavailability of certain data, we were left with a final sample size of 1,095 IPOs.

TABLE 1: Descriptive statistics

	Mean	St. Dev.	Median	Min	Max
Offer Price ($)	0.516	0.781	0.2	0.2	16.5
Gross Proceeds ($m)	36.631	206.54	6	0.002	4,327.4
Age (years)	5.00	11.11	1.42	0.01	120
Assets ($m)	175.4	3,101.3	1.063	0.000001	95,246
Retained Ownership (%)	57.6	19.8	58.0	0	100

Descriptive statistics for the main variables are reported in Table 1. The average age of the companies in our sample is approximately five years which is much less than the 13.6 years for US IPOs reported by Dolvin and Jordan (2008), and the 17.7 years reported for international IPOs in the study undertaken by Engelen and van Essen (2010). The much lower age reported for Australian IPOs reflects the fact that 448 of our sample companies are less than a year old; 344 of these are mining companies. The gross proceeds raised by each of the sample IPOs vary significantly, ranging from $2,000 (Minotaur Exploration Ltd) to $4.3 billion (Arizona Holdings Ltd). The total money raised by the IPOs over our sample period is $39.9 billion with an average offer size of $36.63 million.

The issuing companies retained 57 per cent of the ownership on average with those companies with the highest proportion of retained ownership being in the hotel industry, and those with the lowest proportion being in the financial sector. Only 37.2 per cent of the IPOs in our sample were underwritten, which is in line with the 38.7 per cent reported by Gygax and Ong (2011), with most of the companies using a fixed price offer to go public rather than book building.

The Australian IPO market is dominated by the mining companies (68.58 per cent of the sample) which, on average, are smaller than the non-mining companies both in offer size and total assets. There is a significant difference between the first-day underpricing of the mining companies (average 35.5 per cent) and non-mining companies (average 3.7 per cent).

Method

For each of our three event windows, the raw returns of our sample IPOs are calculated using Equation (1) with their abnormal returns relative to the returns of the All Ordinaries Index being calculated using Equation (2). The first event window measures the level of underpricing calculated from the first-day closing price and the offer price (CAAR$_1$). The second event window measures the price behavior from the first-day closing price to the 60th day closing price (CAAR2, 60). The third event window measures the price behavior from the first-day closing price to the 250th day closing price (CAAR$_{2, 250}$).

$$R_{i,t} = \frac{P_t - P_{t-1}}{P_{t-1}} \tag{1}$$

$$AR_{i,t} = \frac{P_t - P_{t-1}}{P_{t-1}} - \frac{I_t - I_{t-1}}{I_{t-1}} \tag{2}$$

where $R_{i,t}$ is the return of stock 'i' over period 't', P_t is closing price of stock 'i' at time 't' and P_{t-1} is the opening price of stock 'i' at time 't–1'. $AR_{i,t}$, the abnormal returns, is the difference between the return on the stock 'i' over period 't' and the return on the market (All Ordinaries) index. I_t is closing value of the market index at time 't' and I_{t-1} is the opening value of the market index at time 't–1'. The average daily market adjusted abnormal returns (AAR_t) for the sample 'n' at time 'T' are calculated using Equation 3:

$$AAR_t = \frac{1}{n} \left(\sum_{i=1}^{n} AR_{i,t} \right) \tag{3}$$

where AAR_t measures the average abnormal performance on each trading day over the first 250 trading days. The daily cumulative average abnormal returns ($CAAR$) are measured using Equation 4:

$$CAAR_t = CAAR_{t-1}) + AAR_t \qquad (4)$$

The significance of the $CAAR_t$ is ascertained by t-statistics (t_{CAR}) defined in Equation 5, where σ_{CAR} refers to cross-sectional standard deviation of the abnormal returns of 'n' firms at time 't'.

$$t_{CAR} = \frac{CAAR_t}{\sigma_{CAR}/\sqrt{n}} \qquad (5)$$

Findings

The performance of the 1,095 Australian IPOs over each of the three event windows is reported in Table 2. As reported in column 2 of Table 2, the IPOs in our sample are underpriced by 25.51 per cent on average and this first-day return is significant at the 1 per cent level. Thus the underpricing that has been consistently found in studies of Australian IPOs is maintained in our study, with the reported first-day returns well within the range identified in prior studies of Australian IPOs (Lee et al. 1996; Bayley et al. 2006).

TABLE 2: Event study results

|	Mean	Skewness	Wtd. Mean	Median
AAR1 (%)	25.51***	4.77	9.43**	8.62
$CAAR_{2,60}$ (%)	0.61	1.52	0.11	–4.14
$CAAR_{2,250}$ (%)	12.05**	1.06	0.01	3.93

Unlike the findings in many previous studies, the initial run-up in the price on the first day of trading is not reversed over the next year of trading (Bayley et al. 2006). Indeed, we see that the typical IPO outperforms the market by approximately 1 per cent over the next 59 days of trading and by 11 per cent over the remainder of the first year of trading. Hence, we find a slight positive correlation between the first-day returns and those over both the next 59 and 249 trading days.

Overall, our findings suggest that investors do very well both from purchasing IPOs when they are issued, holding them for up to the first year of trading, and also purchasing IPOs after they are listed and holding them for at least the first year of trading.

Figure 1 provides a clearer indication of the price behaviour of the IPOs. Here, we see IPOs continuing to perform well in both their second and third days of trading adding in excess of another 1 per cent. However, over the next month, there is a slight correction with the abnormal returns falling by about 2 per cent. The direction of the performance of the average IPO changes again over the remainder of the first year of trading.

Overall, our findings suggest that investors do very well both from purchasing IPOs when they are issued, holding them for up to the first year of trading, and also purchasing IPOs after they are listed and holding them for at least the first year of trading.

**FIGURE 1: Plot of cumulative average abnormal returns (CAAR$_{1,250}$)**
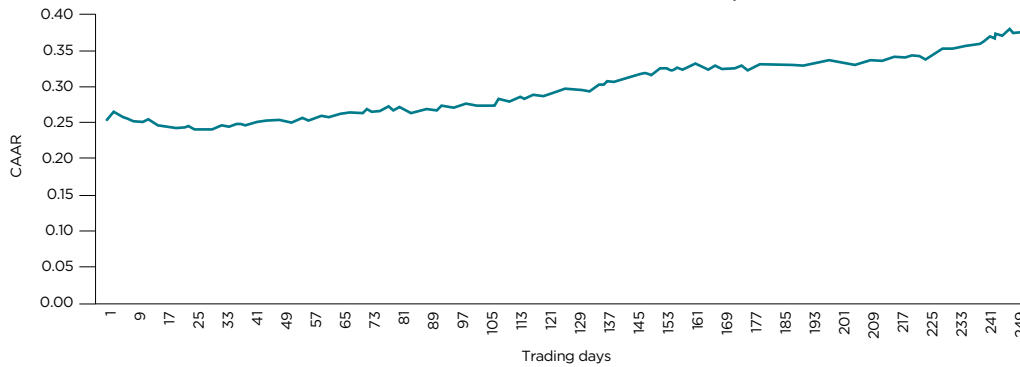
The returns reported in Figure 1 are those that would have been realised from an equal investment in every IPO in our sample. In the fourth column of Table 2, we report the weighted mean which is the return that has been realised on each dollar invested in our sample IPOs. We see that the first-day return as indicated by the weighted mean is 9.43 per cent, which is almost two-thirds less than that indicated by the equally weighted AAR$_1$. The explanation for this significant drop off is that the larger first-day returns are associated with the smaller IPO offerings. Indeed, the CAAR$_1$ for the top quartile of IPOs as measured by the funds raised is 15.93 per cent while that of the bottom quartile is 27.60 per cent. Subsequent to the first day of trading, the weighted means indicate that the returns for the remainder of the first year of trading are almost flat.

One piece of information reported in Table 2 on which we have not commented is the skewness of the CAARs over the three event windows. Where zero indicates no skewness, we see that the CAARs over all of the three event windows are skewed but that this is particularly true for the first-day returns. We see this in Figure 2, which provides a frequency distribution of the CAARs over the three event windows. This brings into question the use of the mean as the measure of central tendency of the first-day returns. Less than one in six IPOs realise an abnormal return of greater than 25.51 per cent (i.e. the mean) on the first day of trading.

The medians are reported in Table 2 for each of the event windows. We see that the median return for the first day of trading is 8.62 per cent which is one-third of the mean and slightly less than the weighted mean. Hence, the level of underpricing of IPOs over our sample period is less than 8.62 per cent in 50 per cent of cases. The median value for the CAAR$_{2,60}$ is –4.14 per cent and for the CAAR$_{2,250}$ is 3.83 per cent. Hence that median abnormal return over the first year of trading is approximately12.5 per cent, which is about one-third of the mean for the same period.

FIGURE 2: Frequency distribution of CAARs
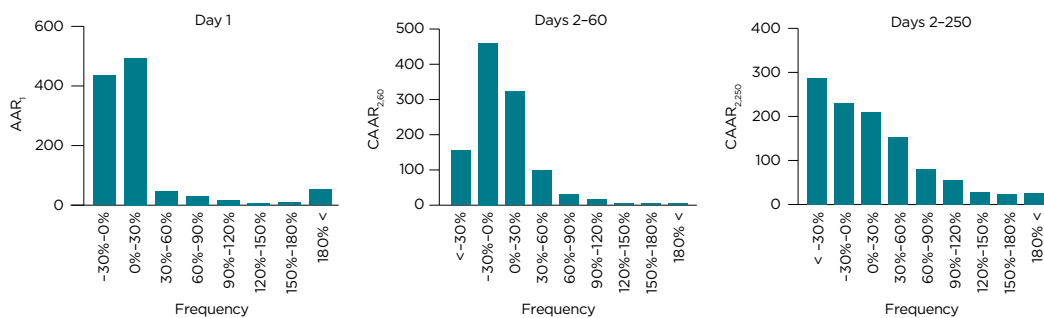
Overall our results suggest that that underpricing of IPOs persists in Australia as the first-day return is not dissipated over the remainder of the first day that the stock is traded. However, we demonstrate that the magnitude of the mispricing is much less than we might be led to believe if we base our assessment solely on the CAARs.

Sub-samples

While the discussion so far has been based on the whole sample we report the performance of important sub-samples in Table 3 to provide further insights into the pricing of IPOs on the Australian market.

TABLE 3: IPO performance by sub-samples

Sub–samples	N	Event Window	Mean (%)	Skewness	Median (%)
Fixed Price	1077	$CAAR_1$	25.50***	4.79	0.86
		$CAAR_{2,60}$	0.44	1.48	–4.23
		$CAAR_{2,250}$	12.36***	1.04	4.32
Book Building	18	$CAAR_1$	26.41	2.66	0.71
		$CAAR_{2,60}$	10.80	2.23	2.92
		$CAAR_{2,250}$	–6.37	1.76	–18.56
Non–underwritten	688	$CAAR_1$	25.60***	4.89	0.94
		$CAAR_{2,60}$	1.42	1.53	–4.51
		$CAAR_{2,250}$	15.88**	1.27	5.10
Underwritten	407	$CAAR_1$	25.37***	4.53	0.63
		$CAAR_{2,60}$	–0.77	1.35	–2.94
		$CAAR_{2,250}$	5.59*	0.31	1.81
Non–mining	344	$CAAR_1$	3.70**	2.57	0.86
		$CAAR_{2,60}$	–1.74	0.72	–2.33
		$CAAR_{2,250}$	7.96*	0.71	2.46
Mining	751	$CAAR_1$	35.51**	3.87	0.86
		$CAAR_{2,60}$	1.68%	1.64	–4.67
		$CAAR_{2,250}$	13.93*	1.17	4.98

Fixed price versus book building

The vast majority of Australian IPOs are issued at a fixed price but the price of many of the larger issues is set after a book building exercise and based on the level of demand elicited particularly from the institutional investors. The underpricing indicated by the first-day returns appears to be fairly similar under both forms of price setting. Again, we find similar results for both fixed price and book building over the longer term with the abnormal return associated with each continuing to rise over the first year of trading. This suggests that there is little difference between the levels of mispricing under each form of price setting.

Again, we see that the CAARs from both types of IPOs are heavily skewed to the right suggesting that the means may overstate the extent of mispricing. The reported medians confirm that this is indeed the case with there even being a suggestion that, in the majority of book-building IPOs, the issue price proves to be higher than the market's view on what the company is worth.

Underwritten versus non-underwritten

The first-day returns on both underwritten and non-underwritten IPOs are very similar. In both cases the abnormal returns over the rest of the first year of trading are positive but they are significantly greater for the non-underwritten issues. Overall, it seems that IPOs are underpriced irrespective of whether or not it is underwritten although the extent of the underpricing is greater in the absence of an underwriter. In both cases, the frequency distributions of the CAARs are heavily right-skewed with this being slightly greater for the non-underwritten issues.

Turning to the medians, we find that the first-day return of the typical IPO is very close to zero. Over the next year, there are slight positive abnormal returns in both instances but these are slightly greater with non-underwritten issues. The conclusion that we draw from the results reported is that the typical IPO is fairly priced with the non-underwritten IPOs perhaps being slightly underpriced.

Mining versus non-mining

About two-thirds of IPOs in our sample are undertaken by relatively small mining companies and we see that the price behaviour of these issues differs from that of the non-mining companies. In the case of the non-mining companies, there is little evidence of underpricing with first-day abnormal returns of about 4 per cent and with slightly negative abnormal returns over the first year of trading. The CAARs are right-skewed and the medians clearly indicate that the typical non-mining IPO is fairly priced. The findings for the mining IPOs are quite different, with initial investors in the typical mining IPO earning a very high first-day return but with the returns being almost flat over the remainder of the first year of trading. The distribution of the first-day returns is heavily right-skewed and a review of the median returns suggests that the typical mining IPO is judged by the market as being fairly priced.

Concluding comments

Based on the average returns across our sample, we find evidence of large underpricing of IPOs consistent with that found in many previous Australian and international studies. We do not find evidence of a large subsequent reversal suggesting that the average Australian IPO is significantly underpriced. However, we also identify that the IPO returns are heavily right-skewed suggesting that the median return might provide a better insight into the pricing behaviour of IPOs.

We find that an analysis of the medians indicates a much lower abnormal return on the first day of trading, which is very similar to that realised on each dollar invested in these new issues. This suggests a much smaller level of underpricing as indicated by price movements on the first day of trading, with little evidence of either positive or negative abnormal returns over the subsequent year.

Based on the average returns across our sample, we find evidence of large underpricing of IPOs consistent with that found in many previous Australian and international studies. We do not find evidence of a large subsequent reversal suggesting that the average Australian IPO is significantly underpriced. However, we also identify that the IPO returns are heavily right-skewed suggesting that the median return might provide a better insight into the pricing behaviour of IPOs.

When we look at subsets of the data, we find little difference in pricing behaviour in the first year of trading between IPOs with fixed pricing, IPOs where the price is set after book-building and those that are underwritten or not underwritten. However, we do find evidence that the underpricing of IPOs is largely restricted to issues made by mining companies with the mining IPOs being reasonably priced.

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